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Resilience through Enhanced Adaptation Action-learning, and Partnership (REAAP)

Indigenous Knowledge and Practices Assessment Report, November 2015

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Activity Overview

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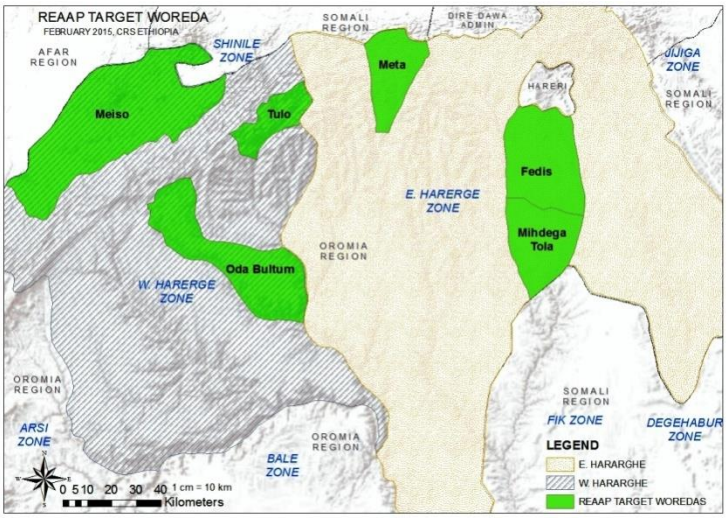

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With gratitude,

Yonis Berkele

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1 Executive summary

Following the drought crisis of 2011 in the Horn of Africa, the Intergovernmental Authority for Development (IGAD) called for a regional effort to end drought emergencies through drought-based disaster resiliency and sustainability initiatives that foster disaster preparedness, early warning and, most importantly-- preventive and risk reduction measures including adaptation to climate change. A major step in this process is to understand the coping mechanisms of people affected by disasters and subsequent changes that affect their livelihoods. Acknowledgement and utilization of existing local/traditional/indigenous knowledge, is therefore a valuable means towards this end.

Accordingly, CRS/Ethiopia initiated a project entitled "Resilience through Enhanced Adaptation, Action-learning, and Partnership (REAAP)". REAAP is a three-year activity USAID-funded activity. It is implemented in six drought-prone and food insecure Woredas (Fedis, Midhega Tola and Meta) of East Hararghe Zone and (Mieso, Oda Bultum and Tullo) of West Hararghe Zone of Oromia Regional State. It is implemented through a consortium of three organizations, Ethiopian Catholic Church-Social and Development Coordination Office of Harar (ECC-SDCOH), Handicap International (HI) and Cordaid.

The program is designed to sustainably increase the resilience of targeted communities and reduce their long term vulnerability to current and future climate change and climate-related shocks and stresses, by making use of local indigenous knowledge as an important resource. .REAAP strengthens linkages and learning through a focus on Community Managed Disaster Risk Reduction (CM-DRR): a process that catalyzes community learning and action by highlighting linkages and inter-dependencies among livelihoods, food security, nutrition and natural resource management as well as by creating community disaster risk reduction (DRR) action plans.

The main purpose of the study is to assess and identify existing indigenous knowledge and practices on weather and climate change forecast, as well as coping and adaptation mechanisms. This study assesses the extent to which communities observe changes in climate and associated impacts, and what mechanisms they use to cope with these changes. In light of this objective, information on local indicators for predicting climate was collected from all surveyed communities. Similarly, the extent to which these community-based indicators supported rural livelihoods were assessed together with potential threats to these knowledge systems.

The assessment showed that the level of awareness among communities about climate change and their indigenous knowledge for climate change adaptation vary. While about 54% of respondents said it is God's curse, 38% of respondents mentioned cutting of trees (over exploitation of natural resources) as a major cause. Few (about 8%) said it is both exploitation of natural resources and God's curse. It is also important to note that FGD participants and individuals interviewed during household sample survey attributed climate change to religious reasons, saying "God is unhappy with our sins and these changes in seasons and weather are signs of punishment".

The communities in the study area recognize drought as one of the major hazards induced by climate

change, and as a cause for severe loss of crop produce, water and pasture for livestock. Spread of crop pests and diseases, such as, rusts and stalk borer is the other destroyer of crop production. Other major hazards are floods to which many families are exposed to during the main rainy season between July and August. This is because intensive deforestation of the surrounding hills has made the kills barren and without flood protection structures. Devastation of crops by Army worms and locust outbreaks every three or four years, as the weather favors them is another hazard that affects agriculture crop production.

Community groups most affected by drought are old people who have no support; households with big family members, children and women headed HHs and people with disabilities. During drought years, women and girls have more work to do. In addition to preparing food for the family and fetching water from far distance and collecting fire wood, they have to locate, cut, and bring back grasses from distant areas for calves and other weak livestock, often going to places where cattle cannot reach. In short, women bear the brunt of the drought's challenges.

As a coping mechanism, communities plant short maturing crops like cabbages, sweet potatoes and haricot beans, in order to fill the food gap. For livestock, they collect dried leaves of sorghum and store it for dry the season when feeds are scarce. When the stored feed is all used up, livestock are sent to places where they can find water and pasture. This system is locally called 'Bulcha' which means moving livestock to the place where they can get water and pasture.

Livestock sale is another coping strategy used by HHs who own livestock. However, as the effects of drought continue year after year causing shortage of water and pasture, the number of HHs who depends on sell of livestock as a copying strategy is decreasing from year to year. This situation has forced HHs who used to have large livestock to reduce their livestock to only a number that could be used to save the family at a time of food shortages.

Communities have their own indigenous knowledge based indicators developed over long term experiences by observing various changes that occurs in their surrounding environment (behaviors of plants, animals, birds, insects and human beings),to predict and cope with climate change, droughts and floods.

In addition to traditional knowledge, communities also follow up the weather forecast by the Ethiopian National Metrology Agency (ENMA). However, despite a wider listening and awareness of the weather forecasts given by the ENMA, most farmers do not use the information to plan their activities based on the weather forecast. The major reason behind this is that they find it to be less reliable and too general to fit the needs of the specific communities. This makes the application of indigenous knowledge in weather prediction very relevant to the rural farmer.

In order to benefit from both traditional weather prediction and modern scientific weather forecast, it is very important to pay due attention to the traditional indicators and use them side by side with modern, scientific ones by setting up mechanisms such as the ones suggested below:

- Establish or use *Kebele* DRR committees that are inclusive of gender and persons with disability (PWDs)
- Establish a mobile information network that connects ENMA with DAs, DRR facilitators and DRR committee leaders to transmit daily and seasonal weather forecast to DAs/DRR facilitators and DRR committees, uninterruptedly through mobile SMS system
- Let these committee and DAs/DRR Facilitators:
    - Gather knowledgeable people among the community and collect their seasonal weather prediction and record;;
    - Similarly collect meteorological information from ENMA and record;
    - Check both records against what really happened at the end of the season;
    - Analyze similarity and differences between the two systems; and
    - Summarize the applicable and useful ones and return back to the community for validation.

There is a need for in-depth studies over extended period to fully understand and benefit of indigenous knowledge, to validate and incorporate them into scientific knowledge systems in order to devise effective adaptation strategies. Weather forecasts from ENMA could also be tailored to the needs of farmers by using validated indigenous knowledge for effective coping and adaptation.

The report is organized into five chapters. A description of each chapter is as follows:

Chapter 1: Describes the introduction, purpose, scope, challenges and limitations, and structure of the report

Chapter 2: Lays out the process of the study, including methodologies and corresponding tools and techniques used to capture field findings.

Chapter 3: Discusses detail findings of the study area's geographic, agro-climatic features and hazard profiles. It also delineate the conceptual framework of perception of climate change, climate change induced hazards, causes and its effects, coping practices, indigenous knowledge on weather forecasts and contains the awareness level of meteorological agency weather forecast and its application.

Chapter 4: Discusses similarities and differences as well as integration of indigenous and scientific knowledge.

Chapter 5: covers conclusion and recommendation, and

Annex: contains references, list of acronyms, contacted persons, list of kebeles, Woreda location map and etc**.**

2 Introduction

Drought and climate issues constantly challenge both communities and governments in the Horn of Africa, including Ethiopia. The drought crisis of 2011, combined with the effects of conflict and displacement, has renewed calls for what the Intergovernmental Authority on Development (IGAD) has termed a region-wide end to drought emergencies through a drought disaster resiliency and sustainability initiatives that are innovative in addressing disaster preparedness, early warning and, most

importantly, preventive and risk reduction measures (Roberts and Hulufo, 2014)[1]. An important component of addressing such risks and increasing the resilience of communities is relying on their local knowledge (Shaw *et al.* 2014)[2]. Globally, the Hyogo Framework for Action (2005-2015) has acknowledged "traditional and indigenous knowledge and cultural heritage" as one source of "knowledge, innovation and education to build a culture of safety and resilience at all levels". It is, however, only in recent years that local and indigenous knowledge (LINK) has received increasing attention by both scientists and practitioners. In the aftermath of the 2004 Indian Ocean earthquake and tsunami, knowledge that helped indigenous communities to survive the disaster was widely publicized.

According to Shaw *et al.* (2008), the four primary arguments for including local and indigenous knowledge in disaster risk reduction policies are:

- Indigenous knowledge can be transferred and adapted to other communities in similar situations;
- Incorporating indigenous knowledge encourages community participation and empowers communities in reducing disaster risk;
- Indigenous knowledge can provide invaluable information about the local context; and
- The non-formal means of disseminating indigenous knowledge can serve as a model for education about disaster risk reduction.

A growing number of projects that tackle climate change adaptation and resilience to shocks are emerging globally. Such climate change adaptation projects are helpful in demonstrating the scope of climate change impact and measures that make vulnerable groups more resilient to shocks and stresses. Some development agencies have attempted to expand disaster risk reduction, which deals with current variability in climate, into the development work of their partners. Taking into account community's vulnerability to climate change impacts and their coping strategies through community based processes is a vital step towards enhancing a community's resilience to climate related shocks. This is widely regarded as the foundation on which resilience to longer-term shocks and stresses are built. However, there is limited experience to date in combining measures that manage and reduce present-day risks but are suitably flexible and robust to cope with an uncertain climate in the future.

2.1 Brief description of REAAP

CRS/Ethiopia is a lead implementing agency for the "Resilience through Enhanced Adaptation, Action-learning, and Partnership (REAAP)" activity. REAAP is a three-year USAID-funded activity implemented in six drought-prone and food insecure Woredas: Fedis, Midhega Tola and Meta of East Hararghe Zone and Mieso, Oda Bultum and Tullo of West Hararghe Zone of Oromia Regional State. It is implemented through a consortium of three members (ECC-SDCOH, HI and Cordaid).

[1]Angela Raven-Roberts and Hassan Hulufo *January 2014.* Regional Assessment of Community Managed Disaster Risk Reduction (CMDRR) in Ethiopia, Kenya and Uganda

[2]Shaw, R., N. Uy, and J. Baumwoll (eds.). 2008. *Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learnt from Asia-Pacific Region.* Bangkok: UNISDRAsia and the Pacific

The program is designed to sustainably increase the resilience and reduce the long term vulnerability of targeted communities to current and future climate change and climate-related shocks and stresses. It strengthens linkages and learning through a focus on Community Managed Disaster Risk Reduction (CM-DRR) process, which will enhance community learning and action by highlighting the link and inter-dependencies among livelihoods, food security, nutrition, and natural resource management and by creating community disaster risk reduction (DRR) action plans.

With this overall purpose, CRS and its consortium members' work to achieve the following three intermediate results (IRs) described below:

IR 1: Communities have improved access to technical information and analytical tools for decision making.

IR 2: Communities identify and implement actions that increase resilience to climate variability, long-term climate change and climate-related shocks.

IR3: Systems for planning, implementation, monitoring and evaluation around DRR and climate change adaptation are established and strengthened through working with government and stakeholders.

2.2 Purpose and scope of the study

The main purpose of the study (see Annex – 4) is to assess and identify existing indigenous knowledge and practices in forecasting weather and climate change, and to understand how the communities cope with and adapt to climate change.

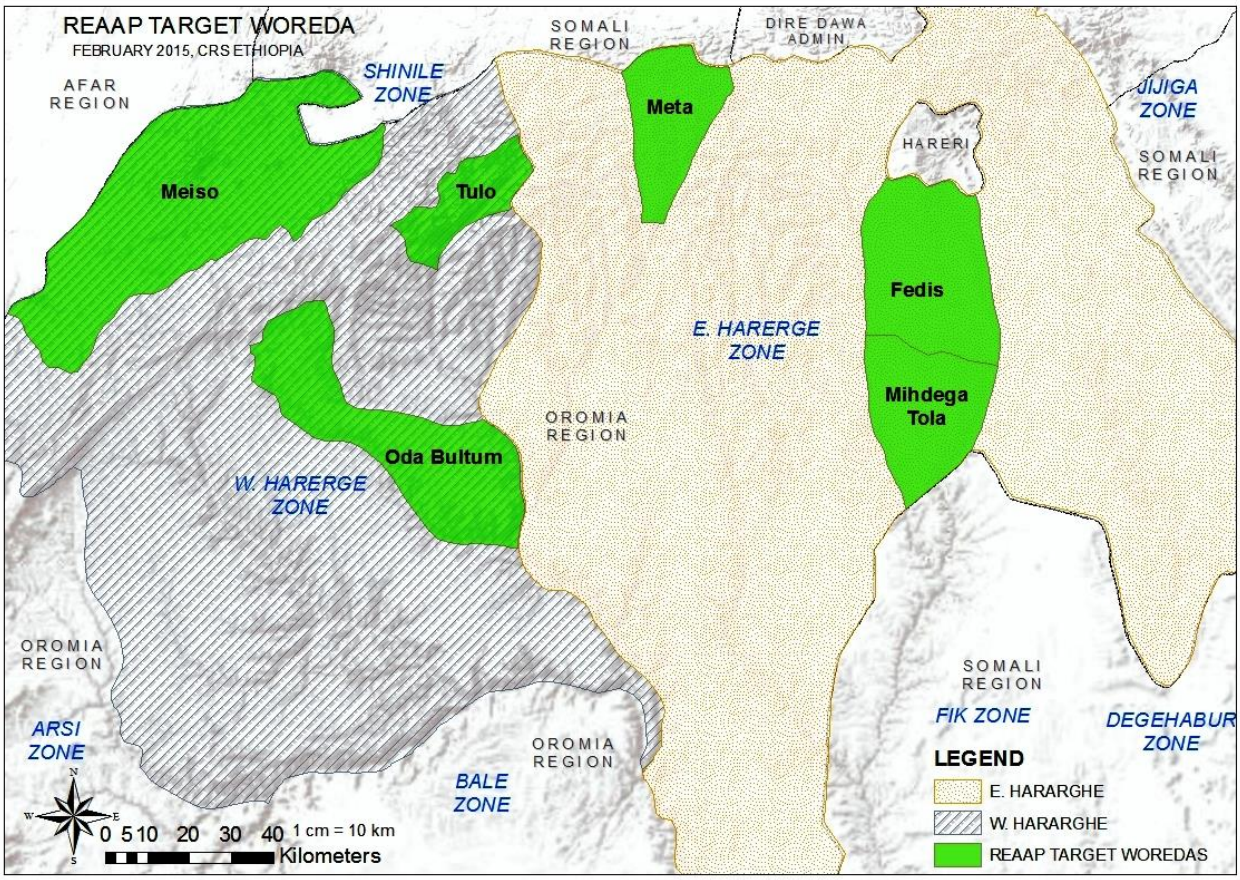
Specific objectives of the assessment are:

1. Explore communities' perception on climate change and its impact on their livelihoods.
2. Identify communities' adaptive/coping strategies in response to the impacts of climate change.
3. Document communities' existing indigenous knowledge and practices,, indicators and early warning signals used to predict weather.
4. Recommend practical approaches that enhance communities' disaster risk reduction to climate change impacts.

A team of consultants assessed and took stock of existing indigenous knowledge, cultural beliefs and practices used to manage the environment, monitor the weather, and enhance resilience to external shocks and climate change in each of the study areas. They explored similarities and differences between indigenous knowledge and scientific knowledge, in order to find out how to integrate indigenous knowledge into scientific knowledge so as to augment communities' disaster risk reduction and climate change adaptation capacities. The assessment covered 18 *Kebeles* of six drought-prone *Woredas* of East (Fedis, Midhega Tola and Meta) and West (Tullo, Meiso, and Oda Bultum) Hararghe zones.

2.3 Description of Study Area

REAAP works in 100 *kebeles* in six of the most vulnerable *Woredas* across East and West Hararghe, reaching 475,000 people through their representative DRR committees. The Indigenous Knowledge and Practice Assessment covered 18 *kebeles* drawn from each *Woreda*.



Map of REAAP Intervention Woredas

East and West Hararghe Zones are two of eighteen administrative zones of Oromia National Regional State located in the eastern part of the country. West Hararghe has fourteen *Woreda*s, its main town is Chiro (325 km East to Addis Ababa), and its total area is 17,635 km² with an estimated population of 2,051,521. West Hararghe has three agro-ecological zones; it is 52%lowland (Kolla), 38%mid-highland (Weyna Dega)and 10%highland (Dega). The lowland experiences moisture stresses compared to the other two agro-ecologies. The highlands and mid-highlands have high population compared to the lowlands, and they are prone to soil erosion that lead to land degradation. Theaverage annual temperature varies from 25 to 32 degree centigrade.

Similarly, East Hararghe has nineteen *Woreda*s; its main town is Harar (526km East of Addis Ababa);its total area is 22,623 km² with an estimated population of 3,304,532 which 94% are living in rural areas and the remaining 6% are urban dwellers. East Hararghe is divided into three climatic zones including *Dega, Weyna-Dega* and *Kola* representing 8%, 24% and 68% of the total area of the zone, respectively. The average annual temperature varies from 17 to 30 degree centigrade.

The two zones have similar seasonal rain patterns and the impacts of climate change are also similar. The rainfall distribution is bi-modal: the first season is known as "belg" and, under regular conditions, it starts in mid-February and finishes at the end of April. The main, long rainy season known as "Meher/Kirmit" in both zones begins, in a normal year, in mid-June and ends towards the beginning of October. The rain fall in both zones is highly variable and erratic, following changes in climatic conditions that create risk of drought is the main climate hazard that causes a major challenge to rural communities. Recurring drought due to the unreliable and inadequate distribution of rainfall in turn causes repeated crop failure and unsustainable crop and livestock production.

