

Jimma University
School of Graduate Study
Jimma Institute of Technology
Civil Engineering Department
Geotechnical Engineering Stream

**Impact of land slide and flood on socio-economic development in DireDawa,
Ethiopia**

A Project submitted to the School of Graduate Study of Jimma University in Partial fulfillment of the requirements for the Degree of Master of Engineering in Civil Engineering (Geotechnical Engineering).

By:
Bekri Shiebre Issa

June, 2017

ACKNOWLEDGEMENT

I would like to express my sincere appreciation and heartfelt thanks to my supervisor Dr. Kifle Woldearegay and advisor Damtew Tsige and Tadesese Abebe who have been a constant source of assistance, encouragement, and support and guiding the right path of my work from the time the study was conceived right up to this completion.

Lastly, I would like to thank my friend Mohammed Abdella gives me secondary data about the different places around the area and constant source of assistance through determination of the goal was achieved.

Contents

Declaration	ii
ACKNOWLEDGEMENT	iii
LIST OF TABLE	vii
LIST OF FIGURE	viii
ABSTRACT	ix
CHAPTER ONE	1
1. GENERAL INTRODUCTION	1
1.1 BACKGROUND INFORMATION	1
1.2. LANDSLIDES AND FLOODING PROFILE IN DERADAWA	2
1.3. THE CURRENT SOCIO-ECONOMIC PROFILE IN AFFECTED AREAS.....	3
CHAPTER TWO	4
2.1 PROBLEM OF STATEMENT.....	4
2.2 OBJECTIVE OF THE RESEARCH	4
2.2.1 GENERAL OBJECTIVE	4
2.2.2 SPECIFIC OBJECTIVES.....	4
2.3. EXPECTED RESULTS.....	4
CHAPTER THREE.....	6
3. PROJRCT METHODOLOGY	6
3.1. Literature research	6
3.2. Field Observation	6
3.3 Field survey/use of questionnaire.....	6
3.4. Interview.....	6

3.5 Visited critical areas and challenges found	8
3.6. Research Design	10
3.7 Geographical Characteristics of Dera Dawa	11
3.8 Flooding impacts.	12
3.9 Some witnesses report.....	12
3.10 Response profile.....	14
3.11 Disaster impacts identification process	15
CHAPTER FOUR:.....	18
CONCLUSION AND RECOMMENDATIONS	18
4.1.CONCLUSION	18
4.2.RECOMMENDATIONS.....	20
REFERENCES.....	22

ACRONYM

DD = dera dawa

NDP=new development policy

GIS = geographical information system

UNEP = united nation educational programs

EHZ = East Hararge Zonal

LIST OF TABLE

Figure 2.1 Land use change map of Dechatu catchment , the year 1985 and 2006	7
Figure 2.2. Inundation map of Dechatu catchment	11
Figure 2.3 photo taken from dechatu river	12
Figure 2.3 photo taken from dechatu river	13
Figure 2.5 Inundation map of Dechatu catchment	15

LIST OF FIGURE

Table 2.1 FIELD VISITED SECTORSS DATA COLLECTION AREAS PRONE TO LAND SLIDE AND FLOODS EVENTS(SECONDARY DATA COLLECTION).....	7
TABLE 2.2 below highlight challenges by each assessed and the follwing items have been noted down such as visited sector,visited cell and villages, Type of Disaster risks found Trigger factor noted , losses identified and proposed coping mechanisms	9

ABSTRACT

This study focused on finding out flood cause factors and the impacts of land slide and flood on the socio-economic sectors of Dire Dawa. To achieve the objectives the study employed trend analysis; secondary data used and take from the goverement office;

Results of the questionery showed that high intensity of rainfall accompanied by severe forest degradation has caused increased flood damage in the impact area. Moreover, he inundation result showed residential areas and business centers experienced the worst socio-economic damages among the different sectors in the city. It has also an enormous impact on the economic foundation of the city due to expenditure for rehabilitation and reconstruction. Absence of early warning system and land-use policy has contributed to the increased impact of the disaster.

Key words; Dire Dawa, Flood, Rainfall intensity, land slide, early warning system

CHAPTER ONE

1. GENERAL INTRODUCTION

1.1 BACKGROUND INFORMATION

Dire Dawa was founded more than a century ago and emerged as a trade and transport center following the establishment of the Ethio-Djibouti railway with the station located in the center of the city, and settlements started birth around the Detchatu River and the railway terminal by both native settlers and Europeans. Kezira and Megala are overpopulated and grid patterned districts with some axis connecting nodal points that facilitate traffic movement and accessibility.

Administratively, Dire Dawa is divided into nine Kebeles, among which one is Melka Jebdu. It is an expansion area to the west of the city with a recorded population of 6,123 inhabitants (CSA 2007) sheltered in 1,229 housing units. Today the population is estimated to be about 13,000.

The Melka Jebdu NDP planning area consists of approximately 164 hectares of land situated between the newly developed railway station, Dire Dawa – Hurso Street, the proposed special economic zones and some established and stable neighborhoods. It is located at 7km west of Dire Dawa city centre and adjacent to Melka Jebdu Settlement. The project site is close to several major institutions, including the Military and Referral Hospital, Gendergie Condominium Village, and Textile Factory, in the range of 2.3 and 4.8 km to the east, two cement factories and the old railway line between the range of 1.7 and 2 km in the south direction, and a proposed international stadium at 2.6 km to the north eastern direction. The Dire Dawa – Hurso Street bordering the NDP site in the south carries considerable amount of through traffic, providing exposure to many passerby people, which is an important and visible part of the community.