The mismanagement or misuse of natural resources (e.g., deforestation and the destruction of natural vegetation cover, soil erosion, and land degradation) aggravates the disaster and accelerate livelihood deterioration.

2.4 Methodology of the Study

The assessment employed both qualitative and quantitative methods to explore existing indigenous knowledge, cultural beliefs and practices concerning the weather, climate prediction and resilience to external shocks and climate change; as well as how these impacts on the livelihoods of the communities in the study areas. Specific methods and tools used for this study are outlined below.

2.5 Secondary data consultation

The Assessment involved reviewing of available literatures on indigenous knowledge on weather forecast, climate change adaptation and its impacts on their livelihoods, their vulnerability and coping mechanisms. The socio-economic situation of the target communities (such as, geographic, agro-climatic characteristics and livelihood situation of rural population, disaster profile) was gathered from relevant literature and pertinent *Woreda* Offices during field visit and key informants interview at *Woreda* level.

2.6 Key Informant Interview

Key Informant Interviews (KIIs) were conducted with *Woreda* government officials drawn from Agriculture, Food Security Desk and *Woreda* Administration, Women and Children Affairs, and Social Labor Affairs Offices. Moreover, representatives/individuals from research centers including Fedis, Mieso and Melkassa as well as Haramaya University were interviewed based on the guiding questions developed for this purpose. In addition, KIIs at *Kebele*/community level were conducted with Development Agents (DA), *Kebele* leaders and knowledgeable religious and traditional elders.

2.7 Focus Group Discussion

Focus Group Discussions (FGDs) were conducted to assess perception of communities on climate change, frequency and types of hazard occurrence in their localities, seasonal activities in communities, historical trends and seasonal changes overtime and their copying strategies, existence and application of indigenous knowledge on predicting weather, awareness of national meteorological service, access to weather information and their application.

A total of three FGD (one women group, men group and mixed group) were organized at each 18 *Kebeles* of study *Woredas*. Inclusion of PWDs and FHHs were considered during the survey. Overall, a total of 54 FGDs (3 X 18) were conducted. Each group consisted of 8 -12 participants. Participants of the FGD were selected by project staff and local partners. The information obtained from FGDwas used for triangulation to ensure consistency of the information provided by various sources.

2.8 Household sample survey

Household sample survey was conducted in all 18 target *Kebeles* of six Woredas in both East and West Hararghe Zones to collect primary information on households' perception of climate change, type of climate hazards they face, impacts of the disaster and their climate hazard coping strategies.

Lot Quality Assurance Sampling (LQAS) was applied as a key method to determine the sample size. Household survey sampling units (interviewees/households) were selected by employing Systematic Random Sampling Method to ensure that the random selection of sampling units cover all areas within the lot. In LQAS method, 19 sampling units were selected from each lot (SA), as minima to conduct the assessment. We considered selected *Woredas* as Supervision Area (SA) and *Kebeles* as lots. Hence, we had 6 SAs and 18 lots. Under each SA (i.e. survey *Woredas*) we have three lots. Our sample size in each lot is 19. Hence, a sample size of [3 kebeles (lots)] X [19 (ample size from each lot)], i.e, 57 households from each *Woreda* (SA) were selected. In other words, 18 *Kebeles* (lots) were selected from six Woredas (SAs), and [19 X 18] = 342 sampling units (households) were selected from the study area for household sample survey.

2.9 Challenges and limitation

Indeed the field staff of ECC-SDCOH and Development Agents of Agriculture office did a superb job in getting access to community members and organizing the meetings. However, it was difficult to have the required size and combination of the participants in the Focus Group Discussions, particularly in inclusion of people with disabilities (PWDs) and female headed households (FHH).

Another challenging is the timing of the study: the fieldwork took place at a time where election campaigns were being conducted and political sensitivity was high. Hence, socialization with communities and trust building took a much longer time in comparison to surveys at other times.

In some places, there were many people with rich indigenous knowledge, including astronomy; but they refrained from sharing their knowledge because they were afraid of religious peer pressure, social condemnation and labeling as 'fortune tellers' which is cursed by religion. In order to address this problem, the researchers split the participants in groups, in an effort to make the discussants fully participate and generate ideas without any fear/suspicion.

2.10 Data entry, cleaning and analysis

The collected data was checked, cleaned and entered into two different Excel spreadsheets and checked

for missing, duplicate and/or outliers through excel double entry validation program. Then the validated data were entered and analyzed using Statistical Package for Social Science (SPSS) computer program. As this study is both quantitative and qualitative in nature, data collected was edited from time to time for accuracy, completeness, uniformity and consistency. After data entry, the dataset was checked once more to minimize any typos on SPSS by Data Entry Validation System.

3 Detailed findings and discussion

3.1 Demographic characteristics of sample households

This section discusses the characteristics of surveyed sample households. Data on sex, age of heads of households, family size, level of education attended by household heads,, and livelihood situation are described hereunder.

In all the six Woredas, the proportion of male heads of households is far larger than that of female. Male heads of households account for 80%, while female accounts only for 20% of the total sample households. The proportion of female heads is largest in Fedis, Mieso and Tullo *Woredas* (accounting for 30%) while Midhega Tola and Meta have lowest number of female headed households (that is, 10%) and Oda Bultum accounted for 20%.

Table1: Proportion of female and male in the sample survey areas.

Sex	Woreda												Total		Average	
	Fedis		Meta		Mieso		Midhaga Tola		Oda Bultum		Tullo					
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Female	15	30	5	10	18	30	5	10	12	20	18	30	73	20	12	21
Male	42	70	52	90	39	70	52	90	45	80	39	70	269	80	45	79
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100	342	100

3.2 Age of heads of households

More than 50% (179 individuals) of head of households interviewed were between ages 50 to 69. About 39% (134 individuals) of head of households interviewed were in the age category of 35 to 49. About 8% of (29 individuals) heads of households were 70 years old and above. The following table presents detail age category of respondents of each Woreda.

Table 2: Age of head of households in years.

Age Category of Household Heads	Woreda												Total	
	Fedis		Meta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
35 to less than 50	22	39	20	35	28	49	29	51	22	39	13	23	134	39
50 to less than 70	28	49	36	63	23	40	25	44	31	54	36	63	179	52
70 and above	7	12	1	2	6	11	3	5	4	7	8	14	29	8
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

3.3 Family size of sample households

The family size of sample households in six Woredas indicates that about 60% (202 households out of 342) have a household size of 6 to 10 members, with the highest proportion (67%) registered in Meta *Woreda*. 33% (113) of the households in the target areas have a family size of 5 or less, while about 8% (27 households) registered a family size of 11 and above.

Table 3: Family Size of Households (in number) by Woreda.

Household Size	Woreda												Total	
	Fedis		Meta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
5 and less	20	35	19	33	18	32	21	37	12	21	23	40	113	33
6 to 10	33	58	38	67	31	54	32	56	34	60	34	60	202	59
11 and more	4	7	0	0	8	14	4	7	11	19	0	0	27	8
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

3.4 Level of education attended by heads of households

Over 65% of the heads of households are illiterate in the survey *Woredas*. Heads of households who attended secondary school and above are only 6 persons (about 1% of interview respondents). About 22% (74 individuals) can read and write, while 10% (35 individuals) had attended primary school. The following table summarizes the level of education attained by heads of households in the sample survey of each six *Woredas*.

Table 4: Level of education attended by head of households.

Level of Education	Woreda												Total	
	Fedis		Meta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Illiterate	41	72	32	56	50	88	36	63	33	58	35	61	227	66
Read/write	12	21	19	33	5	9	15	26	14	25	9	16	74	22
Primary school	4	7	4	7	2	4	4	7	10	18	11	19	35	10
Secondary school	0	0	2	4	0	0	1	2	0	0	2	4	5	1
Above secondary school	0	0	0	0	0	0	1	2	0	0	0	0	1	0
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

3.5 Livelihood profile households

Regarding sources of livelihood, 80% of the households interviewed earned their livelihood from crop farming. Only 6% depended mainly on livestock production while 8% depended on both crop farming and livestock production. This does not indicate that sources of livelihoods are mutually exclusive, as almost all households farmers also keep livestock to support their livelihood and as assets for emergencies.

Table 5: Households sources of livelihood.

Major Sources of Livelihood	Woreda												Total	
	Fedis		Meta		Mieso		Mihdega Tola		Oda Bultum		Tullo			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Crop farming	50	88	52	91	26	46	50	88	55	96	53	93	286	84
Livestock production /pastoral/	5	9	5	9	6	11	4	7	0	0	1	2	21	6
Mixed (Both Crop farming & Livestock)	1	2	0	0	23	40	1	2	0	0	1	2	26	8
Daily labour, petty trade & other off-farming activities	1	0	0	0	2	0	2	2	2	0	2	0	9	0
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

3.6 Household landholding and land use

The overall landholding is considered low and about 71% of households have less than one hectare of land. About 11% of households have a land size of 1 -2 hectares while about 17% have land holding of 2 and above hectares. The largest land size was observed in Mieso (39 out of 57 HHs sampled in the Woreda and 11% from the total) followed by Midhega Tola (14 out of 57 HHs sampled in the Woreda and 4% from the total). About 86% (80 out of 93) households who have land size of one hectare and above are in Mieso and Midhega Tola. Regarding productivity of the land, about 64% said their land is poor in terms of productivity. In addition, about 82% of households have rain-fed land out of which the largest number of households (55 out of 57)in Fedis *Woreda* depend on rain while largest number of households (18 out of 57) in Tullo Woreda have both rain-fed and irrigable land. The following table details landholding of surveyed sample households.

Table 6: Household land holding.

Land Size of HHs in Hectare	Woreda												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
No land	1	2	0	0	1	2	0	0	2	4	1	2	5	1
Less than 1 hectare	47	82	57	100	7	12	26	46	52	91	55	96	244	71
1 hectare to less than 2 hectare	6	11	0	0	10	18	17	30	2	4	1	2	36	11
2 hectare and Above	3	5	0	0	39	68	14	25	1	2	0	0	57	17
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

3.7 Perception on Climate Change

A number of questions related to climate changes (see FGD Questionnaire)were asked in all FGDs as well as in the interviews in order to understand people's views about the notion of climate change. The following table summarizes responses of sample households on cause of climate change.

Table 7: Household perception about climate change.

Cause of Climate Change	Woreda												Total	
	Fedis		Meta		Mieso		Midhega Tola		Oda Bultum		Tullo			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Allah (God's) curse	29	51	31	54	30	53	30	53	36	63	29	51	185	54
over exploitation of natural resources	20	35	19	33	26	46	24	42	19	33	21	37	129	38
Allah (God's) curse and over exploitation of natural resources	8	14	7	12	1	2	3	5	2	4	7	12	28	8
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

In almost all FGDs, it was reported that, there has been a change of the environment in the course of their lives. The most common answer mentioned was destruction of forest, disappearance of wild life, degradation of grazing land and drying of water sources. Some of the major reasons mentioned by the discussants for the environmental changes included cutting of trees for housing, fuel wood, expansion of farms that is related to population growth. They also indicated that trees and forests attract rainfall. In terms of degradation of pasture, they said over-population and over-grazing coupled with reduction of grazing land are major causes.

Regarding God's curse as a cause for climate change, FGDs at Weltahi *Kebele* of Tullo Woreda said:*"We*

dumped away our culture of respecting and listening to one another, particularly elders. We do not love and help each other as we used to do in the past, we do not pray together as our forefathers used to do. So, God cursed us for our wrong doings". They also mentioned cutting of trees and destruction of forests as a cause to the climatic change observed. Climate change is, therefore, not only seen as an over exploitation of natural resources, but also as a punishment from God for hatred and selfishness of this generation.

3.8 Major hazards, causes and consequences

Drought (in the form of untimely and/or shortage of rainfall) is described as a major consequence of climate change. Drought coupled with high deforestation and land degradation is the main reason for crop damage, lack of water and pasture for livestock. Crop pests and diseases, such as, rusts and stalk borer are also another major cause of failure in crop production. Other major hazards are floods to which many families are exposed during the long rainy seasons in the months of July and August. Intensive deforestation of the surrounding hills which leave the land barren and without flood protection structures contribute to regular flooding these people experience. Devastation of crops by Army worms and locust outbreak whenever favored by climate conditions, every three or four years is another factor affecting agriculture and pasture land production.

Recurrent drought has been depleting the already scarce resources of the rural people. The most serious drought that affected Fedis, Mieso and Meta Woreda rural community was about 16 years ago. As a result of the drought at that time, there was complete crop damage/loss and large number of livestock died. Many human lives were also lost due to starvation. Community members were forced to migrate to neighboring Woredas and Hursso Military Camp hoping to get leftovers.

Frequency and severity of drought has increased in the last decades. For instance, drought took place only. Once every ten years between 1984 and 1994. However, it occurred after 5 years in 1999; and it has been happening almost every two years thereafter.

Describing the severity of the drought and livelihood disintegration, one female participant at Ifa Biftu Kebele of Meta Woreda recalled the incident as follows:

> "There were many who died, I remember a woman died in my neighborhood. On the day we had to bury her dead body, there was a call from the government to collect food aid. Can you imagine? We all went to get the food leaving behind a dead body that we traditionally ought to give priority to burying. That woman was buried the next day; drought and hunger have pushed us that far. There were many children who died, there were many families who migrated to other areas, there were women who were found dead on road sides while going to market to sale firewood. I myself lost a daughter and I have not cried for my daughter because I was so weak to cry, death was so common we did not cry for our dead".

The discussants recalled that year the saying from the host communities they migrated to:"Fadisoo miilaTayyaaraa, duutu eenyutu si awwaala", which means"You fast moving guys from Fedis, who will

bury you if you die here" As noted by one of the discussants this is how climate change destroyed the dignity or respect of hard working people.
Drought was not the only problem people in rural areas of Midhega Tola and Mieso Woredas were facing. They had regular conflicts with a neighboring Woreda in the Somali Regional State. Focus group discussion participants and key informants however, noted that, new territorial demarcation between Oromia and Somali Regions on a referendum conducted, have relatively reduced the tension between the two Woredas, although it still remains a concern in the minds of the community. Despite the destructive nature of conflicts, discussions with community members put drought, and then hunger, as the top two risks in the *Woreda*. As one FGD participant in Mudhi Bali Kebele put it, "Waraanni fiigi fi dheesii qaba, garaan garuu fiigii fi dheesii hin-qabu" (War can be run from or left behind but one cannot run away from hunger).

Group discussants at Weltane Kebele of Meiso Woreda attested that, many of their villages have been invaded and occupied by Somalis and had changed their original names... Hence, Meiso rural communities who participated in the discussions and key informants interviews perceived that, the impact of climate change is twofold::only had erratic rainfall increased competition over diminishing resources, but in combination with boundary issues, it also contributed to conflict among the main clans in the area, which remain unsolved to date.

The studied communities asserted that all of the above mentioned hazards are induced by change of Menzil or flake (climate change). It is portrayed as change of rainfall pattern, explained by respondents as follows, "The rain starts late, is intermittent in the middle of the season and ceases earlier at critical time when crops are flowering or setting seeds- resulting in poor crop yield, which means loss of income and hunger. Further, high yielding fruits and crops such as peaches, banana, coffee and pumpkin are near extinction because of the changing weather sometimes unexpected intensive rains occur, causing heavy flood damages. The FGD participants in Meta Woreda explained the situation as "The once cool weather is now changed into a hot one. Temperature is increasing, deforestation, soil degradation, shortages of grazing lands and water is becoming serious problem for our community".

The main consequences of recurrent drought, crop pest and livestock disease were severe and caused crop failures and loss of livestock, which affected rural people's livelihoods. Crop pest and diseases affecting crop production every year are: Striga - A weed known as "Benth, Scrophulariaceae" by its scientific name affecting sorghum; Parthenium, stalk borer, aphids (affecting Sorghum and maize) and Downey mildew (affecting maize). Groundnuts are also susceptible to fungal diseases. Livestock diseases are also other challenge. The major diseases affecting this sector are Pasteurellosis (affects cattle and goats), anthrax and internal and external parasites that affect all type of livestock every year. These crop and livestock diseases have made the population less and less resilient and more vulnerable even to minor shocks. As a result, quite a large part of the population reliant on external food aid for survival. Community groups most affected by drought are old people who have no support, households with big family members, small children, as well as female headed households. Women are significantly disadvantaged give priority to their family/children and divide the available food between children and the elderly first and eat after them, only if there's any food left. They are also the ones that go in search

of food, water and fire wood in addition to taking care of others. In times of drought, have to travel further to collect water, animal feed, and food for their families in order to compensate for all the shortages in these resources brought about by droughts. Therefore, in addition to taking care of their families, they have to locate, cut, and bring back grasses from distant areas for calves and other weak livestock, often going to places where cattle cannot reach. In short, women bear the brunt of the drought's challenges more than men.

3.9 Traditional coping strategies

During the year, most HHs in the six *Woredas* faces food shortage during long rainy season starting from the end of June to early September. Communities plant short maturing crops like cabbages, sweet potatoes and haricot beans, so as to fill the food gap. In addition, they use inter-cropping of early maturing plants, such as Maize, Sorghum and Chat as a common mitigation action and coping strategy.

For livestock feed, communities collect crop residues, thinning (locally known as "Chinki"), mainly of sorghum and maize stalk (locally known as "kera"), and household waste. As an additional feed, mineral soil salt (locally known as "Haya") is used by the farmers to keep their livestock. When the stored feed is all used up, communities in Midhega Tola, Fedis, Meiso and part of Tulo Woredas send their livestock to places where they can find water and pasture, usually to nearby valleys (in case of Midhega Tola, Fedis and Oda Bultum) and forest areas in case of Meiso. This system is locally called 'Bulcha' which means moving livestock to the place where they can stay temporarily for water and pasture. It is young men with arms (guns) who take the livestock for "Bulcha". If the young man who goes for Bulcha is married and does not have children, it is common that they take their young wives with them. However, communities in Meta, Tulo and part of Oda Bultum (Highland Woredas), who usually own smaller number of livestock do not practice "Bulcha", according to HH survey results, HH that own between 1 to 4 cattle are 60% in Meta, 60% in Tulo and 70% in Oda Bultum. Rather, they try to save their livestock by collecting plants which are not usually fed to such as euphorbia (Hadamii) off of which they burn the tiny thorns to feed the leaves to the cattle.

Traditionally, communities in study Woredas use different coping strategies during severe drought years. Borrowing food in kind, for immediate HH consumption and seed from neighbors or close relatives is one of the most commonly used strategies. The other coping strategy is through gifts from relatively better-off (richer) members of the community to drought affected households. However, such practice is phasing out as these rich people themselves are affected by recurrent droughts, making them unable to help others.

Desperate HHs however, go as far as to eating wild foods such as, 'tini – fruit of Euphorbia plant', and 'mererie", a wild weed plant. These plants are not normally eaten by people or animals. They are drought tolerant, thus, they are found around villages, farms, in gullies and in and around forests/bush lands. However, it is common that, when people starve they go and find them wherever the plants are.

Praying to God and believing and hoping for his help not only strengthened the morals of affected communities but strengthen their social cohesion and held together in the faces of drought. Supporting each other is considered one of the strongest coping strategies communities have. They pray together, under big trees called "Hujuba", asking God to forgive their sins and to have mercy over them by

helping them to be stronger to withstand problems they face and to ask for better rains in the coming season.

In addition, in some areas like "Agudora Kebele" in Fedis Woreda, there is a celebrated family called 'Agebar', who are believed to bring through their prayer. Contributions "Gumata" are made by the community members to cover cost of sacrifice and "Bercha – Chat ceremony" to this family. The role of the communities is to work on the family's farms while the family prays for rain. The discussants said that community members used to believe that they would get rain immediately after the prayer of this celebrated family; but they noted that this practice is now abandoned due to religious awareness as well as the disappearance of this family.

Depending on local predictions and advice from National Meteorology Agency, communities basically prepare early maturing and drought resistant seeds; in case the normal seeded farms are hit by drought and fail. The survey findings indicate that HHs who plan their agricultural activities based on the weather forecast by ENMA are 30% in Fedis, 30% in Meta, 40% in Meiso, 30% in Midhega Tola, 40% in Oda Bultum and 30% in Tulo Woredas. On average, 30% of the HHs in the survey plan their activities based on the weather forecast from the ENMA.

Households who have assets in the form of livestock, sale part of their livestock and other properties as a draught coping mechanism, while others are engaged in petty trading, charcoal making and selling of 'Kerewella' – (rafter poles or logs of juniper or other tree specious in Meta Woreda) for construction. Selling of firewood is also used as an alternative coping strategy. Others make use of social capital and cooperation to engage in joint labor, as well as oxen and pack animals sharing. Borrowing cash or crop in kind is also a common coping strategy of HHs in the area. Strategies like petty trading and sell of firewood are mostly strategies used by women while temporary employment, charcoal making and sale of wooden pole for construction are strategies used by men.

One increasingly emerging coping mechanism in recent years is reduction of herd size and diversification of livestock types. In agro-pastoral and pastoral Woredas like Meiso, Midhega Tola and Fedis, many community members are turning from grazers (cattle and sheep) to browsers that eat bushes (camels and goats). Camels and goats are said to adapt more easily to droughts situations and changes in pasture and are becoming more important. However, camels are more expensive and are generally owned by few richer households.

Here, it is important to note that while coping strategies differ among wealth groups, there's often an increase in activities already practiced by households in any case. For poorer households, there is an increase in the sale of firewood in nearby towns. There is also an increase in search for casual employment by poor and "middle income" households. .

As an action of mitigation, better-off and middle households use modern agricultural technologies like fertilizers, improved seeds and pesticides and exploit the little opportunity created by the weather condition to produce food crop even during drought years.

There are places like Lubu Dhekeb Kebele of Tulo Woreda where new forms of livelihood are being created: the youth (men) are organized into quarry cooperatives/groups to extract and sell stone/rock for a marble factory. The group also uses part of their income for buying livestock feed called "Furushka" – a byproduct of flourmills. In addition, since the main highway passes through their village, most youth also engage in loading/unloading of goods/chat.

Landscape of Meta Woreda in East Hararghe and Tulo and Oda Bultum Woredas in West Hararghe are hilly and sloppy and farming practices are vulnerable to soil erosion and flooding. Communities used to make traditional bunds so as to protect the soil from erosion. They also used to leave some spaces (usually 1 to 2 meters wide) uncultivated, particularly between cultivable plots. These plots primarily served as boundaries between farm plots called "Geffaa", while also serving as hindrances to flood to preserve the soil from erosion. In addition, grasses are grown on these uncultivated strips of land that are used either as animal feed or for thatching of houses. Such strips of land have now been cultivated because of shortage of farmland; as a result, the traditional soil protection mechanisms are no more functional. However, some community members in risky flood areas (vulnerable to flood hazards) specially in Tulo and Oda Bultum Woredas in West Hararghe zone construct flood diversions around their homes as well as around their farms to safeguard their assets and livelihoods from the damage of floods.

In Meiso Woreda, areas which were part of traditional "reserve grazing areas" in the past, and which were left intact for prolonged dry season grazing are now invaded by neighboring communities from adjacent Somali Regional state. The search for water and pasture clearly has become more difficult as extreme weather has reduced their availability and often provokes cross boarder conflicts among Woredas like Meiso and Midhega Tola and their neighbors from other region. Bush encroachment and the spread of invasive species, notably Prosopis juliflora, also have reduced pasture land. Household survey conducted about the severity of emergence of new plant/weed specious in Meiso Woreda shows that 60% of HHs said it is sever and 30% said it is very sever.

3.10 Indigenous knowledge on weather prediction and its relevance

From the analysis of information generated during FGDs and HH survey, the evaluation team has learned that, most of the time, predictions are made by men, through the study and observation of the stars, domestic and wild animals, climatic elements and celestial bodies. Likewise, there are a few women who make predictions by observing the behavior of domestic animals like chicken and children's plays. The assessment has revealed that, traditional knowledge stated below are used as indicators to forecast the weather and predict the coming season in order to plan agricultural operations and manage livelihoods. The indicators were drawn from long periods of observation of behavioral changes of nature, domestic and wild animals, birds, vegetation, the stars, the moon, wind directions and intensity by seasons and time of the day, temperature and so forth. Findings from HH survey show that, 90% of HHs responded yes to a question "Do you know any traditional ways of predicting the weather"?

The indigenous knowledge categorized under different indicators (Human behavior, animal behavior, behavior of birds, warms and insects, celestial bodies, climatic/weather events and behavior of plants) are drawn from FGDs, KII and HH survey conducted in the study areas.

3.11 Traditional weather forecast indicators

The findings of the assessment are categorized by type of indicators and the predictions a snapshot of the findings is presented below. The full list can be found in Annex 3.

Animals: this includes observation of both domestic and wild animals.

- In dry season cattle normally drink more water, however, if they are seen drinking less water in such a dry season and run around pleasantly as if in a celebration mood, it is an indicator of the coming of good season (rains).
- When cattle take/drink excessive water and refuse or become reluctant to move away from the watering point, it is alarming that, the coming season will be drought.
- When hyenas gather, giggle and run with their heads down to the earth, this is a prediction indicator that there will be rain soon.

Birds: communities have a practice of watching the behavior of both domestic and wild birds and predicting the weather as expressed below.

- Birds are normally active, sing and nest when the coming season is going to be good. The absence of this activity indicates the possibility of drought. For instance, in the month preceding rain, a bird called "Laakkam" will fly straight up, somersault with its tail spread wide, and glide down. Upon reaching the ground, it cries out. This behavior is noted to precede coming of rain. This is one of the predictions indicator made by both men and women alike based on the behavior of this bird.

- A bird called "Hummoo", Erkum in Amharic, moans early in the morning during dry spell it is an indication of rain coming soon. On the contrary, if these birds moan while it is raining during rainy season, it is a sign that the rain will stop soon.

- When "Sololeya", Guinea fowl, is heard calling out during the night, the coming season is predicted to be good.

Plants: regarding plant phonology, trees are considered the most important indicators of possible rain.

- When trees seen with high volumes of flowers during dry season, indicate that the season to come carries good rain. These flowering trees are: 'dhadacha' – a tree of Acacia species with scientific name called "Dodonaea viscos/Acacia tortilis", 'Dembi tree' – a tree of Ficus species scientifically called "Ficusthonningi/Moraceae", and 'Doddotii' – a tree of Acacia species called "Acacia gerrardii/Aetbaica".

- There is a tree with thorns called "Hallo". This tree normally does not make noise even through the wind; but if it makes rumbling sound like in interaction with the wind, then, elders predict that, rain is coming.

Atmospheric (weather/climate elements): community members who participated in FGD and KII, revealed, that predictions are made based on the cyclical nature of drought. Wind direction is also another indicator based on which the community predicts the coming or absence of rain. Multi-year

cycles of drought and rain were regarded as a strong indication of the weather that might be anticipated in a given year. These cycles represented longer-term weather patterns in the region as observed over past centuries.

Wind behavior

- If the wind starts blowing from south to north in the dry season, it indicates the end of the dry season and coming of rain.
- However, if the wind starts blowing from north to south during a heavy rainy season, it indicates cessation of the rain.
- Some community members also associate climatic change such as good rain and harvest, rain shortage and poor harvest with the Ethiopian New Year, each of which is named after the four Gospels: Mathew, Luke, John and Mark. There is a saying in Amharic that characterizes each year to what would happen in that year. For example, "Be zemene Lukas Eras be zemene Mathewos efes" which translates to ""plant in the year of Luke and harvest in the year of Mathew" implying Mathew is a year of good harvest. In the year of "Mark" unusual death of children is predicted, in the year of "Lukas - Luke" unusual death of known people is anticipated while in the year of "Yohannes - John" good harvest is envisaged.

Human behavior: elders take note of behaviors of others, for example children, and make predictions, as they believe their activities and games reflect the level of anxiety within a community.

- Young children playing at cooking or taking a meal, and fighting over meals, travelling with their bag or donkey, buying food stuff, the coming season is predicted to be bad/drought.

- On the other hand, young children playing herding, making fences and dividing imaginary herds amongst themselves or pilling their harvest (grain) in bags it is an indication of rain (or prosperity) in the near future.

- Children playing with imaginary guns are considered as a strong indication of the possibility of conflict/war in the near future.

Celestial (astronomic bodies): regarding its relevance and existence of this traditional knowledge all interviewees and FG study participants indicated that, there are few persons who study stars (called Urjino – local astrologist) and predict what the coming season will look like. People used to ask these knowledgeable persons whether it is time for planting or not. They tell them what to do and people used to listen to them. However, this tradition is being lost because many say it is only God who knows the future. Among the indicators related with celestial bodies are:

- Buhsan (Orion star) rising in the morning, marks the conclusion of the short rainy season (Badhessa) and the beginning of the dry season.
- When Bakkalcha (thought to be Mercury) appears in the East, a breeze is expected from east followed by rain. This planet is thought to be the 'star of cattle'. Cattle then stand facing east while Bakkalcha is seen rising.

Worms/Insects: community members who took part in the discussions have explained that,

predictions are made by observing the appearance and behavior of worms and insects as follows.

The appearance of an army of worms is considered a good harvest season. The participants have a saying in support of the appearance of armyworms as, "Dhufa teeyna waan-gammadanii nuubooda waan-shammadanii", which literally translates to "people will not be happy by our coming, but they will not buy food after us". This is due to the fact that, part of the plant (sorghum) eaten by the armyworm will coppice and have many stems/shoots, which gives more than double production of the original. Appearance of army worm was indicated cyclical, every two years.

3.12 Current practices of traditional weather forecast

Most of this knowledge is preserved only in oral traditions, and older generations pass away without imparting their wisdom. Declining practice of traditional knowledge on early warning indicators is also attributed to religious practice because it is seen as 'predicting the future'.

Regarding reliability and applicability of indigenous knowledge, there are mixed responses from the community because the knowledge was orally transferred from ancestors to some old people, so the wisdom is kept by a few knowledgeable elders only. Major reasons for not properly transfer of IK to the younger generation are the following according HH survey and FGD respondents.

- **a.** There are some religious (Muslim leaders in the area) people who block the knowledge transfer by condemning the use of traditional knowledge and weather prediction as prophesy (fortune telling) which is anti-religion. They assert that, it is only God that knows the future whether it will be raining or not. In the past our ancestors used the knowledge to predict the weather because they did not understand the teaching of God (in Islam); no one can predict what is coming except God. Prediction is a curse in religion.
- **b.** From the other side, there are groups of the community members, who claim that, the people in the past had great traditional knowledge that was given to them by God. Besides, they were stronger believers in God than the current generation. They were wise and very much aware that, the indigenous knowledge is not against any religion. So it is important to sieve apart the religion and knowledge so that we can use our valuable traditional knowledge while appraising and remaining faithful to our religion.
- **c.** The other issues raised were communities used to perform traditional ritual practices like slaughtering of animals, preparing coffee, cutting bread (Kismidal), praying for rain, getting together under big tree called "Hujuba" and praying to God for rain and other things they need. This is considered as "traditional believe" which is rejected by the religious leaders in the community.
- **d.** Disappearance of some of traditional indicators following loss of wild animals, birds and plants by the effects of climate change itself has weakened the indicators and knowledge transfer.

The issue of reliability of indigenous knowledge is found to be a divisive one. To this effect, HH survey result shows that, 50% of HH survey respondents said that, it is not reliable, while 40% said that it is reliable and the remaining 10% answered "I do not know". The responses by Woreda on who said not reliable are: Fedis 50%, Meta 60%, Meiso 50%, Midhega Tola 50%, Oda Bultum 50% and Tulo 40%. Whereas, 40% of respondents in the first 5 Woredas (According to the list above) and 50% of respondents in Tulo Woreda have said that, yes it is reliable.

Whereas, 40% of respondents in the first 5 Woredas (According to the list above) and 50% of respondents in Tulo Woreda have said that, yes it is reliable.

However, disappearance of local indicators (like birds, trees and wild animals), did not play major role in making decision about unreliability of prediction made on the bases of IK, only 5% of HH survey respondents said that this was the factor for their decision (See the table below).

Table 8.Responses on Non-reliability of IK in weather forecast

Reasons for non-reliability	Woreda												Total	
	Fedis		Meta		Mieso		Midhega Tola		Oda Bultum		Tullo			
	N	%	n	%	n	%	n	%	n	%	n	%	n	%
Not applicable (I am using)	20	40	21	40	24	40	22	40	21	40	29	50	137	40
Indigenous knowledge is not passed to us properly from our ancestors	5	10	0	0	2	0	8	10	1	0	3	10	19	5
Only Allah (God) knows what will happen in future	26	50	32	60	19	30	21	40	34	60	23	40	155	50
Disappearance of local indicators (like birds, trees and wild animals)	5	10	2	0	7	10	4	10	1	0	1	0	20	5
Modern science and religious influence are pressuring us to abandon our traditional way of dealing with our environment	1	0	2	0	5	10	2	0	0	0	1	0	11	0
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

The table above shows that, the major factor for HH survey respondent to decide the unreliability of IK is their religion. The table also clearly indicates that, 40% of HHs responded that, it is reliable and they are using it. On the other hand, it is obvious that, modern education and science have minimal or no influence on the decisions community members make on the reliability of their IK. In general there are community members who are for and against climate prediction. In order to make use of some practicable IK it is very important to build them into community knowledge to aware the community and let them access the information.

3.13 Awareness, access and application of meteorological information

In general, about 80% of HH survey in the study areas is aware of weather forecast provided by Ethiopian Meteorological Agency (EMA). The level of awareness among Woredas is significant as shown here: Fedis 80%, Meta 80%, Meiso 90%, Midhega Tola 80%, Oda Bultum 90% and Tulo 80%.

With regards to access, most community members in the surveyed Woredas have access to weather information forecasted by EMA over a radio. However, accessibility to this information is not the same across HHs in the Woredas. It is also not the same for men and women. 55% of the respondents indicated that, they have access to weather forecasts. Out of those who responded that they have

access to weather forecast information have reported that they have access to the daily weather forecast (14%) others to the seasonal (75%) and the third group to both the daily and seasonal weather forecasts (11%)[3].

Though most of the respondents - both men and women- have awareness, accessibility varies drastically between the two sexes. On one hand, only three women groups confirmed that they have access to weather forecast broadcasted on the radio. But they said that they do not listen as often because they are busy with domestic work. The remaining 15 groups said that they have no access to the weather forecast primarily because they do not have radios and because they do not have the time and interest to listen to the radio. They nevertheless added that, sometimes they get information from neighbors, friends or development agents when there is some kind of community gathering.

On the other hand, 12 out of 18 men groups said that, they have access to weather forecast information even if they do not have radios. They further explained that, only some community members own radios, but that those who have direct access to the weather forecast share what they learned with others (neighbors, friends, relatives) immediately. And they said that they can get any information when they want to. Hence, accessibility is not only about access to the source of information but also about interest in, and time to listen to and make use of the information.

According to the information drawn from focus group discussion, source of information is not only the radio. Communities also have a tradition of sharing information with others. Therefore individuals, who have radios or any other source of information, share whatever information they hear including weather forecast with fellow community members. In addition, agricultural experts like development agents serve as sources of information especially when it comes to information such as weather forecast, which would affect the lives of that community. Interestingly, even if the majority of the respondents are aware of weather forecast, most of them said that they do not plan their activities based on the weather forecast information. This indicates that access to the information does not necessarily reflect in the utilization of the weather forecast. Among a number of farmers who have used the information from the weather forecast, majority of them said that they used the seasonal forecasts to decide on when to harvest their crops, in case of an untimely rain forecast.

When it comes to why they do not rely on weather forecast from ENMA, the participants of the survey highlighted the following reasons:

1. Most of the respondents prefer to stick to their traditional knowledge, which is more reliable, effective and localized.
2. Local indicators are more precise than ENMA's weather predictions, as the weather forecast information from ENMA covers large areas and is not specific to their locality.
3. Many of the participants said that, they do not have time or make any effort to listen and pay attention to any weather information broadcasted over the radio.
4. Many respondents believe that only God knows the future;; so they do not depend on weather information forecasted by ENMA to know the future.

[3] Out of 342 total sample respondents 26 (8%) receive daily forecast, 140 (41%) receive seasonal forecast and 21 (6%) receive both daily and seasonal forecast.