Natural hazards like Floods and Landslides can lead to major disasters which hamper the development of the nations and affect many areas in the World. Most of countries around the world, especially Asian and African countries, do not have adequate methodology of estimation of losses due to the occurrence of natural disasters. The information about loss estimation caused by floods of different magnitudes and the loss return period are crucial to develop policies for rational flood and landslide alleviation, based on cost effective measures.

Dire Dawa is one of two chartered cities in Ethiopia (the other being the capital, Dire Dawa). And lies in the eastern part of the nation, on the Dechatu River, at the foot of a ring of cliffs that has been described as "somewhat like a cluster of tea-leaves in the bottom of a slop-basin." With a latitude and longitude of 9°36'N 41°52'E Coordinates: 9°36'N 41°52'E.

It shares borders with East Hararge Zonal (EHZ) administration of Oromia National regional state in the south and south east. Whilst in the north, northeast and west it borders with Shinile Zonal administration of Somali National regional state

Dera Dawa is currently vulnerable to climate change as it is strongly reliant on rain-fed agriculture both for rural and cities livelihoods where we experience emergency situation from flooding and landslides disasters. Dera Dawa is located in equatorial Africa, with shortage of data to produce robust climate projections. Although temperature rise is uncertain while future rainfall patterns are even more uncertain, making it difficult to plan for the future. This is particularly important for agriculture, where crop yields are affected by temperature and rainfall, and planning for future water demands to support the economy. Climate data from Dera Dawa should improve confidence in global climate models and enable better regional modeling, contributing not only to DeraDawa's adaptation planning, but planning in the region.

With recent years, floods and landslides have caused a number of effects on affected population. This study comes to illustrate the induced effects on socio-economic development.

1.2. LANDSLIDES AND FLOODING PROFILE IN DERADAWA

Dire Dawa city is accessible by air, train and road and is about 311 Kilometers to the west of Djibouti port and it is the second largest city in Ethiopia. The climate of Dire Dawa is classified in the semi-arid category. The seasonal rainfall has a bi-modal distribution with its peak in April and August while mean annual rainfall is 657mm and the mean annual temperature is 23.50c and June is the warmest month of the year while December and January are the coldest months of the year.(DD Administration web site 2014).

According to census report of 2007, Dire Dawa City had a total population of 232,854. Out of this; male were 116,000 while the numbers of female were counted for 116,854. (CSA, 2008)

Dire Dawa, the second largest city of Ethiopia, has been suffering from disastrous floods in its

history. The flooding of 6 August, 2006 was unprecedented and caused severe impacts in the city.

Several areas of the country have experienced floods following on-going above normal heavy rains which resulted into landslides in localized areas of the country where steep slopes and mountain valley are presents (*Meteorological Services, 2012*).

The floods affected Dechatu and melka Jebedu following the torrential rains that have impacted the region of East Province. In Muko Sector. Most of the water came from Vally area . They have demolished homes and washed away soils and infrastructures were littered with debris of stones and parts from a broken bridges.

1.3. THE CURRENT SOCIO-ECONOMIC PROFILE IN AFFECTED AREAS

The current socio-economic status of the communities in affected areas is strongly dependent on agricultural and trade activities where 80 Percent of livelihoods are farmers and livestock combined and the rest is living in cities, business centers with various trading. The critical issues is that all agricultural activities are carried out on a fragile land in many localized areas of the country, where most of landslides and flooding fatalities are due to human activities carried out on steep slopes, lack of drainage system and rain water collection, poor soil cohesion etc.

These facts are aggravated by critical rate of population growths which makes pressure on land water and energy resources and climate change impacts all this is associated with a number of other triggering factors. (UNESCO/UNEP, 1988).

CHAPTER TWO

2.1 PROBLEM OF STATEMENT

Basing on current situation of the landslides and flooding cases in DeraDawa, there are so many losses of lives, property damages and environmental degradation in localized areas affected by these hazard events. Having seen that most of households in affected areas are mostly living with agricultural and livestock activities, there is a need to know the effects induced by landslides and flooding events in affected communities that challenged the socio-economic and development of affected livelihoods.

This study has come up with a clear picture of the situation with recommendations and appropriate measures for immediate actions to be implemented by the Government of DeraDawa so as to alleviate all these challenges. After having Identifying all Disaster Higher risk Zones on floods and Landslides, some Districts like Kefira, kebel 5 and Dechatu were found the most vulnerable to both natural disasters and it is in this respect that Dechatu Districts was selected as a case study.

2.2 OBJECTIVE OF THE RESEARCH

2.2.1 GENERAL OBJECTIVE

The main objective of this research is to assess the socio-economic status of the households living in floods and landslide prone areas and come up with project to address the number of issues identified.

2.2.2 SPECIFIC OBJECTIVES

1. To assess the impacts of floods and Landslides on socio-economic development of households in the prone areas,
2. To analyze the intensity of vulnerabilities within flooding and landslides in affected areas.
3. To evaluate the losses caused by floods and landslides in the prone areas,
4. To propose possible mitigation and preventive measures and immediate action to withstand these events.

2.3. EXPECTED RESULTS

The following are expected Results when the research on the socio-economic impacts of floods and Landslides is well conducted:

1. All the challenges originated from floods and Landslides which impacts on the socio economic of livelihoods in restricted areas of study will be identified.