5. The timeliness of the forecast i.e a farmer can make his own decisions based on his observation but one needs to wait for the forecast from ENMA,
6. Traditional local weather indicators are hands on weather forecast information and does not require seeking experts for weather information

In relation to this, the findings from HH survey show that, in Fedis 20%, Meta 30%, Meiso 30%, Midhega Tola 20%, Oda Bultu 20% and Tulo 20% of the respondents do not use the weather forecast from ENMA. The average HH survey respondents who do not use the weather forecast are 20% across the Woredas.

The finding from the analysis of sampled FGD participants indicates that out of the 18 women groups sampled, 6 of them (33%) confirmed that they plan their agricultural activities based on the weather forecast information. However, 12 of these groups (67%) said that, they use the seasonal forecast to save their harvest from damage by untimely rain at the time of harvest and that they also use the information to plan for land preparation and planting (sowing).

Out of 18 men focus group participants, 12 of the groups (67% of the sampled groups) said that they make use of the weather information from EMA only during harvest season. The other 6 groups (33%) said, they do not use the information at all.

These groups said that, the weather forecast is not reliable and it is only God who knows the future so they do not trust the weather information forecasted by EMA. The sources of information for weather forecasts are radio, friends/neighbors and extension agents. To this effect, HH survey results show the following.

Table9. Summary of HH survey responses with regard to sources of information

Sources of Weather forecast Information	Woreda												Total	
	Fedis		Meta		Mieso		Midhega Tola		Oda Bultum		Tullo			
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
not applicable	28	50	23	40	18	30	27	50	27	50	32	60	155	50
Solely radio	7	10	14	20	17	30	11	20	18	30	16	30	83	20
Radio/TV	7	10	7	10	1	30	5	10	4	10	5	10	29	10
DA/Expert	9	20	5	10	13	20	7	10	5	10	3	10	42	10
Friends/Neighbors	3	10	8	10	6	10	7	10	2	0	1	0	27	10
others (DA/Expert, Friends/Neighbors and radio)	3	10	0	0	2	0	0	0	1	0	0	0	6	0
Total	57	100	57	100	57	100	57	100	57	100	57	100	342	100

Similarly, analysis from sampled FGD responses show that, the major source of weather information for the majority of the community members is secondary sources: friends, neighbors, development agents

and other experts in the area. The radio is also another important and primary source of information the majority of the participants' use, with the exception of one group member in one of the four MFG discussion participants who sited TV as source of weather information. Among the sampled women groups in the four Woredas, 3 groups (75% of the sampled) mentioned that the major source of weather information is radio while one group (25% of the sample) said that, they do not know the sources. However, not all of them have access to the radio, but they get the information from others who have access to radio as second hand information.

On the other hand, among the sampled men groups in the four sampled Woredas, all the four groups (100% the sample) cited radio as a major source of weather information. However, two of the groups (50% of the sample) said that, not all community members have radios but they get a second hand weather forecast information from neighbors or friends who have direct access to radio and they share with others what they have heard on the radio.

4 Indigenous knowledge and scientific knowledge on weather forecast

4.1 Indigenous knowledge vs scientific knowledge: similarities & differences

Rural people have been using traditional knowledge for generations, to understand their environment and predict various events including weather and climate patterns, so as to make decisions about their life including planning and managing agricultural activities. This knowledge has been developed through many decades of experience and cultural beliefs and practices orally passed on from generation to generation and adapted to local conditions and needs.

Communities use different kinds of observations such as wind movement, lightning, animal behaviors, bird movement, and the shape and position of moon crescent and build them into traditional knowledge used to predict weather climate and other events such as conflict. Traditional knowledge provides a framework for the rural community to explain relationships among different observations and predict the future including climate and weather occurrences.

Indigenous Knowledge is transferred to younger generations by the older ones through casual conversation, observations in the field, folk songs, metaphors, and so forth. For instance, in the ritual or "ceremonial plowing," all of the farmers in a village come together, inaugurate the onset of rain and initiate the first plowing. The elders use the same occasion to informally educate the younger generation about the traditional rain classification and appropriate cropping practices.

Scientific Knowledge based weather forecasting is a scientific estimate of the weather conditions at some future time, hourly, daily, monthly and seasonal, expressed in terms of variables such as temperature, precipitation and wind using probability distribution method.

Scientific forecasts differ from traditional knowledge prediction methods in scale as well as types of materials used to collect information, interpretation and forecasting the weather. The technique uses high technology such as satellites and radar (radio detection and ranging). It is expensive since it requires high technology and expertise while traditional methods use observation of changing phenomenon around the area and rely on community elders for interpretation and use.

To some extent, both methods use observation of the celestial phenomenon such as, wind speed and direction, temperature changes, appearance and position of stars and moon. However, traditional knowledge uses observation of other elements such as animal, birds, insect plants behaviors as indicators to forecast the weather. Traditional forecasts are highly localized and specific, mostly at the village level while the scientific forecasts encompass much larger area of approximately within 100 km radius.

The seasonal rainfall forecast does not provide information on the likely onset of rainfall, its distribution, amount and time of onset which are critical parameters for the community to plan and make decisions on their agricultural activities. On the other hand, traditional forecast knowledge is able to help the

farmers in terms of seasonal forecast and the possible onset of rainfall. Thus combination of the two systems would provide communities with more valuable and reliable information, more so than any one of the other systems can do. The disparity of the two systems is shown in the table below.

Table 10: comparison of indigenous knowledge and scientific knowledge based weather forecast methods.

Indigenous Knowledge	Scientific Knowledge
Use biophysical indicators of the environment as well as spiritual methods	Use weather and climate models of measurable meteorological data
Forecast methods are seldom documented	Forecast methods are more developed and documented
Up-scaling and down-scaling are usually complex	Up-scaling and down-scaling are relatively simple
Indicators are mostly observed	Indicators are usually measurable
Dissemination of forecast output is less developed	Dissemination of forecast output is more developed
Communication is usually oral	Communication is usually in written
Explanation is based on spiritual and social values	Explanation is theoretical
Taught by observation and experience	Taught through lectures and readings

4.2 Integration of indigenous knowledge with scientific knowledge

Indigenous knowledge is more qualitative and geographically specific in contrast to scientific knowledge, which is normally quantitative and more general in terms of area coverage. Despite its usefulness, too often indigenous knowledge is neglected in favor of scientific knowledge denying the deep interest of local communities who are using it

Most of the indigenous knowledge has scientific explanations. In order to make use of the indigenous knowledge it should be appreciated and incorporated into scientific process and be part of any disaster risk reduction (DRR) programs. Combination of the two systems will provide more applicable information to users and enable them to manage their activities and livelihoods effectively.

So the following process is suggested to initiate the integration

- Establish or use kebele DRR committee that is inclusive of gender and PWDs
- Establish a mobile info network that connects ENMA with DAs, DRR Facilitators and DRR committee leaders to transmit daily and seasonal weather forecast to DAs/DRR Facilitators and DRR committees uninterruptedly, through mobile SMS system.
- Allow these committee and DAs/DRR Agents:
    - Gather knowledgeable people among the community and collect their seasonal weather prediction and record;
    - Similarly collect meteorological information from ENMA and record;

- At the end of the season check both records against what really happened;
- Analyze similarity and differences between the two systems; and
- Summarize the applicable and useful ones and return back to the community for validation.

5 Conclusions and recommendations

5.1 Conclusions

The assessment shows that rural communities have knowledge on climate change which they recognize in terms of alteration and unpredictability of the rainy seasons and recurrent droughts, increasing temperature, drying up of water sources, extinction of wild animals and depletion of natural resources. Local communities confirmed that change of climate was noticeable from inconsistency onset of rainy season, changes on planting calendar, recurring long drought spells, and decreasing crop yield and livestock. They also noted changes in their environment in the form destruction of forest, soil degradation, pest and disease infestation, overgrazing, bush encroachment and conflict over scare resources accompanied by hot temperature.

Hence, to predict and adapt to the changing environment, the communities have developed useful knowledge based on long term observations of celestial bodies, atmospheric conditions, animal and plant behaviors, human reactions, etc. to manage their reality.

They often use their knowledge to predict and then take pre-emptive action to save their assets and manage their livelihoods. Notable action in this regard are sending their cattle to safer places where water and pasture are available, preparing drought tolerant and early maturing seeds, collecting wild fruits and temporarily migration to nearby towns to work.

Indigenous knowledge, however, faces challenges, such as lack of documentation and disappearance of some of the natural indicators, affecting its relevance and utility. On top of this, natural indicators are under threat from scholars who consider indigenous knowledge just as a collection of unjustifiable set of beliefs. Some religious teachers also oppose weather forecasting by labeling it as fortune prophesying, which is considered a curse in many religions. As a result, indigenous knowledge systems have not yet properly studied and explained scientifically to be used by the people.

Both Indigenous knowledge and scientific knowledge use celestial bodies, atmospheric condition as well as plant phonology. Indigenous knowledge and scientific knowledge differ in terms of data gathering, analysis and dissemination. Indigenous knowledge uses observations of various events around the community while the scientific ones uses advanced technological equipment to gather atmospheric and celestial information and interpret them. Thus, while scientific knowledge covers a wider area, indigenous knowledge is localized and applicable only to the area of the study. This makes meteorological information too broad and unreliable to local communities. Hence, even if communities are aware of ENMA's weather forecast, they do not use it except during harvest season, to protect the harvested crops from untimely rain damage. The communities relay more on traditional knowledge than the scientific ones. Integration of scientific and indigenous knowledge could result in the best combination of reliable and specific information which is locally acceptable to the community. However, there is no system that can combine the two knowledge systems and put on use, so far.

5.2 Recommendations

- The study identified that despite its potential in solving environmental deterioration issues there is inadequate rural community based research and documentation of indigenous knowledge

based weather forecasting indicators used. Therefore it is very important to recognize existence of very wide and deep indigenous knowledge, useful and applicable to weather forecast and livelihood planning for rural communities.

- The study stresses the need to record, document and impart the indigenous knowledge on the use of traditional weather forecasting indicators so as to ensure that the forecasting methods are available for the present and future generations and to eliminate the problem of divergent interpretations from the same indicator.

- While many of the indigenous knowledge practiced by the studied communities have scientific explanation or bases, this relationship is not well studied or documented. The study also brought out that the accuracy of the forecasts derived from traditional indicators needs to be scientifically validated to enable indigenous weather forecasts to bring it to the same level with conventional weather forecasts. Therefore, it is essential to get them inventoried, validated and explained through an in depth study at the local, regional and national levels, through participation of communities, governmental and non-governmental bodies (researchers, academicians and practitioners).

- As a result of previous recommendation, detailed scientific documentation of this knowledge together with standardization of indicators that are still pertinent is a must. Besides empowering the local communities, this effort would be beneficial in improving weather forecasting and its translation into better decision making tool and thereby improve disaster risk reduction and climate change adaptation endeavor of rural communities. ENMA needs to give attention to IK based weather forecast indicators and take the upper hand to integrate both the traditional and scientific knowledge.

- It is also equally important to note that there are beliefs and practices that promote social cohesions as climate change adaptation strategy even if they cannot be explained scientifically. These believes should not be disregarded but should be seen as part of the people's way of life, that if promoted, can help them to cooperate and adapt to climate change and also reduce their vulnerability.

- Disaster risk reduction and climate change adaptation programs, projects and strategies should integrate available local and indigenous knowledge with scientific knowledge for enhanced implementation, using the following arrangements:

    1. Establish or use kebele DRR committee that is inclusive of gender and PWDs;
    2. Establish a mobile info network that connects ENMA with DAs, DRR Facilitators and DRR committee leaders to transmit daily and seasonal weather forecast to DAs/DRR Facilitators and DRR committees uninterruptedly, through mobile SMS;
    3. Allow these committees and DAs/DRR Agents to:
        - Gather knowledgeable people among the community and collect their seasonal weather prediction and record;

- Similarly collect meteorological information from ENMA and record;
- At the end of the season check both records against what really happened;
- Analyze similarity and differences between the two systems;
- Summarize the applicable and useful ones and return back to the community for validation.
- Use school system to teach children and aware community at large for transferring knowledge to generations;
- Raise awareness traditional and religious institutions on importance of IK in climate change adaptation and disaster risk reduction so as to involve them in the campaign.

6 Annexes

6.1 Annex 1: References

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6.2 Annex 2: List of Acronyms

AC: Adaptive Capacity
ACCRA: Africa Climate Change Resilience Alliance
AIDTS: Agency for Integrated Development Training Services
CCA: Climate Change Adaptation
CBDM: Community Based Disaster Management
CEDRA: Climate Change and Environmental Degradation Risk and Adaptation Assessment
CMDRR: Community Managed Disaster Risk Reduction
COVACA: Community Owned Vulnerability and Capacity Assessment tool
CRISTAL: Community-Based Risk Screening Tool – Adaptation and Livelihoods
CRS: Catholic Relief Service
CVCA: Climate Vulnerability and Capacity Analysis
ECC-SDCOH: Ethiopian Catholic Church Social & Development Commission of Harar
ENMA: Ethiopian National Meteorology Agency
HI: Handicap International
IGAD: Intergovernmental Authority on Development
IR: Intermediate Result
LINK: Local and Indigenous Knowledge
KIIs: Key Informant Interviews
PADR: Participatory Assessment of Disaster Risk
PVCA: Participatory Vulnerability and Capacity Assessment
USAID: United States Agency for International Development
VCA: Vulnerability Capacity Assessment

6.3 Annex 3: Traditional Weather Forecast Indicators

Animals: This includes observation of both domestic and wild animals.

- Cattle urinate and excrete while lying, as if to indicate that, in the months to come they will not have the strength to stand for this exercise as a result of drought.
- Cattle begin to shake their rear legs, as if in anticipation of mud being removed, when the coming season is good.
- Cattle become very active in the morning to go out of the barn and to go to grazing fields, when the season is going to be good.
- Camels usually lay in their confine at night facing downward slope. If camels are seen to face northeast (Qibla) it is an indication of rain to come.
- When cattle are observed jumping around happily in the field while there is cloud, it is predicted that it will rain after few hours; if under the same cloudy condition cattle do not show sign of playing/jumping happily it is predicted that, the cloud is dry and it does not carry rain.
- In dry season cattle normally drink more water, however, if they are seen drinking less water in such a dry season and run around pleasantly as if in a celebration mood, it is an indicator of the coming of good season (rains).
- When cattle take/drink excessive water and refuse or become reluctant to move away from the watering point, it is alarming that, the coming season will be drought.
- Cattle and shoats are eager (Show more eagerness than the usual) to return to their home in the evening when the coming season is favorable.
- In a looming drought, cattle and shoats are anxious and will disappear in pairs in the bushes and remain in the bush till around sunset.
- When cattle refuse to follow the leadership of their herder and run way scuttling in different/opposite directions, it's an indication of an upcoming drought.
- When cattle make some specific throat vocal sounds while sleeping at night, it is an indicator that, the coming season will be good.
- When oxen become "arrogantly playful", even breaking watering troughs with their horns, it is considered that they are declaring that they will not queue for water; that the coming season is will be good.
- With coming drought, milk production declines despite adequate levels of fodder or pasture. Even cows may refuse their calves from suckling.
- When livestock starts to feed on bones and droppings of other animals it is predicted that, the upcoming drought will be hard.

- When female camels urinate while lying, as if to express the hopelessness of the future, the coming season is predicted to be drought.

- When hyenas gather and giggle and run with their heads down to the earth, this is used as an indicator to predict that there will be rain soon.

- Howling of hyena is also considered an early warning of a forthcoming season. As presented by FGD participants and key informants, there are persons who predict from the howl of hyena based on the number of howls and the sound it releases. For example if a hyena howls only once, it is an indicator that, he is going to attack someone, therefore people who know this try to save the targeted person by calling each other and running to the direction the howl is heard. On the other hand, if a hyena howls 10 times or more, it is considered as an indicator of rain coming soon.

- If hyenas come together without calling each other to an open space and play and snort it indicates there will be rain.

- Appearance of a wild animal called "Jedeeloo/Qebero" – Jackal or common fox in a village is a sign of a good rainfall season ahead. This wild animal normally remains in the bush and does not make noise; but if a number of Jackals/foxes come together in an open area and make noise, it is an indication that rain is coming.

- A small wild animal called "Aweloo" (Similar to bush cutter) usually digs a hole in the farms and bushes but if it digs a hole in a middle of a road, it is an indication that, there will be sudden death of people in that area, but if it unusually digs many hole in farmlands it is an indication of good season.
- If a "tiger" roars three times, then, rain is expected within days.

Birds: Communities have a practice of watching the behavior of both domestic and wild birds and predicting the weather as expressed below.

- Birds are normally active and sing and nest when the coming season is going to be good. The absence of this activity indicates the possibility of drought. For instance, in the month preceding rain, a bird called "Laakkam" will fly straight up, somersault with its tail spread wide, and glide down. Upon reaching the ground, it cries out. This behavior is noted to precede coming of rain. This is one of the predictions made by both men and women alike based on the behavior of this bird as an indicator.

- A bird called "Hummoo" – Erkum in Amharic", unusually moans early in the morning during dry spell, this is an indication of rain coming soon. On the contrary, if these birds moan while it is raining, it is a sign that the rain will stop.
  When "Sololeya" - Guinea fowl - is heard calling out during the night, the coming season is predicted to be good. If "Sololeya" moves in pairs, is also an indication of coming rain,

- When a wild bird called "Jejuu/Urungu - "Gugut", makes repeated loud noises or moans, appearing to individual household compound being tree branches, on fence or wherever closer to house gate it is believed as bad omen and something bad will happen to that family..
- When flock of birds locally named "Girrisaa" fly very high in the sky, it is an indicator that, the rains are far (drought), but when they fly low it gives an indication that the rain is approaching.
- If chicken refuse to retire early in the evening, and rest till late in the evening, (till forced by people), elders predict that, the coming season is bad. On the other hand, if chicken retire/rest early in the day, it means the coming year is good.
- Normally, chickens do not wonder around when it is raining. If chickens venture out to feed while it is raining, people predict that for at least the next few days there would be rain.
- A bird called "Dulaa", usually sings (makes loud noise) around noon. However, if it starts making such sound much earlier, it is considered like declaring that the planting season is over.

Plants: Regarding plant phonology, trees are considered the most important indicators of possible rain.