2. The project will propose a number of recommendations and immediate Actions to support the community affected and ways of addressing socio-economic challenges to improve their wellbeing
3. The Disaster risk reduction mechanisms will be strengthened to avoid or reduce the impacts of other Natural Disasters that could happen in future.
4. The technical studies aimed at finding durable solutions from the challenges originated from natural Disasters will be proposed to save lives and environmental rehabilitation.

CHAPTER THREE

3. PROJRCT METHODOLOGY

To carry out this research, a number of methods and techniques have been used:

3.1. Literature research

In order to have historical and back ground information related to floods and landslides in districts of study, some existing published materials have been read. These include government official documents, different reports, electronic publications, visited links, thesis and memoirs. Other publications have been consulted and used as model in methodology and research design. All of the publications have been read are in-text referenced and all of them are found in reference list.

3.2. Field Observation

Where the observation did not demand other analysis, the information will be noted and its analysis should be done either immediately or later. Observation will be used to view events on the field in the study area. The photos will be taken as evidence from the fields.

3.3 Field survey/use of questionnaire.

Questionnaire will be directly administered to the respondents chosen from the heads of households, the group of interest to get the information on socio-economic and development of affected livelihoods. Ten Sectors of DeraDawa District the most vulnerable to these Disasters will be assessed and data collected will be scrutinized to eliminate duplications.

3.4. Interview

Surveying using interviews will be the main source of data. This method has been selected because the research questions pursue understanding of land users' actions and human activities and it also helped to gain the interviewee trust. Two types of interview will be used including structured and semi-structured. Interviews were useful in order to clarify a number of issues in the questionnaire and to make the results of this study more reliable.

a) Interviews

To collect primary data, interviews will be used in different areas. And this will ensure the accuracy and the completeness of collected information.

b) Focus group discussion

Focus groups will be organized will be organized to gather data on effects caused by floods and landslides. These will be composed by groups of 10-12 people living in the selected areas.

Other techniques such as the use of GPS and GIS treatment to analyze the collected data, snow ball, etc will be combined to ensure the reliability of corrected data

Table 1 Table 2.1 FIELD VISITED SECTORSS DATA COLLECTION AREAS PRONE TO LAND SLIDE AND FLOODS EVENTS(SECONDARY DATA COLLECTION).

Study area	villages
Melka Jebdu	Kebele 01, Goladen, Gedenser, Adiga Felema, Hulla Aselisso, Gende Rige
Addis ketema	Kebele 04, 05, 06, Harlla Belinna, Legeaneni, L/Mirga
sabian	Sabian 02, 03
legehara	Kebeles 07, 08, 09