- Flowering of trees, such as,: 'dhadacha' – A tree of Acacia species with scientific name called "Dodonaea viscos/Acacia tortilis", 'Dembi tree' of Ficus species scientifically called "Ficusthonningi/Moraceae", and 'Doddotii' –tree of acacia species called "Acacia gerrardii/A.etbaica" –when seen with high volumes of flowers during dry season, indicate that the season to come carries good rain.
- There is a tree called "Qiltu" – a species of Ficus trees, which if it sheds off its leaves on the side of the highland, is predicted that, lowlands will have good season/rain; but when this tree sheds off its leaves on the lowland side, the coming season is good for highlanders.
- The blooming into green and releasing of tender leaves by tree species known as Croton - locally called 'Mekenissa', 'Bisana' in Amharic and 'Harbu' trees - indicate the coming of rain. Otherwise, if the season is going to be dry/bad, these trees shed off their leaves and start to bloom at the beginning of the rainy season.
    - If these trees bloom into green only on one side, only the areas (communities) on the green side will receive rain.
    - The direction where the flowering is denser is also an indication of the direction where there will be good rain.
- Flowering and sprout of new shoots of trees (such as, Harfasaa, Sopheensa, Roka - is a tree known by its scientific name 'Tamarindusindica") indicate the approaching of rainfall.
- There is a tree with thorns called "Hallo"; which normally does not make noise even through the wind; but if it makes rumbling sound like in interaction with the wind, then, elders predict that, rain is coming.

Atmospheric (Weather/Climate Elements): Community members who participated in FG discussions and KII, revealed, that predictions are made based on the cyclical nature of drought. Wind

direction is also another indicator based on which the community predicts the coming or absence of rain.

Wind Behaviour

- If the wind starts blowing from south to north in the dry season, it indicates the end of the dry season and coming of rain.
- However, if the wind starts blowing from north to south during a heavy rainy season, it indicates cessation of the rain.
- If wind blows from north to south direction, it is taken as an indicator of rainfall in the upcoming season.
- Participants of FGD in Midhega Tola indicated that, arrival of the rainy season is announced by wind blow. Such wind event is characterized by a striking wind that is neither hot nor cold; neither dry nor wet; but has a roaring sound. When it arrives early in the evening, the rains are a bit further off. If it arrives late in the night, rains are expected soon.
- Cloud gathering and repeated lightning from north to east over the horizons of the mountain, in the evenings of the dry season, is a sign of rain.
- Winds blowing from the west to the east together with dark clouds coming from east and north predict a rainy season.
- Clouds from the east to the west with strong winds indicate that the rain has passed.
- Presence of reflective and bright dew in early morning during the dry season indicates that, there will be rain.
- When morning dew that lasts till 9 or 10 during rainy season indicates the disappearance of rain. On the other hand, when morning dew lasts till 9 or 10 in the morning in a dray season is an indication of coming rain.
- When there is dense fog seen on top of the mountain during onset of short rainy season (Bedhessa) , it is an indication of less rainfall for the season but when it is seen in long rainy season (Genna) the season will have more rainfall
- When there is more frequent thunder and lightning in the month prior to the short rainy season (Bedhessa), it is an indication of a very strong rainy which may flood the community
- High frequency in occurrence of wind swirl is considered another indicator of good rain.

Cyclical Nature of Weather Pattern

Multiyear cycles of drought and rain were regarded as a strong indication of the weather that might be anticipated in a given year. These cycles represented longer-term weather patterns in the region as observed over past centuries.

- The discussants expressed the cyclical pattern of drought as occurring every four years on average. They mentioned two extreme weather conditions as "Sadeen Okkotee" (A cooking pot made of clay); "Afuran Okolee" (Container or grain storage made of animal dung) which means to show that the first three consecutive dry years with less or no rain are followed by four good years with ample rain. Community members observe this weather change from growth cycle of wild plant species known as "Dallas". 'Dallas' requires eight years from germination to flowering,

to drying away and then regeneration (start seedling). The first three years are considered drought years while the following four years are considered surplus/prosperous years. In its eighth year, it flowers and dries out

- Christian community members also associate climatic changes such as good rain and harvest, rain shortage and poor harvest with the Ethiopian New year, each of which is named after the four Gospels: Mathew, Luke, John and Mark. . There is a saying in Amharic that characterizes each year to what would happen in that year. For example, "Be zemene Lukas Eras be zemene Mathewos efes" which translates to "plant in the year of Luke and harvest in the year of Mathew" implying Mathew is a year of good harvest. In the year of "Mark" unusual death of children is predicted, in the year of "Lukas - Luke" unusual death of known people is anticipated while in the year of "Yohannes - John" good harvest is envisaged.

Human Behavior: Elders take note of behaviors of others, for example children, and make predictions, as they believe their activities and games reflect the level of anxiety within a community..

- Young children playing at cooking or taking a meal, and fighting over meals, travelling with their bag or donkey, buying food stuff, the coming season is predicted to be bad/drought.

- On the other hand, young children playing herding, making fences and dividing imaginary herds amongst themselves or pilling their harvest (grain) in bags it is an indication of rain (or prosperity) in the near future.

- Children playing with imaginary guns are considered as a strong indication of the possibility of conflict/war in the near future.

- When children are observed playing a game called "Shantee" - where they throw up small pieces of stones/pebbles (five in number) and try to collect them back on their outer palm – if one fails to collect all the pebbles thrown up, he/she loss the game. Elders use this to predict shortage of rain and usually advice children not to play this game.

- Children playing with imaginary guns are considered as a strong indication of the possibility of conflict/war in the near future.

- Physical conditions such as vibration of the top of the right eye, feeling of ailment, such as, backache, pain, tiredness, and excessive sweating at night time are indicators of rain coming,
- In a traditional ceremony called "Killaa /Buna Qlaa", roasted coffee is boiled with butter in a pot called "Okote" and poured in to wooden bowl called "Qori". It is then left to settle where a knowledgeable elder leading the ceremony will read the arrangement of the coffee beans to predict what is to come.
    - Killaa/Buna Qlaa is also used for individual affairs or social affairs too (Fortune telling). Hence, prediction is dependent on the purpose for which the "Killaa /Buna Qlaa" is organized.

- There are also pebble throwers, traditional seers, who are considered experts in future-telling. There are series of steps followed by the pebble throwers for prediction of different future incidences including weather. The pebble thrower collects 48 pebbles & makes a composite unit

to work with, then randomly dividing the 48 pebbles in to four portions. From each portion he picks two pebbles at a time until one or two pebbles remain and he repeats the same process eight times. Then based on the number of pebbles which could remain at the end in each of the quadrants either in odd (i.e. one pebble) or even (two pebbles) respective names are designated to each from which prediction is made.

Celestial (Astronomic Bodies): Regarding its relevance and existence of this traditional knowledge all interviewees and FG study participants indicated that, there are few persons who study stars (called Urjino – local astrologers) and predict what the coming season will look like. People used to ask these knowledgeable persons whether it is time for planting or not. They tell them what to do and people used to listen to them. However, this tradition is being lost because many say it is only God who knows the future. Among the indicators these groups used, are:

- Buhsan (Orion star) rising in the morning, marks the conclusion of the short rainy season (Badhessa) and the beginning of the dry season.
- When Bakkalcha (thought to be Mercury) appears in the East, a breeze is expected from east followed by rain. This planet is thought to be the 'star of cattle'. Cattle then stand facing east while Bakkalcha is seen rising.
- One of the FG discussants at Urji *Kebele* stated that, if Buhsan' and 'SadeenWaataa' stars meet on 15th of May, it indicates the end of planting (sowing) season. If this event happens earlier however, it indicates prolonged dry season.
- If the moon crescent faces northeast, they predict a possibility of war;
- If the moon crescent faces southeast, the coming season will be good.
- There is a star called 'Zahara'. It appears as a very bright star in the west after sunset and at dawn during the last phase of the moon. It appears to accompany the moon. If it appears in the east after sunset it, indicates onset of rainy season.

Worms/Insects: Community members who took part in the discussions have explained that, predictions are made by observing the appearance and behavior of worms and insects as follows.

- The appearance of an army of worms is considered a good harvest season. The participants have a saying in support of the appearance of armyworms as, "Dhufa teeyna waan-gammadanii nuubooda waan-shammadanii", which literally translates to "people will not be happy by our coming but they will not buy food after us". This is due to the fact that, part of the plant (sorghum) eaten by the armyworm will coppice and have many stems/shoots, which gives more than double production of the original. Appearance of army worm was indicated cyclical, every two years.
- If an insect called "Bombii shegnii" comes (fly) into the house, it is an indication that, it is planting time, if one fells to plant immediately, it is believed that person has missed the season,
- Honey bees begin fetching water and nectar at late hours of the morning during spring season in a normal situation. If they start getting out of their hive and begin their movement early in the morning it indicates drought season.

- Whenever the ants leave upland to the lower land near the streams or rivers, it is an indication of little rain and no floods. But when they move from the stream area to the upland, it means there will heavy rains which can cause flooding. So they are an indicator of both higher rainfall and no rainfall
- If red ant is seen in the house, it indicates the coming of rain,

Amphibian/Reptiles:

- When frogs are heard croaking towards the end of the dry season it announces coming of rain.

6.4 Annex 4: ToR and Work Plan

Catholic Relief Services/Ethiopia

Terms of Reference

REAAP Assessment of indigenous knowledge and practices

Assessment of indigenous knowledge and practices to map weather and climate change, and its impacts on livelihoods, vulnerabilities and resilience in REAAP operation areas.

Consultant name:	TBD
Project:	Resilience through Enhanced Adaptation, Action-learning and Partnership (REAAP)funded by USAID/Ethiopia
Supervisor:	Nikaj van Wees, COP REAAP
Duration:	TBD, but approximately 6 days per week for 4 weeks, including 2 travel days, total of 26 billable days.
Location:	East and West Hararghe Zones, Ethiopia
Assignment title:	REAAP Assessment of indigenous knowledge and practices

I. Background/Justification

CRS/Ethiopia is a lead agency for implementation of Resilience through Enhanced Adaptation, Action-learning, and Partnership (REAAP) a three year Activity funded by USAID and implemented in six drought-prone and food insecure Woredas(Fedis, Midhegatola and Meta) of East Hararghe Zone and (Mieso, Odabultum and Tulo) of West Hararghe Zone of Oromia regional state. It is implemented through a consortium with three members (ECC-SDCOH, HI and Cordaid).

The program is designed to sustainably increase resilience and reduce long term vulnerability to current and future climate change and climate-related shocks and stresses in communities of targeted Woredas. It will strengthen linkages and learning through a focus on Community Managed Disaster Risk Reduction (CM-DRR) process, which will enhance community learning and action by highlighting the link and inter-dependencies among livelihoods, food security, nutrition, and natural resource management and by creating community DRR action plans.

REAAP is developed to have sustainably increased resilience and reduced long term vulnerability to current and future climate change and climate-related shocks and stresses among the communities of East and West Hararaghe Zones. With this overall purpose CRS and its consortium members aspire to work to achieve the following three intermediate results (IRs) described below:

IR 1: Communities have improved access to technical information and analytical tools for decision making.

IR 2: Communities identify and implement actions that increase resilience to climate variability, long-term climate change and climate-related shocks.

IR 3: Systems for planning, implementation, monitoring and evaluation around DDR and climate change adaptation are established and strengthen through working with government and other stakeholders.

REAAP is looking for a qualified consultant to assess existing indigenous knowledge that takes stock of existing relevant indigenous knowledge, cultural beliefs and practices concerning the environment, weather, climate and resilience to external shocks and climate change; as well as how these impacts the livelihoods. Moreover the study will also assess available technologies that are used/can be used by the community for climate change adaptation.

The study will establish differences and discrepancies with scientific knowledge and identify historical trends that influence their livelihoods; and evaluate the relevance of different beliefs and practices to the program interventions.

Once collected information is analyzed it will be translated into local language and forms more accessible to communities. REAAP will create key messages from this information and share to communities.

The information obtained from the study will be used and will be integrated to the REAAP intervention to strengthen potential IK to help build community resilience to climate change and disaster impact.

The main purpose of the study is to assess and identifies existing indigenous knowledge and practices in forecasting weather, climate change and how the community cope and adapt with the change.

The specific objectives of the study are:

1. To identify communities existing indigenous knowledge and practices concerning the environment management and forecasting weather and climate change impact on their livelihoods;
2. Show differences, discrepancies and integration of IK with scientific knowledge and the kind of influence these have on livelihoods; and evaluate the relevance of different practices to REAAP interventions;
3. Strengthen potentially strong existing community/customary practices that build their resilience to climate impact;
4. To help develop contextually relevant community resilient framework;

II. Scope of Work

Having indigenous knowledge, and practices, which is available within the communities and the area will give chance to have more information and understanding that enable communities to use in future planning and implementation.

The Indigenous Knowledge and Practices/CM-DRR assessment will be conducted and lead by a consultant jointly with participation of REAAP coordinator at partner level, Hararghe Catholic Secretariat staff. It will be implemented in three Woredas (Tulo, Meiso, and Odabultum) of West Hararghe Zone, and three Woredas (Fedis, Midhegatola and Meta) of East Hararghe Zone. To address

the entire program intervention areas the total sample household will be proportionally distributed across the six Woredas so as to increase the representativeness of the survey sample. To minimize heterogeneity within the samples, project target kebeles will be grouped into livelihood zones (farming, pastoralist and agro-pastoralist).

Research Methods and Tools

The study will use different quantitative and qualitative techniques and approaches in order to gather data, analyze and produce standard reports.

***Quantitative household sample survey*:** The consultant is expected to conduct household survey using standard minimum sample size that would be collected from few sample kebeles randomly selected from the three livelihood zones (farming, pastoralist and agro-pastoralist areas) to make representative sample to the general population. The consultant will develop appropriate structured and semi-structure questionnaires that are used to collect household information.

***Qualitative techniques*:** Among the major ones the consultant is advised to use Participatory Rural Appraisal (PRA) methods, key informant interviews and Focus Group Discussions (FGD)
The key informant interview will be conducted with selected elders/traditional leaders, extension workers (optional), religious leaders, In addition the consultant will also conduct resource and social mapping exercise, pair wise ranking and seasonal calendars, historical, transit/trend storytelling/case story, vulnerable groups ranking, Venn diagramming and individual and community capacity matrix will be applied in order to collect and triangulate the information generated.

Secondary data on climate and weather, and technologies and practices will be collected from relevant sources such as universities, agricultural research institutes and government bureaus and reports of other development organizations.

A total three kebeles from each Woreda will be selected randomly and one livelihood zone representative (farming, agro pastoral and pastoral) of from each Woreda will be randomly selected based on criteria set by the study team to ensure better representation of communities in the whole Woreda. Representatives of the community from different social groups (one women group, men group and mixed group) each groups with 12-16 members will be participated. And representatives of selected Woreda sector offices (Agriculture, Health, Water, Food security, Women affairs offices) will be interviewed.

Prior to the inception of the study, orientation on CM-DRR/Indigenous Knowledge and Practices assessment will be provided to the study team to make sure that the familiarization of tools and research methodology is fully achieved.

Location of work: The study will be conducted in three Woredas (Tulo, Meiso, and Odabultum) of West Hararghe Zone, and three Woredas (Fedis, Midhegatola and Meta) of East Hararghe Zone of Oromia Region.

Required Qualification

The survey team should have the following qualification and experience:

- Relevant academic and professional background in Agricultural Economics, Rural Development, /Sociology and social anthropology, Food Security and Disaster Risk Management or related field.
- Extensive practical experience in conducting quantitative and qualitative assessment and producing quality reports.
- Experience in conducting participatory assessments and research work, Monitoring and Evaluation, Disaster risk Assessment/CM-DRR process, indigenous knowledge and practice assessment is essential.
- Extensive knowledge in Knowledge and information management system.
- Experience/exposure to areas to the project intervention area.
- Expertise level in English writing and communication as well as knowledge of local language (Afan Oromo).

Roles and responsibilities of the consultant:

- Work closely with CRS, implementing partners HCS and Woreda government sector offices in planning and implementation of the field work.
- Responsible for designing quantitative and qualitative data collection instruments and tools.
- Recruit qualified and experienced data collectors/enumerators and supervisors.
- Review and analyze key project documents such as approved technical proposals, annual work plan, PITT, PIRS, result framework and project proposal.
- Ensure that the study focuses on the overarching objectives taking into account ingenious knowledge as well as the current vulnerability, risk and existing opportunities.
- Review and design study questions, checklists and field guides and other instruments to be used as tools in the collection and analysis of the field findings and secondary sources.
- Lead and supervise the field work during data collection period.
- Provide overall guidance to the study team members in the data collection processes as per the established methodology and work plan.
- Code, encode and analyze collected quantitative data using appropriate statistical software like SPSS, Stata and provide syntax as appropriate.
- Submit all the cleaned data disaggregated by sex, age and others.
- Ensure that best practices commonly used by the communities are well identified and incorporated in the report.
- Facilitate consultative, debriefing and feedback meeting and discussions with CRS, its consortium members and USAID.
- Discuss and agree on work schedule, methodologies, time frame and other arrangements for undertaking the assessment.
- Produce and submit interim reports (field report, first draft and second draft) on field work findings per the agreed format per schedule.
- Submit final report (hard and e-copy of max 30 pages) after incorporating comments from CRS and partners.
- Responsible to ensure all the tasks are met as per the given set of standards.
- Present and validate the final findings of the study to the CRS, partners and other stakeholders.

Ethical issues:

The consultant should adhere to the following ethical issues:

- All terms/conditions stipulated in the contract agreement.

- Conducting in a respectful manner, while undertaking assignment, which includes not making any commitments to communities and any other persons, on behalf of CRS Ethiopia, USAID and partners.
- Time-frame and conditions outlined in the SoW and consultancy agreement.

Deliverables

A comprehensive report of no more than 30 pages on Kindpractices will be produced with separate sections of each target Woreda. The information obtained from the study will be the basis for its intervention throughout the remaining and will be used to prepare CM-DRR planning for each project kebele. The information obtained from the study will be the basis for implementation of the REAAP. A consultant requires producing a full report delivered both in hard copy and soft copy.

Reporting

Reports will be expected at critical juncture that will provide a review of the accomplishments made thus far (those interim reports will be drafted as sections of the final report, and should be included later to fully document the process). The expected interim reports are:

Interim report 1: to be produced before initiation of training of enumerators. It contains the final field manual/tools and the questionnaire forms.