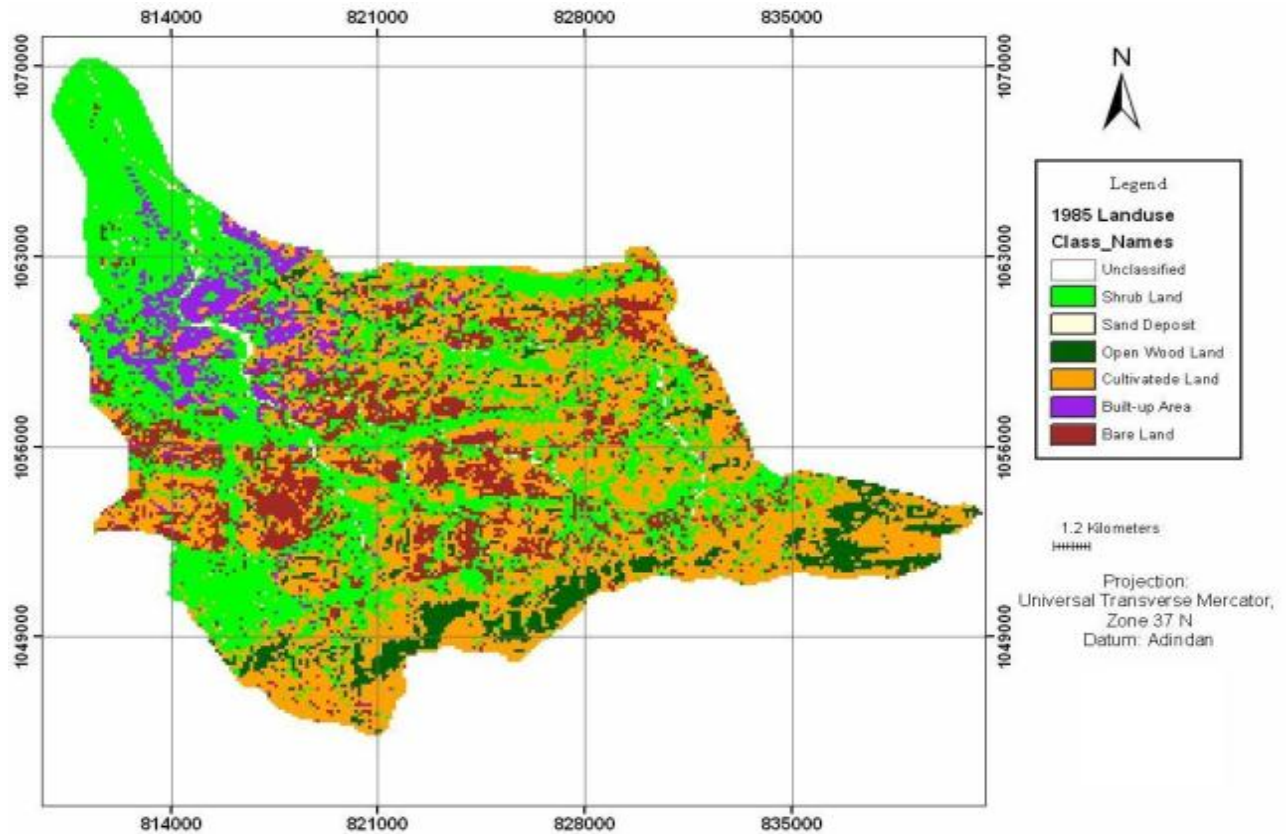


Figure 2.1 Land use change map of Dechatu catchment , the year 1985 and 2006

3.5 Visited critical areas and challenges found

Most of the sectors visited in DeraDawa District were basically affected one another by flooding and Landslides and every sector depending on its geographical aspects and the types of existing vulnerabilities. Among these sectors, Dechatu sector is the most vulnerable to floods and mudflows. The water channels originated from heavy rain

These include Kefira, Amesetegna, deneggo vally, highschool, and Finally Dechatu Sector get a lot of challenges from these channels because all water channels from this high mountains meet in this sector. That is the raison why this sector is the mostly affected than others, Recall that the Main river channels

Table 2 TABLE 2.2 below highlight challenges by each assessed and the following items have been noted down such as visited sector, visited cell and villages, Type of Disaster risks found Trigger factor noted, losses identified and proposed coping mechanisms

Sector	Cell and Villages the most affected	Type of Disaster risks found	Triggering Factor	Losses identified in affected areas	Proposed coping mechanisms
Legehare	Kebeles 07, 08, 09, Beke Halo & Leg/Lehare	-Soil eroded -Mudflow events in place Households near the water channel	-Heavy rain -Rain water channels, -Drainage system low, -Lack of anti-erosive ditches and plantations, -Lack of protected gabions with iron filings in water channels. electricity poles damage	Soil eroded, - environmental degradation), -Floods and landslides affected many households. . -Landslides affected roads, and streets. - Several Tones of soil eroded and environmental degradation along the rain water channel	-Improve settlement -Improve the building structures that can survive these events, and respect the building codes. -Use of protected Gabions to reduce the water speed from Volcanoes, -Increase of number of community cooperatives, Promoting the vocational schools).
Addis Ketema	Kebele 04, 05, 06, Harlla Belinna, Legeaneni, L/Mirga	Soil eroded -Mudflow events in place, -Vally water channel in place. -Houses near the vally water channels damages and destroys .	Drainage system low, -Lack of rain water collection on many houses -Lack of anti-erosive ditches and plantations, -Lack of protected gabions with iron filings in water channels -electricity poles damage	-many Houses damaged -market places destroyed. -Environmental degradation in Villages. -many households relocated in three villages -briges cracks and failed	-Improve settlement policy. -Use of protected Gabions to reduce the water speed from Volcanoes -Improve the building structures that can survive these events, and respect the building codes -Increase of number of community cooperatives, Promoting the vocational schools .

Melka Jebdu	Kebele 01, Goladen, Gedenser, Adiga Felema, Hulla Aselisso, Gende Rige	-Landslide event in place, - Community houses on steep slopes (Steep slopes Between 20-40 and over 40% of slopes. -Poor farming methods-- Lack of rain water collection	-Heavy rain - Low Drainage system -Lack of anti-erosive ditches and plantations on slopes, -Lack of rain water collection on many community houses and infrastructure - -Lack of anti-erosive ditches and plantations,	-many houses destroyed other damaged such as one bridge river, one Nursery school and cell office destroyed, electricity poles damage, due to electrical poles cooled down. -Environmental degradation noted. - Farmland declined. -Landslides affected roads, crop yields, building and Infrastructure. - Soil eroded in cooling water from slopes	Improve settlement policy. -Use of protected Gabions to reduce the water speed from Volcanoes -Improve the building structures that can survive these events, and respect the building codes -Increase of number of community cooperatives, Promoting the vocational schools

3.6. Research Design

The research is initiated with a literature review in relation to the objective. The review is carried out with the purpose of establishing a theoretical framework to more fully understand the concept of floods, landslides and the principles and criteria used to assess the vulnerability in the prone areas.

Phase one is the development of the research proposal which includes the formulation of research objectives and associated research questions. The pre-field work phase focused on developing criteria for identifying prone areas on floods and landslides. In the third phase, the data collected in the prone areas were analyzed against the intended goals. The process of the research approach is illustrated in the following chapter.

DATA ANALYSIS

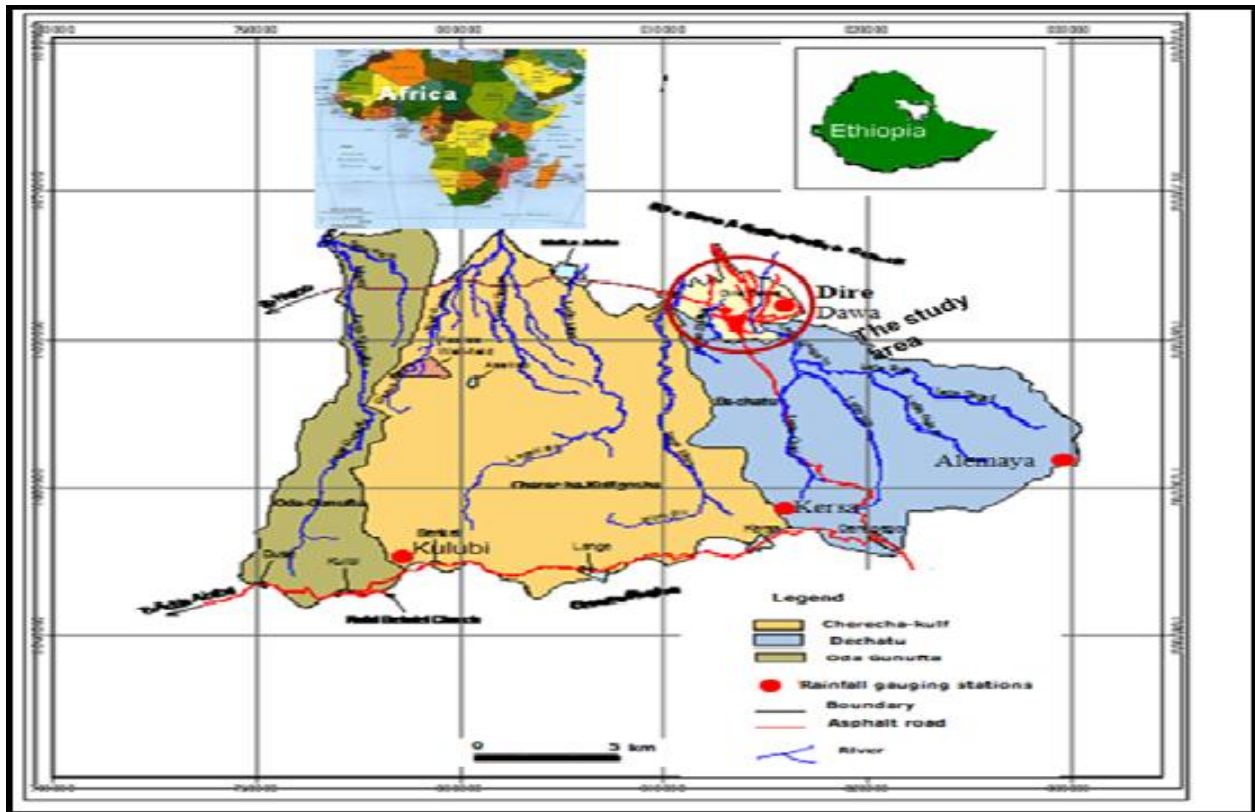


Figure 1 Figure 2.2. Inundation map of Dechatu catchment

3.7 Geographical Characteristics of Dera Dawa

DeraDawa located at the foot hills of eastern *Harerge*

highlands, has been repeatedly hit by powerful flood disasters. Floods at different time have destroyed homes, public institutions, market places with their properties, infrastructures, crops in the field, livestock. In Dire Dawa, flood in August 1981 which killed about many people was previously considered as the worst in the town’s history. However, the unprecedented August 6, 2006 flooding was worst of all cases; it surpassed all flood disasters that occurred in the past in loss of human life, and property damages.

Dera Dawa as a land of many hills is characterized by hilly topography covering mountains of steep, medium and low slopes. It has Valleys and wetlands where various and rivers are embedded. District experience the regular and sometimes heavy rainfall pattern over the year. This situation dictates the types of disasters that strike the areas including Floods and landslides in localized sectors of the

District. The scenario of the events is that rainwater from heavy rain that usually strikes., soil erosion and impacts on livelihoods of the community living near the rain water channels.

3.8 Flooding impacts.

Floods ravaged DERA DAWA AROUND ASHEWA



Figure 2 Figure 2.3 photo taken from dechatu river

Soil erosion from the heavy rain water creating wide channels destroyed the agricultural farmlands

3.9 Some witnesses report.

Ruinous floods emanating from the neighboring Dengego Mountains left scores of residents of Deradawa homeless and crops destroyed as unpredictable floods continue to hit the Sector of dechatu area ;Sectors affected include many kebelas . The Ministry of Disaster Management and Refugees Affairs dispatched a team to join forces with local authorities, police and RDF personnel to assess the extent of the damage and possible interventions.

“The floods have destroyed everything I possessed. The whole area has been cleared of crops we had just planted,” Kedir Aba mecha , a farmer from Melka Area said “It is going to be a hard time to survive because everything we have washed away.” The surging water from Dengego and near area Mountain, changed its normal course and flooded the water channels in sectors which had not experienced floods for decades.



Figure 3 Figure 2.3 photo taken from dechatu river



Figure 2.4 photo taken from Melka Jebedu farming area

impacts on the socio-economic profile of community livelihoods living in District sectors prone areas.

According to the current socio-economic situation, the Agriculture and trade is the lifeblood of the District. At least many of the population is engaged in agriculture and trade. Many hectares of land has been prepared for planting chats.

The flooding cases that happened in the above listed sectors of deradawa low land area impacted heavily on the socio-economic profile of the community in place. The agricultural sector has been the mostly affected than others.

The landslides impacted heavily the community from these sectors and it is usually due to the geographical characteristics of region where the said sectors are located Dechatu and Sebategna regions are characterized by hilly topography covering steep slopes beyond 40% , the types of soil characterized by the weak soil cohesion and community houses

established on this fragile soil. Therefore it is obvious that heavy rain will cause landslides events depending on the number of vulnerabilities sited above. The DENGEGO area which come the third to be affected by landslides and floods and is characterized with hilly topography and is among the sectors adjacent to the vally.