Interim report 2: to be produced at the end of the training. It updates the first inception report with the results of instrument, field tests and corresponding adjustments in the field manuals.

Interim report 3: to be produced at the end of field work to list all the problems that emerged in the field, and how they were addressed. If necessary, all changes made during the field phase to the instruments will be explained in this report.

Interim report 4: to be produced at the end of the data entry and cleaning procedures. This includes all the data, with double entry validation tables, frequency distributions for detection of outliers and any other relevant problems encountered during the data.

Draft and final reports: The content of report (max 30 pages) should at least include the following sections:

Cover page: Title page with date, logos and RFA #, name of the organization.

Executive summary: a brief of maximum 2 pages description of the main findings, methodologies, recommendations and conclusions of the assessment.

Introduction

Objective of assessment

Brief description of REAAP

Methodologies employed

Detail analysis of findings in depth discussion of general and specific sector assessment questions

Summary of findings disaggregated by gender, age, and livelihood zones as appropriate.

Cross cutting issues including Gender and disability inclusion

Good practices and Evidence of change supported by:

- *Case stories*
- *Challenges*
- *Photo*
- *Conclusions and Recommendations.*

Annexes: the survey TOR, composition of consultant team, tools and methods, list of sites visited, list of key informants, references, list of acronyms.

III. Time Frame

It may take a suggested twenty two days to conduct the study (familiarization workshop, primary and secondary data collection) in selected kebeles of each Woreda, academic and research institutions, and government bureaus. An additional eight days may be needed to do the analysis and produce the report. The following table shows the suggested activities to be undertaken, which will have to be adjusted by consultant in technical proposal:

Approximate number of days	Activity	Deliverables	Approach
	• Development of study plan with data collection methodology & check list& tools to be used & logistical requirements included if required	Inception document on the proposed activities	• Desk review
	• Incorporating feedback into plan and tools	Finalized process and tools	• Office work
Day 1	• Familiarize the study team with tools and checklists used for data collections and the analysis process • Select sample kebeles and livelihood zones for the study	Conduct workshop on checklist and tools	• Conduct workshop
15 days	Data collections in six Woredas&kebeles3livelihood zones		• PRA techniques
3 days	Data collections from universities and research institutions, and	Secondary data source	• Secondary data source

	government bureaus		
6 days	Data analysis and report writing	•	•
	Data analysis and compilation of draft final report and documents	Draft documents/report	
1 days	Organize validation workshop	•	•
	Submit a final report	•	•

IV. Proposal details and submission

The deadline for submission of bid both Technical (max 10 pages) and financial proposal (max 2 pages) is before close of business, at the 10th day from the first day of this announcement. Soft hard copies of technical and financial proposals including CVs should be submitted with information about the title of this SOW mentioned above to the following address to Nikaj.VanWees@crs.org Hard copies of financial and technical proposal could also be submitted to the following address, CRS- Ethiopia, P.O. Box – 6592, Addis Ababa, Ethiopia. CRS will review and will contact shortlisted consultants for reference check and communicate the winner as well as unsuccessful short listed bidders after analysis.

The evaluation criteria are based on technical and financial responsiveness which also includes a valid license and tax registration. The key technical evaluation criteria are:

- Known reliability in delivery of timely and quality services
- Relevant field/country experience
- Relevant sector specific technical experience & qualifications
- Presentation and writing skills evident from the proposal
- Demonstrated understanding of the work proposed in the TOR
- Clarification of methodology
- Cost/budget
- Knowledge of local language is highly recommended

REAAP Indigenous Knowledge and Practices Field Assessment Schedule			
Date	**Woreda**	**Kebele**	**Activity**
20-Apr-15	Travel to Dire Dawa		
21-Apr-15	Conduct Training for Data Collectors **(Venue to be arranged by CRS)**		
22-Apr-15	Pre test data collection tools **(sample kebele to be arranged by CRS from its intervention area closer to Dire Dawa)**		
23 – 25/4/2015	Midhega Tola	Midhaga	Woreda KII, 2ndy Data,
23-Apr-15		Mudhi Bali	3 FGD, 4 KII, 19 HHS
24-Apr-15		Bilisuma	3 FGD, 4 KII, 19 HHS
25-Apr-15		Urji	3 FGD, 4 KII, 19 HHS
26 – 28 /April/2015	Fedis	Boku Town	KII-Fedis RC, KII-Woreda, 2ndy Data,
26-Apr-15		Agudora	3 FGD, 4 KII, 19 HHS
27-Apr-15		Belina Arba	3 FGD, 4 KII, 19 HHS
28-Apr-15		Iftu	3 FGD, 4 KII, 19 HHS
29/April/2015 - 01/May/2015	Meta	Chelenko	Woreda KII, 2ndy Data,
29-Apr-15		Ifa Biftu	3 FGD, 4 KII, 19 HHS
30-Apr-15		Doke #2	3 FGD, 4 KII, 19 HHS
01-May-15		Gemechu Duse	3 FGD, 4 KII, 19 HHS
02-May-15	**Travel to West Hararghe**		
03 - 05/May/2015	Tullo	Hirna	Woreda KII, 2ndy Data,
03-May-15		Chefe	3 FGD, 4 KII, 19 HHS
04-May-15		Lubu Dakab	3 FGD, 4 KII, 19 HHS
05-May-15		Waltahi	3 FGD, 4 KII, 19 HHS

06 - 08/May/2015	Oda Bultum	Bedessa	Woreda KII, 2ndy Data,
06-May-15		Lege Lafto	3 FGD, 4 KII, 19 HHS
07-May-15		Guba Gutu	3 FGD, 4 KII, 19 HHS
08-May-15		Goda Hora	3 FGD, 4 KII, 19 HHS
09 - 11/May/2015	Mieso	Mieso	Woreda KII, 2ndy Data, Mieso Research Center
09-May-15		Dire Qalu	3 FGD, 4 KII, 19 HHS
10-May-15		Weltane	3 FGD, 4 KII, 19 HHS
11-May-15		Sodoma Boromisra	3 FGD, 4 KII, 19 HHS
12-May-15	**Travel Back to Addis**		

6.5 Annex 5: List of Contacted Persons

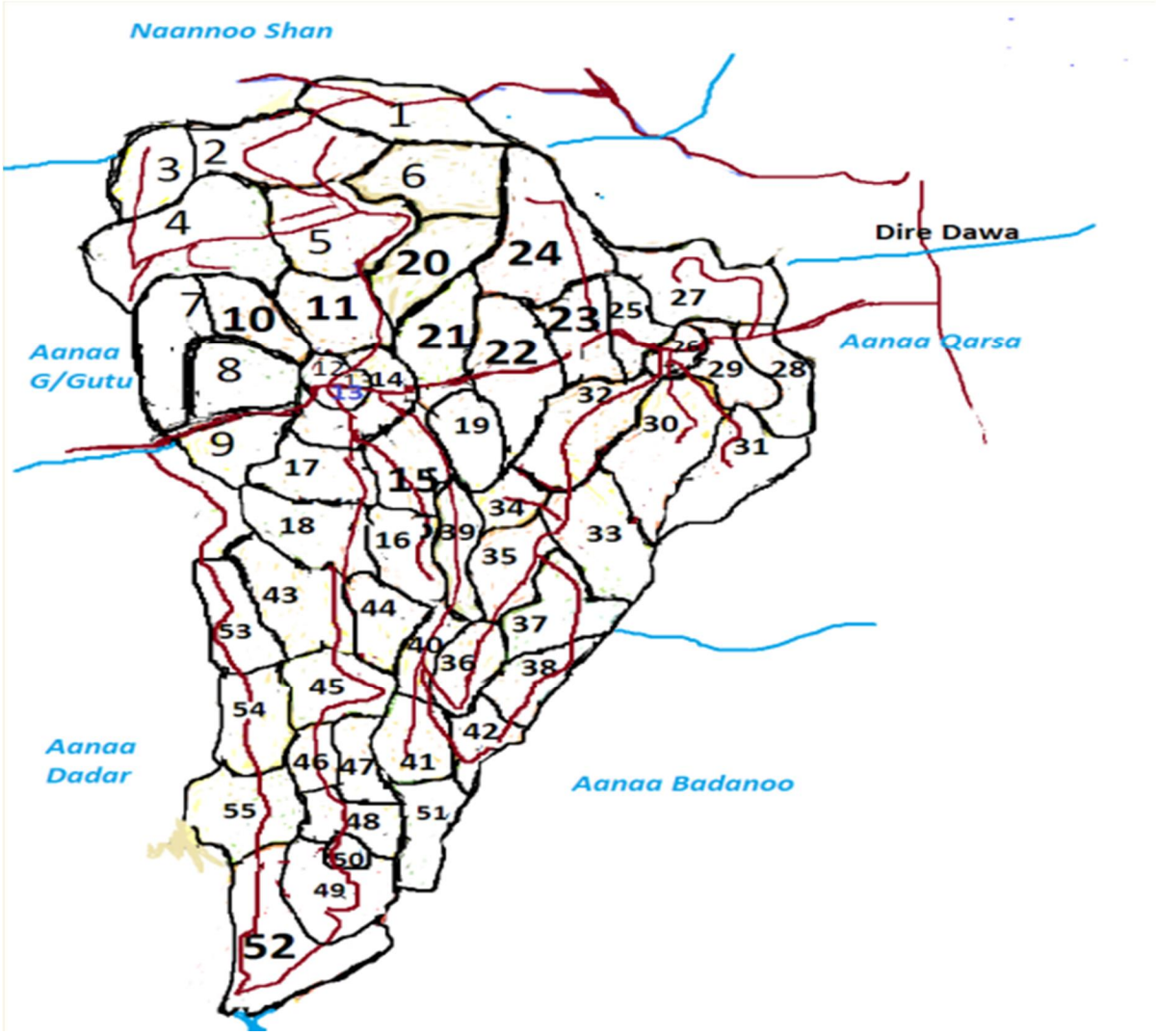
No	Name of the Person	Woreda	Organization	Position
1	Alemayehu Feleke	Fedis	Woreda Agriculture Office	Head of Planning
2	Samson Tesfaye		Woreda Labor & Social Affairs	Team Leader
3	Oljira Worku		Woreda Women, Children & Youth Affairs	Process Owner
4	Cheru Kenenisa		Woreda Food Security Desk	Expert
5	Reuf Mohammed		Woreda DPPC Desk	Expert
6	Ashebir Hailu	Midhega Tola	Woreda Administration	Head of the Office
7	Mesfin Alemayehu		Woreda DPPC Desk	Process Owner
8	Chaltu Bekri		Labor & Social Affairs	Expert
9	Nasir Mume		Woreda Women, Children & Youth Affairs	Process Owner
10	Abrahim Umer		Woreda Pastoral Development Office	Process Owner
11	Solomon Zerihun	Meta	Woreda Agriculture Office	Expert
12	Takele Geleta		Woreda Agriculture Office	Exten.T/Leader
13	Johara Abdurahman		Woreda DPPC Desk	Expert
14	Abdi Abdullahi		Woreda Food Security Desk	Team Leader
15	Abebech Alemu		Labor & Social Affairs	Team Leader
16	Woineshet Abebe		Woreda Women, Children & Youth Affairs	Expert
17	Tajudin Hussen	Tullo	Woreda Food Security Desk	Head
18	Yazew Mulugeta		Woreda Agriculture Office	Deputy Head
19	Yasin Abdi		Woreda Labor & Social Affairs	Expert
20	Meseret Legesse		Woreda Women, Children & Youth Affairs	Expert

21	Meskerem Gashaw		Woreda DPPC Desk	Expert
22	Hangarashe Kissii	Oda Bultum	Woreda Labor & Social Affairs	Expert
23	Abebu Bizuneh		Woreda Women, Children & Youth Affairs	Expert
24	Asegid Tefera		Woreda DPPC Desk	Head
25	Anwar Yusuf		Woreda Health Office	MCH Expert
26	Ibrahim Hassen		Woreda Agriculture Office	Deputy Head
27	Asnake Demissie		Woreda Food Security Desk	M&E Officer
28	Eyob Alemayehu	Mieso	Woreda Pastoral Development Office	Natrural Resource Expert
29	Kamil Mohammed		Woreda Health Office	Team Leader
30	Ahmed Mohammed		Woreda Administration Office	Communication & Public Relation Expert
31	Fatuma Adem			Team Leader
32	Gebisa Benti		Fedis Research Center	Crop & Horticulture Research Expert
33	Yonas Manaye		Ethiopian National Meteorology Agency	Mieso Station Expert
34	Sintayehu Hailu		Mieso Research Center	Expert
35	Asalfew Nigussie		Ethiopian National Meteorology Agency	Adama Branch Manager
36	Jemma Haji, Professor		Haremaya University	Lecturer,Researcher

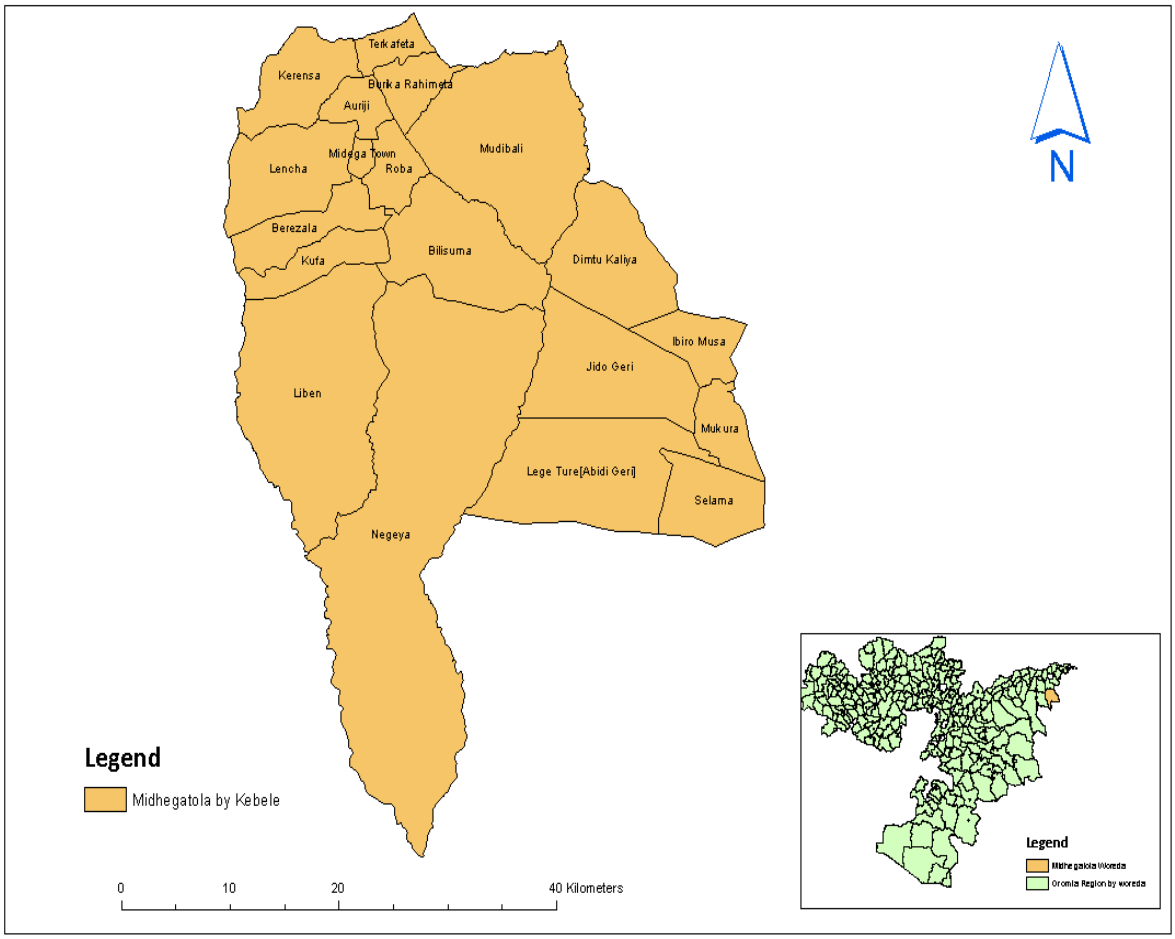
6.6 Annex 6: Location Maps of Study Areas