According to the analyzed data from respondents in all over the Region assessed, the level of preparedness is still very low. People are not well prepared to withstand with the natural disasters and more trainings are needed to prepare community on how to behave during and after a disaster and the goverement Ministry in collaboration of local authorities have to play a big role in these above mentioned activities.

3.10 Response profile

The response capacity is low in all over the region assessed comparing to the number of households affected. The sectors adjacent to the Dchatu mostly affected by flooding and landslides sourced from heavy rain striking from the mountain , water from there created big water channels that impacted on community. Fewer affected communities accessed on intervention relief items but others are still waiting three months ago.

Dechatu region was the most affected among others because all these water channels from the channel meet in this sector before getting the Dechatu River. The Soil eroded, community displaced, bridges collapsed and houses damaged, environmental degradation and many others are the main socio-economic challenges triggering the community .

While the sebatgn is threatened by the Goro River that created big flooding in the channel, Marmarsa village where the researchers identified many hactar of land flooded, various crop yields damaged. In The response in the two vulnerable area is still low comparing the number of households affected.

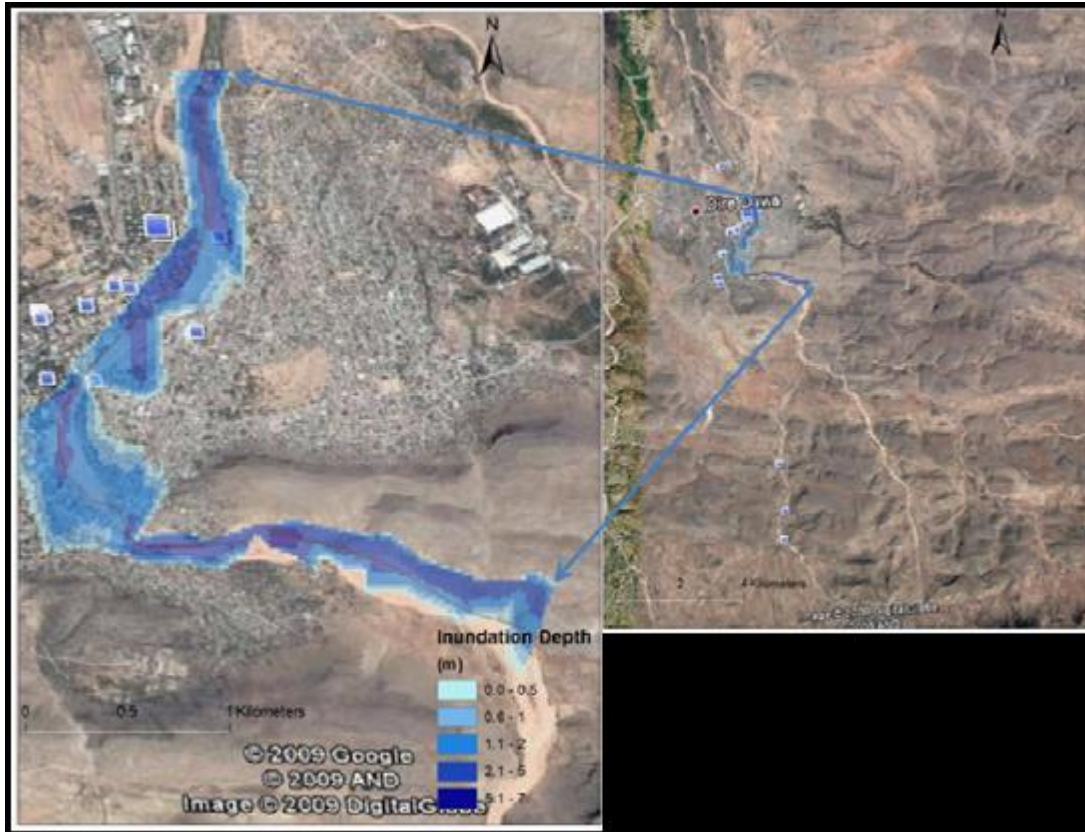


Figure 4 Figure 2.5 Inundation map of Dechatu catchment

3.11 Disaster impacts identification process

Disaster impacts identification involves the process of describing the hazard in its local context and provides a description and historical background of potential environmental hazards that could impact the community. This process results in a clarification of a set of damages .

The 2006 flood has inflicted severe direct and indirect damages on social; infrastructure and economic sectors of Dire Dawa. It caused the death of 256 people, 244 missing and 15,000 people displaced from their dwellings. Number of fatalities was large because floods hit the city in the middle of the night while people were in deep sleep and absence of early warning system that alerts the residents before the flood hit the city. Of the total fatalities, the proportions of women fatalities were 134 as compared to 83 men fatalities; and the remaining 39 fatalities were children. This is mainly due to the fact that most affected Kebele (05) is center for small scale business where women are most involved and residing in the area.

Flood in 2006 also severely damaged infrastructure and housing sector. In the housing section, a total of 1628 houses were totally and partially damaged with a total value of 10.23 million USD. The total sum of direct and indirect damages on agriculture and trade and industry sector

including cost of demolition and removal of debris was about 2.6 million USD. and indirect disaster impacts occurred in agriculture; trade & industry; and infrastructural sector

in the 2006 flooding as per the result of ECLAC calculation was 14.9 million USD. The housing sector is the most severely affected sector in the 2006 flooding in Dire Dawa.