1. Administrative Map of Fedis

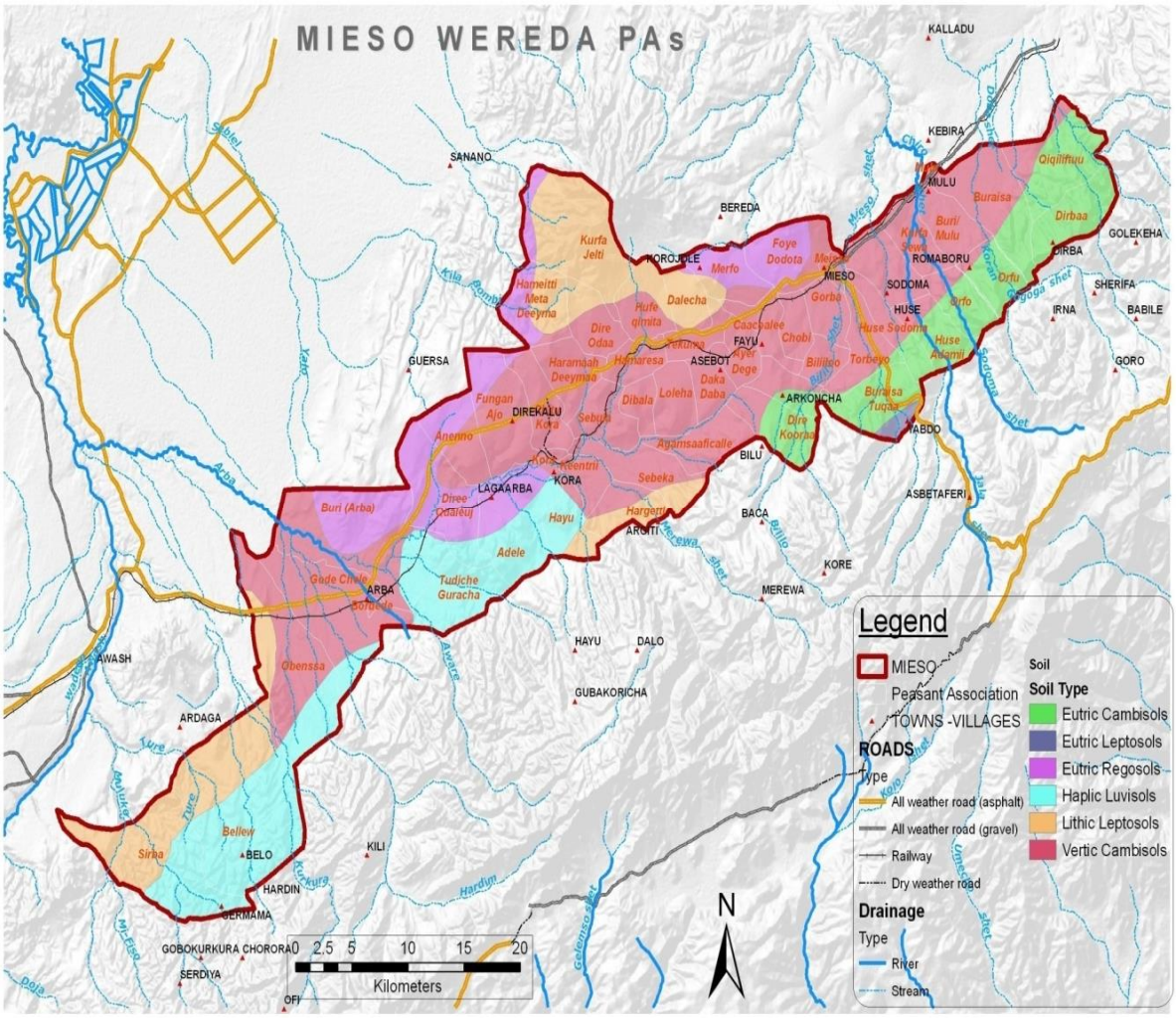
2. Administrative Map of Meta Woreda



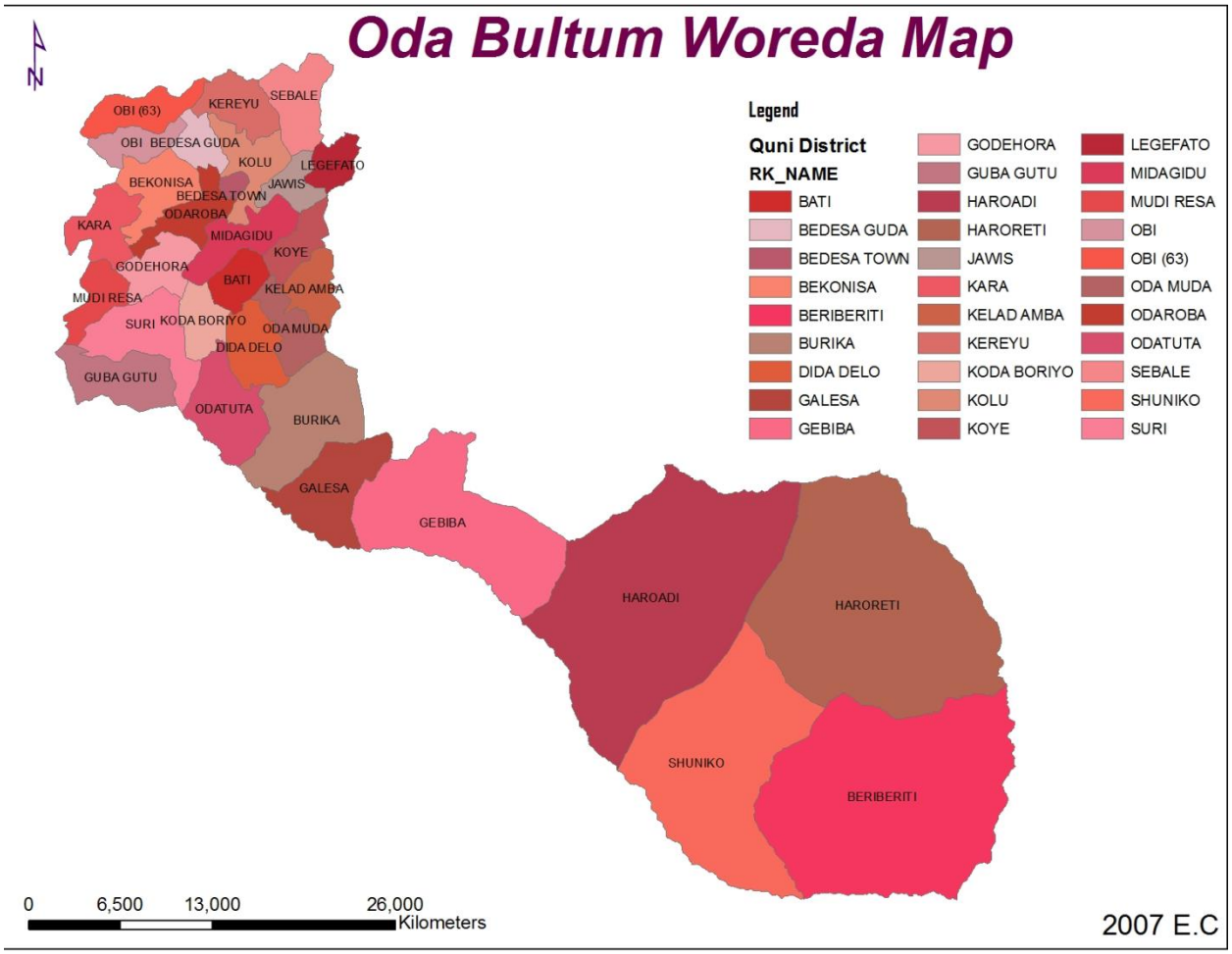
3. Administrative Map of Midhega Tola Woreda



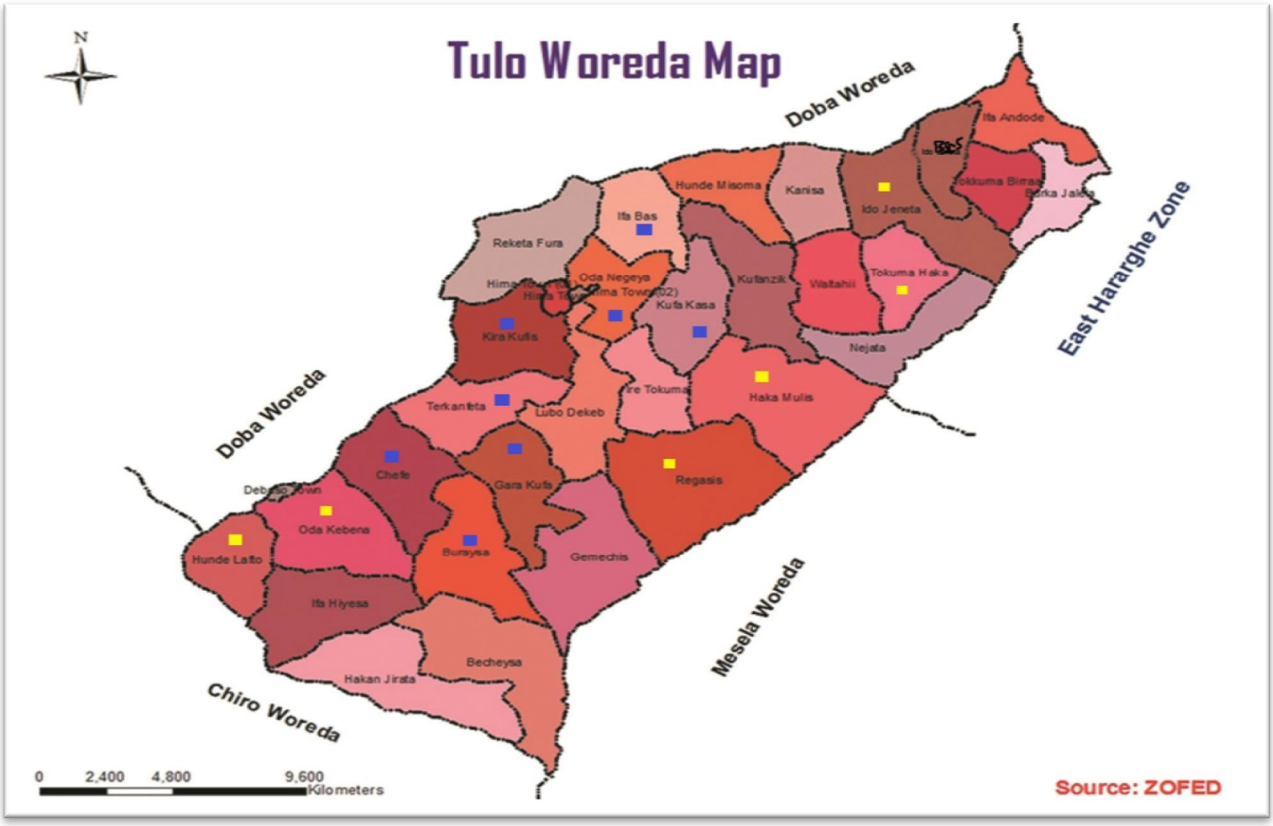
4. Administrative Map of Mieso



5. Administrative Map of Oda Bultum



6. Administrative Map of Tullo


Tulo Woreda Map
N
Doba Woreda
Ifa Andode
Hunde Misoma
Kanisa
Ido Jeneta
Tokuma Bimas
Ifa Bas
Reketa Fura
Oda Negeya
Kufanzik
Waltahii
Tokuma Haka
Kufa Kasa
East Hararghe Zone
Kira Kutis
Nejata
Doba Woreda
Terkanfeta
Lubo Dekeb
Haka Mulis
Chefe
Regasis
Gara Kufa
Oda Kebena
Hunde Lafto
Burayisa
Gemechis
Ifa Hiyesa
Mesela Woreda
Becheysa
Hakan Jirata
Chiro Woreda
0 2,400 4,800 9,600
Kilometers
Source: ZOFED

6.7 Annex 7: List of Survey Kebeles

S/No.	Zone	Woreda	Kebele
1			Agudora
2			Belina Arba
3		Fedis	Iftu
4		Midhega Tola	Mudhi Bali
5			Bilisuma
6			Urji
7		Meta	Ifa Biftu
8			Doke #2
9	East Hararghe		Gemechu Duse
10		Tullo	Chefe
11			Lubu Dakab
12			Waltahi
13		Oda Bultum	Lege Lafto
14			Guba Gutu
15			Goda Hora
16		Mieso	Dire Qalu
17			Weltane
18	West Hararghe		Sodoma Boromisra

6.8 Annex 8: Data Collection/Research Tools

REAAP Indigenous Knowledge and Practice Assessment

Household Survey Questionnaire

Start Time: _____

End Time: _____

Interviewee Code: _____,

General Information

Region: _____, Zone: _____, Woreda: _____ - (Code: _____)
Kebele/Village Name: _____ - (Code: _____)

Date of interview: _____, Day _____, Month _____ Year,

Name of interviewer: _____ Signature: _____,

S/No.	Questions	Responses	Code
100	**I. Demographic Profile**		
101	Position in the Household	Head of Household ……..…….. 1 Spouse ……...…… 2 Son/Daughter.…….…..…. 3 Mother/Father ……..……..…..… 4 Sister/Brother ……..……..……. 5 Other (specify) ……6	_____
102	Sex	Female ……...……...….. 1 Male ……...……...……... 2	_____
103	Age		_____
104	Household Size (number of family members)		_____
104.1	How many male(s) are (is) there in your family?		_____

104.2	How many female (s) are (is) there in your family?		_____
105	Level of Education	Illiterate ……,…….…..….. 0 Read/Write ……..……...……. 1 Primary School ……..…..…. 2 Secondary School ……..…..…. 3 Above High School ……..…….. 4	_____
200	**II. Livelihood Profile**		
201	What are your main sources of livelihood/income? [If the response is "Livestock/Pastoral" then proceed to question Q. 204]	Crop farming ……...…...…..…… 1 Livestock/Pastoral ….....…..…. 2 Mixed ……..…… 3 Daily Labor ……...…..…… 4 Gathering firewood or other forest products ……..……...……..….. 5 Trading ……..……...…..…....…. 6 Other off-farming (carpentry, handicrafts, mason, etc.) ……. 7	_____
		Other (specify) …… 8	
202	Landholding		
202.1	What is the size of your land in ha/qindi)?		_____
202.2	How do you evaluate the quality of your land in terms of productivity?	Very good …… 1 Poor …….. 2 Not productive ……. 3	_____
202.3	What type of land do you have? [If the response is not "Both Irrigable & Rain-fed", go to Q. 203]	Irrigable land ……..…… 1 Rain-fed land ……..…… 2	

		Both Irrigable & Rain-fed…….. 3	_____
202.4	What is the size of your irrigable land out of the total land you have?		_____
203	Land Use pattern		
203.1	What is the size of your land allocation for crop out of the total land you have?		_____
203.2	What is the size of your land allocation for vegetable out of the total land you have?		_____
203.3	What is the size of your land allocation for Fruits and perennial trees (Mango, Avocado, and orange, Chat, Eucalyptus or other) out of the total land you have?		
203.4	What is the size of your land for pasture/forage development out of the total land you have?		
204	Livestock Possession		
204.1	How many cattle (caw, ox, and heifer) do you have?		_____
204.2	How many goat/sheep do you have?		_____
204.3	How many chickens do you have?		_____
204.4	How many donkey/mule/horse do you have?		_____
204.5	How many Camels do you have?		_____
204.6	What other animals do you have? Please, specify		_____
300	**III. Perception on Climate Change**		
301.	How many rainy seasons do you have in your locality?	Do not know ……..…….....…..…… 0 I …….....…….. I	_____

		2 ……..……...…….. 2	
301.1	What are the local names for the different rainy seasons?	1. _____ 2. _____ 3. _____ 4. _____	
302	At what time of the year do you get these rains?		
302.1	Long rainy season	From _____ to _____	
302.2	Short rainy season	From _____ to _____	
303	Have you observed changes in the rainfall pattern in the past 10/20 years? [If response is "No" go to Q. 306]	No ……..…….…….. 0 Yes ……..……..……. 1	_____
304	What was the change you observed in rainfall pattern?	Occurrence: No ..... 0 Less frequent ..... 1 Frequent ..... 2 More frequent ..... 3 Others (Specify) 4	
304.1	Not in time (late start and early secession)		_____
304.2	Low in volume (insufficient for planting)		_____
304.3	Unpredictable rain during harvest season		_____
304.4	Frequent interruption of rain during rainy season		_____
304.5	Others (Specify)		_____
305	What do you think are causes for this?	God's curse ..... 1 Over exploitation of natural resources 2	_____

		Other (Specify)..... 3	
306	Have you ever heard about climate change? [If response is "no" go to Q. 401	No ..... 0 Yes 1	_____
307	Where did you hear about climate change?	Mass Media (Radio/TV) .....1 Family member ..... 2 Friends/Neighbors ..... 3 Extension Agent/Expert .....4 Others, (Please, specify 5	_____
400	**IV. Climate Hazard & Its Impact**		
401	Can you name/list major extreme (bad) weather events occur to your locality in the past 10/20 years? How frequent do they occur?	No .....0 Less frequent ..... 1 Frequent ..... 2 More frequent 3	_____
401.1	Drought		_____
401.2	Flood		_____
401.3	Off-season rain		_____
401.4	Hailstorm		_____
401.5	Windstorm		_____
401.6	Landslide		_____
401.7	Diseases outbreak (Livestock)		_____
401.8	Wild fire		_____
401.9	Emergence of new plant species/weeds		_____
401.10	Increasing Heat/temperature		_____

401.11	Tribal Conflict		_____
401.12	Insects/Pests infestation		_____
401.13	Human disease outbreak		
401.14	Others (Specify)		
402	In your opinion which one of weather extreme events has severely affected your livelihood?	Not severe ……..……....…. 0 Less sever ……..…….…… 1 Severe ……..……... 2 Highly severe ……..…… 3	
402.1	Drought		_____
402.2	Flood		_____
402.3	Off-season rain		_____
402.4	Hailstorm		_____
402.5	Windstorm		_____
402.6	Landslide		_____
402.7	Diseases outbreak (Livestock)		_____
402.8	Wild fire		_____
402.9	Emergence of new plant species/weeds		_____
402.10	Increasing Heat/temperature		_____
402.11	Tribal Conflict		_____
402.12	Insects/Pests infestation		_____
402.13	Human disease outbreak		
402.14	Others (specify)		
403	In your opinion how did these weather extreme events affected your crop farming	Not Applicable ……..…..…. 0 Reduced productivity ……..… 1 Reduced quality…….…… 2	_____

		Increased input cost .....……3 Others (specify) …….……. 4	
403.1	Please prioritize the effects of weather extreme events you mentioned above	1st _____ 2nd _____ 3rd _____	
404	In your opinion how did these weather extreme events affected your livestock production	Not Applicable ….…….…. 0 Reduced livestock productivity …..1 Reduced livestock quality…...…….2 Increased cost of feeding……...…..3 Increased disease……..……...…..…4 Shortage of food …….…….....…5 Death of livestock……..……..7 Others ……..……8	_____
404.1	Please prioritize the effects of weather extreme events you mentioned above	1st _____ 2nd _____ 3rd _____	
500	**V. Coping Strategy**		
501	What traditional measures (copying strategy) do you use to cope with the climate change events in case of crop production?	1. _____ 2. _____ 3. _____ 4. _____ 5. _____	_____

		6. _____	
502	What traditional measures (copying strategy) do you use to cope with the climate change events in case of livestock production?	1. _____ 2. _____ 3. _____ 4. _____ 5. _____	_____
503	How did your traditional copying strategies changed over time?	_____ _____	
VI.	**Awareness, Access to and Application of Meteorological Information**		
601	Have you ever heard of weather forecasts being broadcasted by Ethiopian Meteorology Agency (EMA)? [If "No" go to Q. 701]	No ..... 0 Yes 1	_____
602	If 601 what type of weather forecasts you heard of being disseminated by the Agency?	Daily forecast ……...……..……1 Seasonal forecast ……....….. 2 Both daily & seasonal forecast….. 3	_____
603	Where do you get this information (which source do you use to get weather forecast information?	Solely Radio ..... 1 Radio/TV ..... 2 DA/Experts ..... 3 Friends/neighbors .....4 Others (Specify) 5	_____
605	How frequent do you get this information?	Daily 1	

		Weekly .....2 Monthly .....3 Seasonally 4	_____
606	Do you use the information you get on weather forecast?	No …….. 0 Yes …….……1	_____
607	How do you use this information on planning your agricultural activities?	Plan activities based on EMA's weather forecast ……..…...……..1 Sometimes plan activities based on the information ……..…. 2 Do not plan activities based on the weather forecast by WMA ..…….. 3	_____
608	If you donotuse EMA's weather information for your agricultural practices, why not?	Have local knowledge and experience of weather to make decision ..... 1 Do not have time to listen and pay attention to EMA's weather information ..... 2 EMA's predictions do not come true and have caused losses ..... 3 The weather forecast is not made for our locality..... 4	_____
700	**VII. Indigenous Knowledge**		
701	Do you know of any traditional ways of predicting the weather (e.g., when the rainy season starts, when flood occurs, and so forth)? [If the response is "Yes" go to Q.705 & back to Q.702]	No …….……..…….. 0 Yes …….……..……. 1	_____

702	Are these methods used to predict weather mentioned above is still reliable today?	No ..... 0 Yes ..... 1 I do not know 2	_____
704	If not, why not, and what are the implications for your lives?	1._____ 2. _____ 3._____	

705. Prediction Indicators/signal and their interpretation/meaning

Local Indicators [Animal/birds, plant, celestial/astronomical, weather: wind, cloud, etc]	**Description of the Indicator**	**Meaning of the Indicators**	**Applicability of the Indicators**	
			Yes	**No**

REAAP Indigenous Knowledge and Practice Assessment

FGD Guiding Questions

Note-taker's name					
Facilitator's name					
Regional State	Oromia	Woreda		Kebele/village	
Location of interview					
MP3 folder		MP3 file name			
Date		Start time		Finish time	

Participant names	Sex	HH head?	Remark
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Were there any interruptions to the discussion?	
Were there any other problems or comments?	