Originated from the events, the magnitude that may pose a threat to the human, built, or natural environments. Comprehensive historic data on all hazards are critical in understanding what hazards have impacted a community in the past and their likelihood for the future. The flooding and landslide impact identification process was implemented using questionnaire to collect useful information best to our research. Among the sectors that were assessed, Dechatu is the mostly vulnerable to floods originated rain water from valleys. The GORO was the second to be affected by flooding and it is quite originated from river flooding of Goro River that takes its source in Area. The river has affected around many ha of agricultural crops, 4 houses collapsed while 20 houses are strongly affected on maramarsa area. These events created the big losses of sandy soil that has been eroded, agricultural crops collapsed, community displaced and many other challenges due to these events and many of them are suffering from poverty and food insecurity. Thus measuring the impacts of disasters requires getting on the ground, knowing the type of hazards, how vulnerable the community is in the natural hazard, what are the losses. This process will involve an examination of past disasters and the potential for future disasters within the community and the useful tool to collect past hazard information is using a sound questionnaire. We stress that even an insignificant hazard could trigger a much larger secondary hazard. It should be noted that hazards are part of our lives, and all communities face hazards of many types. disasters have natural, economic, and human impacts including loss of lives, destruction of homes, businesses and critical infrastructures and damage to sensitive natural areas such as wetlands or water bodies etc.

Disasters result from the interface between natural, the built, and human systems. Clarifying the nature and extent of this interface allows us to determine where the interactions are constructive and when loss or damage might result. Our capacity to minimize adverse effects of disasters depends on our human adaptation to natural events, including our building codes, land use regulation, and the design of our critical infrastructure. Our resiliency or capacity to withstand or to recover from a disaster is influenced by human adaptive actions.

Therefore, we must examine our natural, human, economic and constructed systems to fully understand what actions may be taken to reduce our vulnerability and enhance our resilience to natural hazards. Fundamental to this process is an identification of the hazards that face our

communities and organizations. Hazard identification clarifies natural and human-caused events that threaten a community. This process results in information that reveals a community's capacity to deal with a disaster. It provides an opportunity to identify the physical characteristics of buildings, the social characteristics of community and local response capabilities. Hazard identification may be directly used in preparedness activities by clarifying hazard zones for response, but Doyle et al. (1998) note that it can be used for establishing setbacks and zoning classifications. The comprehensive identification of hazards can support hazard risk management policies and programs and determine benefits of alternative policies to reduce the vulnerability.

Landslides are various types of gravitational mass movements of the Earth's surface that pose the Earth-system risk; they are triggered by earthquakes, rainfall, volcanic eruptions and human activities. Landslides cause many deaths and injuries and great economic loss to society by destroying buildings, roads, life lines and other infrastructures; they also pose irrecoverable damage to our cultural and natural heritage. Landslides are multiple hazards, involving typhoons/hurricanes, earthquakes, and volcanic eruptions, and sometimes causing tsunamis. Landslide disaster reduction requires cooperation of a wide variety of natural, social, and cultural sciences (*Kyoji Sassa et.al. 2005*).

CHAPTER FOUR:

CONCLUSION AND RECOMMENDATIONS

4.1.CONCLUSION

First and foremost the impacts of floods in the field visited sectors of nine kebele has been respectively pronounced in the table. It is in this respect that the interventions with the relief items to support the community affected is paramount in these affected communities. The need to assist them in Disaster risk reduction at their places should not be neglected. Most of the interventions received by affected community were basically oriented to the community works from the neighboring households supported by the local community leaders. The existing community works has nothing to do with the rain water channels created by heavy rain from the mountains unless there is the technical study to channeling the rainwater from volcanoes. The following sectors of Dechatu area were found to be mostly affected by landslides; these are kefir, Ashewa and addis ketema. Most of households affected by Landslides in these areas are experiencing the following challenges such as houses collapsed, others damaged, Bridges crakes, roads and street slided. Some of livestock around the region while environmental degradation is causing a set of challenges. Another challenge found in most of the field visited sectors is the lack of rain water collection in all over the community houses and Infrastructures. Normally we identified the gaps between the local leaders and the community where the newest and oldest houses are the mostly characterized by lack of rain water collection and this vulnerability increase the landslides and floods risks when a natural hazard like heavy rain strike the area. The current situation presents gaps in terms of lack of rain water collection procedures, reason why there is a need for a comprehensive coordination and implementation of government policies. Local leaders are invited to monitor regularly the implementation of the government plans by the community through sensitize them about the settlement policies and the way forwards.

In General the research on the impacts of floods and Landslides on socio-economic and development was conducted in restricted areas of study. Most of challenges identified were basically oriented to agriculture and livestock. Recall that in our early pages we pinpointed the socio-economic and development style of the community in assessed areas, was based on agriculture and Livestock farming and livestock. The agriculture is carried out on the land that has a set of vulnerabilities including the hilly topography that covers the steep slopes of over 40% others between 20-40%, community houses in located in steep mountain areas, where gravity is pronounced, Weak soil

cohesion, the lack of rain water collection, rapid population growth, environmental degradation, use of poor farming techniques on these fragile slopes, and many others, are the sources of landslides cases. All these challenges regarded as vulnerabilities will be combined with the natural hazard to result into landslides disasters.

Flooding has been also another Disaster that impacted on socio-economic style in the field visited sectors and the mostly affected sectors include those adjacent to Dengego vally. The number of challenges identified during our research process was as follows. Communities located in low land , the lack of drainage systems in different visited wetland, the lack of protected gabions with iron filings in the rain water channels to reduce the speed of the rainwater from the area, environmental degradation, the lack of rainwater collection and many others. These existing vulnerabilities have accelerated the flooding risk when the natural hazard especially the heavy rain stroked the area. Other challenges that accelerate the landslides and floods cases are the climate change and rapid population growths.

The climate change is regarded as the changes experienced in our modern climate and is specifically due to human activities such as deforestation, destruction of critical ecosystems that impacts on critical biodiversity, burning the fossil fuel for energy purposes. These challenges will at the end result into disasters when the natural hazards strike the area. The rapid population growth will cause the over exploitation of natural resources, and strong pressure will be exerted .

- The increasing intensity of rainfall accompanied by forest resource degradation particularly in the upland areas of the catchment has potentially caused floods in the Dire Dawa city.
- The increased extent of the 2006 flood disaster was partly caused by lack of early warning system that could awaken the community to evacuate to safer places before the flood hit the city.
- Ethiopia lacks a comprehensive land-use policy which gave way to increased forestland degradation and this in turn contributed to increased occurrence of flood disaster in downstream areas
- The 2006 flood impact on the socio-economic sector of Dire Dawa was worst that the extent of its impact is incomparable with other flood disasters occurred in the flooding history of Dire Dawa city. Total direct and indirect impacts of flood disaster in all sectors are about 15 million USD.on land, water, food and energy resources and when a natural hazard strike the areas characterized by these issues it results into natural Disaster.

4.2.RECOMMENDATIONS

The following are recommendations based on the research on the Impacts of floods and Landslides on socio-economic and development in the restricted areas of study:

1. The local authorities and the community itself are requested to improve the settlement policy and its implementation.
2. The technical study related to searching ways of channeling the rainwater from the heavy rain that occurred in the Vally and created big water channels which impacted on soil erosion and environmental degradation. This technical study will be carried out in the sectors adjacent to the Area.
3. The use of protected gabions with the iron filings is recommended in all over the water channels to stop the speed of the rain water from vally that created a number of big water channels.
4. The relocation of the households near the big water channels is recommended to avoid the deaths and injuries that could be originated from the rain water coming from Vallys.
5. Rehabilitate the existing big rain water channels from the Vally and this will be done in selecting the number of plantations such as zenbaba(palm oil) to stabilize and recover the rain water channels.
6. The rain water collection on the houses is recommended in all over the visited sectors to turn the challenges originated from the rainwater into an opportunity. This should be a responsibility of the local community leaders to conduct the regular inspection as well as the sensitization of the Government plans and Policies.
7. The Drainage System of Dechatu river is recommended to find solutions of that threatening river which caused flooding of housesband crop yields from the community having lost their property in these flooding cases of river.
8. Quick response with food items and seeds is recommended to the affected communities
9. The government and myore is suggested to conduct regular monitoring of the use of various interventions and response of relief items to support the affected community

10. the wake up call is needed some of the community were asleep while others are providing some local warnings of the incidents. The trainings of Sector Disaster Management committee are needed to strengthen their capacity in managing disasters.

11. The Ministry of Disaster Management and Refugee Affairs is recommended to hire the Districts Disaster Management Officers in all over the all kebele of the country to support the District in the regular monitoring of Disaster risk reduction activities and the said officers will be part of the staff because this staff is in the chart of the District structure.

12. The Governrnt and the city municipal needs to increase the strategic stores of relief items in all over the District of the country to support timely the vulnerable from Disasters.

13. During our research process a number of communities were found built their houses, and Infrastructures over the area..

REFERENCES

1. Bishaw B., 2001, Deforestation and Land Degradation on the Ethiopian Highlands: A Strategy for Physical Recovery. Michigan, USA.
2. Calder, Ian R., 1999, *The Blue Revolution, Land-use and Integrated Water Resources Management*. London: Earthscan publications Ltd.) ECLAC, 2003, Handbook for Estimating the Socio-economic and Environmental Effects of
3. Disasters. <http://siteresources.worldbank.org/INTDISMGMT/Resources/intro.pdf>
- UNDP, 2007, Climate Change and Human Development in Africa: Assessing the Risks and Vulnerability of climate Change in Kenya, Malawi, and Ethiopia, Intergovernmental Authority on Development, Climate Prediction Center.
- USDA, 1986, Urban hydrology for small watersheds, TR 55. Natural resources conservation service, U.S.A.
4. DM Policy revised, MIDIMAR 2012
5. RRC report, 24 May 2012
6. Climate change and Disaster risk Reduction, Geneva, September 2008
7. Rwanda Atlas of our changing Environment, REMA, 2011.
8. National Strategy for Climate Change and Low Carbon Development (RCSCCLCD), MINIRENA, 2011.
9. Mainstreaming Disaster risk Reduction into Development: Challenges and Experience in the Philippines, Charlotte Benson, 2009.
10. EAC climate change Master plan, Working Paper I, March 2010.
11. MDGs Towards sustainable Development AND Economic Growth, country report 2007.
12. Hazard Mapping and Vulnerability Assessment, PASCO Corporation Japan, August 2002.