1. **General Introductory Questions**
   1.1. How long have you been living in this village/community?
   1.2. Can you please explain what distinguishes your community from others in terms of its topography, natural resource, arable land size, land degradation, soil erosion,
   1.3. Can you please explain your farming practices?
   1.4. Can you please explain your traditional management practices of your environment and natural recourses (Forest, water resources, soil, pasture, etc)

2. **Perception on Climate Change**

   2.1. How do you see changes in environment in the course of your life? (Soil, pasture, water); Probe: quality of land, Soil erosion, land degradation, water availability, forest land, wild life, etc. Can you give reasons for these changes?
   2.2. Can you give possible reasons for the changes of the environment you told us above?
   2.3. How do you see a change of the climate? Probe: shift of rainy and dry seasons, change in rainfall pattern and duration, changes in springs, perennial rivers, ponds, etc. **(Ask this question if the answer to question 2.2 indicates the causes are climatic),**
   2.4. What do you think is (are) cause(s) for the climate change you talked above?

3. **Major Hazards, and Consequences:** Climate Change induced Disasters and Damages
   3.1. Have you experienced any major hazards over the past 20/30 years (e.g., floods, droughts, landslides, earth quake)? If yes can you please prioritize/rank them,
   3.2. When did these hazards occur (Draw timeline of events)? How frequent? **Write on a flip chart,**
   3.3. How did these events affect your community?
   3.4. Which community group was affected the most by these hazards?
   3.5. Would you please describe periods of major weather events and related hazards that occur in a year? (Major events like rainy and dry seasons, floods, drought, food shortage, pasture shortage, harvest time, planting time, etc.), (draw table – seasonal colander),

4. **Coping Strategy**
   4.1. How did you (your community) prepare to mitigate the foreseen disaster?
   4.2. How did you dealt with to survive/cope with the effects of the disasters? (Coping strategy by type of hazards),
   4.3. Is there any difference/similarity in women and PWD's coping mechanisms used to others? Please explain/list by type of disasters (*(Idea: „You have experienced droughts in the past It resulted in food shortage, livestock disease/death…")* How did you cope with drought impact? / How did you manage it? (**Water, soil, pasture**) Probe: animals (mechanisms like giving animals away); where did you get water from?
   4.4. Do you still use these mechanisms today? Why/why not?

   4.5. Indigenous Knowledge
   4.6. How do you predict possible whether extreme events?
   4.7. How is this knowledge passed on?

4.8. How can indigenous knowledge systems in the community contribute to disaster risk reduction?
4.9. Do you believe that this indigenous knowledge is still important in current ways of life?
4.10. Are there shortcomings in the use of your traditional practices (indigenous knowledge) in disaster risk reduction in your community? If there is can you please explain?
4.11. What can be done to improve the role of indigenous knowledge systems in disaster risk reduction? (How can IK be linked with improved extension and early warning systems?)

5. Level of Awareness, Access to and Application of Meteorological Information

5.1. Have you (your community) ever heard of weather forecasts being broadcasted by Ethiopian Meteorology Agency? If so, what do the forecasts tell about? If no thank and close the discussion.
5.2. Where do you get this information (which source do you use to get weather forecast information?
5.3. How frequent do you get this information (daily, weekly, and seasonally)?
5.4. Do you use the weather forecast information? Why/why not?
5.5. If "Yes", how do you use this information on your agricultural practices? Do you plan your activities based on the information you receive? Why?/Why not?
5.6. Is the indigenous knowledge better than what you hear from Radio/Extension agents?

6.10 Annex 9: Household Survey Data

	Woreda name												Total	
	Fedis		Mitta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
101) Position in the household	n	%	n	%	n	%	n	%	n	%	n	%	n	%
head of the household	48	.8	52	.9	44	.8	51	.9	48	.8	46	.8	289	.8
spouse	9	.2	4	.1	12	.2	3	.1	9	.2	9	.2	46	.1
son/daughter	0	.0	0	.0	0	.0	1	.0	0	.0	0	.0	1	.0
mother/father	0	.0	1	.0	0	.0	2	.0	0	.0	0	.0	3	.0
others	0	.0	0	.0	1	.0	0	.0	0	.0	2	.0	3	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
102) Sex	n	%	n	%	n	%	n	%	n	%	n	%	n	%
female	15	.3	5	.1	18	.3	5	.1	12	.2	18	.3	73	.2
male	42	.7	52	.9	39	.7	52	.9	45	.8	39	.7	269	.8
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
103) Age	n	%	n	%	n	%	n	%	n	%	n	%	n	%
35 to less than 50	22	.4	20	.4	28	.5	29	.5	22	.4	13	.2	134	.4
50 to less than 70	28	.5	36	.6	23	.4	25	.4	31	.5	36	.6	179	.5
70 and above	7	.1	1	.0	6	.1	3	.1	4	.1	8	.1	29	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

104) Household size(number of family members)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	0	.0	0	.0	1	.0	1	.0	0	.0	1	.0	3	.0
2	4	.1	2	.0	1	.0	3	.1	2	.0	5	.1	17	.0
3	6	.1	5	.1	2	.0	1	.0	0	.0	5	.1	19	.1
4	3	.1	6	.1	5	.1	6	.1	3	.1	7	.1	30	.1
5	7	.1	6	.1	9	.2	10	.2	7	.1	5	.1	44	.1
6	9	.2	10	.2	5	.1	8	.1	10	.2	14	.2	56	.2
7	11	.2	11	.2	9	.2	11	.2	6	.1	10	.2	58	.2
8	7	.1	9	.2	6	.1	6	.1	6	.1	6	.1	40	.1
9	3	.1	5	.1	7	.1	7	.1	8	.1	3	.1	33	.1
10	3	.1	3	.1	4	.1	0	.0	4	.1	1	.0	15	.0
11	2	.0	0	.0	2	.0	2	.0	5	.1	0	.0	11	.0
12	1	.0	0	.0	3	.1	0	.0	5	.1	0	.0	9	.0
13	1	.0	0	.0	2	.0	0	.0	1	.0	0	.0	4	.0
14	0	.0	0	.0	1	.0	1	.0	0	.0	0	.0	2	.0
18	0	.0	0	.0	0	.0	1	.0	0	.0	0	.0	1	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

104.1) How many male(s) is(are) there in your family?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0	0	.0	0	.0	2	.0	1	.0	0	.0	1	.0	4	.0
1	8	.1	6	.1	2	.0	3	.1	1	.0	9	.2	29	.1
2	14	.2	14	.2	20	.4	11	.2	10	.2	14	.2	83	.2
3	12	.2	13	.2	7	.1	20	.4	12	.2	21	.4	85	.2

4	6	.1	12	.2	7	.1	11	.2	9	.2	6	.1	51	.1
5	11	.2	5	.1	10	.2	7	.1	10	.2	2	.0	45	.1
6	2	.0	5	.1	4	.1	3	.1	10	.2	4	.1	28	.1
7	1	.0	1	.0	3	.1	0	.0	3	.1	0	.0	8	.0
8	3	.1	1	.0	2	.0	0	.0	1	.0	0	.0	7	.0
9	0	.0	0	.0	0	.0	0	.0	1	.0	0	.0	1	.0
12	0	.0	0	.0	0	.0	1	.0	0	.0	0	.0	1	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

104.2) How many female(s) is(are) there in your family?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0	0	.0	1	.0	0	.0	2	.0	1	.0	0	.0	4	.0
1	11	.2	9	.2	5	.1	9	.2	7	.1	10	.2	51	.1
2	9	.2	11	.2	10	.2	10	.2	6	.1	14	.2	60	.2
3	19	.3	13	.2	14	.2	12	.2	17	.3	16	.3	91	.3
4	9	.2	15	.3	10	.2	13	.2	12	.2	12	.2	71	.2
5	6	.1	6	.1	10	.2	6	.1	6	.1	4	.1	38	.1
6	3	.1	2	.0	3	.1	4	.1	5	.1	1	.0	18	.1
7	0	.0	0	.0	2	.0	0	.0	2	.0	0	.0	4	.0
8	0	.0	0	.0	1	.0	0	.0	1	.0	0	.0	2	.0
9	0	.0	0	.0	1	.0	1	.0	0	.0	0	.0	2	.0
10	0	.0	0	.0	1	.0	0	.0	0	.0	0	.0	1	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

105) Level of Education	Woreda name						Total
	Fedis	Metta	Mieso	Midhaga Tola	Oda Bultum	Tullo	

	n	%	n	%	n	%	n	%	n	%	n	%	n	%
illiterate	41	.7	32	.6	50	.9	36	.6	33	.6	35	.6	227	.7
read/write	12	.2	19	.3	5	.1	15	.3	14	.2	9	.2	74	.2
primary school	4	.1	4	.1	2	.0	4	.1	10	.2	11	.2	35	.1
secondary school	0	.0	2	.0	0	.0	1	.0	0	.0	2	.0	5	.0
above secondary school	0	.0	0	.0	0	.0	1	.0	0	.0	0	.0	1	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

201) What are your main source of livelihood/income? If "livestock/pastoral", skip to. 204	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
crop farming	50	.9	52	.9	26	.5	50	.9	55	1.0	53	.9	286	.8
livestock/pastoral	5	.1	5	.1	6	.1	4	.1	0	.0	1	.0	21	.1
mixed	1	.0	0	.0	23	.4	1	.0	0	.0	1	.0	26	.1
daily labor	0	.0	0	.0	0	.0	1	.0	0	.0	0	.0	1	.0
gathering firewood or other forest products	0	.0	0	.0	1	.0	0	.0	0	.0	0	.0	1	.0
trading	1	.0	0	.0	0	.0	0	.0	0	.0	1	.0	2	.0
Other off-farming(carpentry, handicraft, mason, etc..)	0	.0	0	.0	1	.0	0	.0	2	.0	0	.0	3	.0
others(crop farming & gathering firewood or other forest products)	0	.0	0	.0	0	.0	1	.0	0	.0	1	.0	2	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

202.1) What is the size of your land in Hectare?	Woreda name						Total
	Fedis	Metta	Mieso	Midhaga Tola	Oda Bultum	Tullo	

	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 hectare	47	.8	57	1.0	7	.1	26	.5	52	.9	55	1.0	244	.7
1 hectare to less than 2 hectare	6	.1	0	.0	10	.2	17	.3	2	.0	1	.0	36	.1
2 hectare and Above	3	.1	0	.0	39	.7	14	.2	1	.0	0	.0	57	.2
No land	1	.0	0	.0	1	.0	0	.0	2	.0	1	.0	5	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

202.2) How do you evaluate the quality of your land in terms of productivity?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Not applicable	1	.0	0	.0	1	.0	0	.0	2	.0	1	.0	5	.0
very good	26	.5	8	.1	16	.3	22	.4	21	.4	26	.5	119	.3
poor	30	.5	49	.9	40	.7	35	.6	34	.6	30	.5	218	.6
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

202.3) What type of land do you have? (if "not both irrigable & rain-fed", go to Q.203)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No land (not applicable)	1	.0	0	.0	1	.0	0	.0	2	.0	1	.0	5	.0
irrigable land	1	.0	2	.0	0	.0	0	.0	12	.2	2	.0	17	.0
rain-fed	55	1.0	51	.9	51	.9	57	1.0	29	.5	36	.6	279	.8
both irrigable & rain-fed	0	.0	4	.1	5	.1	0	.0	14	.2	18	.3	41	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

202.4) What is the size of your irrigable land out of total land you	Woreda name						Total
	Fedis	Metta	Mieso	Midhaga Tola	Oda Bultum	Tullo	

have?	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 hectare	1	.0	6	.1	4	.1	0	.0	23	.4	21	.4	55	.2
1 hectare to less than 2 hectare	0	.0	0	.0	0	.0	0	.0	3	.1	0	.0	3	.0
2 hectare and above	0	.0	0	.0	1	.0	0	.0	0	.0	0	.0	1	.0
No land (not applicable)	1	.0	0	.0	1	.0	0	.0	2	.0	1	.0	5	.0
No irrigable land	55	1.0	51	.9	51	.9	57	1.0	29	.5	35	.6	278	.8
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

203.1) What is the size of your land allocation for crop out of the total land you have?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 hectare	48	.8	55	1.0	12	.2	45	.8	55	1.0	56	1.0	271	.8
1 hectare to less than 2 hectare	2	.0	0	.0	11	.2	5	.1	0	.0	0	.0	18	.1
2 hectare and above	1	.0	0	.0	32	.6	7	.1	0	.0	0	.0	40	.1
No land	1	.0	0	.0	1	.0	0	.0	2	.0	1	.0	5	.0
not applicable	5	.1	2	.0	1	.0	0	.0	0	.0	0	.0	8	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

203.2) What is the size of your land allocation for vegetable out of the total land you have?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 hectare	9	.2	2	.0	1	.0	5	.1	8	.1	6	.1	31	.1
1 hectare to less than 2 hectare	0	.0	0	.0	1	.0	0	.0	0	.0	0	.0	1	.0
No land(not applicable)	1	.0	0	.0	1	.0	0	.0	2	.0	1	.0	5	.0

No land for vegetable	47	.8	55	1.0	54	.9	52	.9	47	.8	50	.9	305	.9
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

203.3) What is the size of your land allocation for fruits and perennial trees (mango, avocado and orange, khat, eucalyptus or other) out of the total land you have?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 hectare	37	.6	35	.6	16	.3	57	1.0	55	1.0	56	1.0	256	.7
1 hectare to less than 2 hectare	0	.0	0	.0	1	.0	0	.0	0	.0	0	.0	1	.0
No land (not applicable)	2	.0	0	.0	1	.0	0	.0	2	.0	1	.0	6	.0
No land for fruits and perennial	18	.3	22	.4	39	.7	0	.0	0	.0	0	.0	79	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

203.4) What is the size of your land for pasture/forage development out of total land you have?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 hectare	2	.0	0	.0	8	.1	6	.1	3	.1	2	.0	21	.1
1 hectare to less than 2 hectare	0	.0	0	.0	2	.0	2	.0	0	.0	0	.0	4	.0
No land(not applicable)	1	.0	0	.0	1	.0	0	.0	2	.0	1	.0	5	.0
No land for pasture/forage	54	.9	57	1.0	46	.8	49	.9	52	.9	54	.9	312	.9
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

204.1) How many cattle(caw, ox, and heifer) do you have?	Woreda name						Total
	Fedis	Metta	Mieso	Midhaga Tola	Oda Bultum	Tullo	

	n	%	n	%	n	%	n	%	n	%	n	%	n	%
none	8	.1	19	.3	4	.1	8	.1	11	.2	8	.1	58	.2
1 to 4	42	.7	34	.6	11	.2	34	.6	37	.6	41	.7	199	.6
5 to 9	7	.1	4	.1	22	.4	13	.2	8	.1	8	.1	62	.2
10 and above	0	.0	0	.0	20	.4	2	.0	1	.0	0	.0	23	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

204.2) How many goat/sheep do you have?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
none	18	.3	22	.4	10	.2	5	.1	32	.6	41	.7	128	.4
1 to 4	31	.5	29	.5	16	.3	30	.5	24	.4	15	.3	145	.4
5 to 9	7	.1	5	.1	17	.3	18	.3	1	.0	1	.0	49	.1
10 and above	1	.0	1	.0	14	.2	4	.1	0	.0	0	.0	20	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

204.3) How many chickens do you have?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
none	26	.5	31	.5	28	.5	18	.3	38	.7	26	.5	167	.5
1 to 4	25	.4	18	.3	21	.4	30	.5	15	.3	26	.5	135	.4
5 to 9	6	.1	6	.1	7	.1	7	.1	4	.1	5	.1	35	.1
10 and above	0	.0	2	.0	1	.0	2	.0	0	.0	0	.0	5	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

204.4) How many	Woreda name	Total

donkeys/mule/horse do you have?	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
none	12	.2	41	.7	13	.2	6	.1	19	.3	41	.7	132	.4
1 to 4	45	.8	16	.3	44	.8	50	.9	36	.6	16	.3	207	.6
5 to 9	0	.0	0	.0	0	.0	1	.0	1	.0	0	.0	2	.0
10 and above	0	.0	0	.0	0	.0	0	.0	1	.0	0	.0	1	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

204.5) How many camels do you have?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
none	50	.9	56	1.0	36	.6	55	1.0	51	.9	57	1.0	305	.9
1 to 4	7	.1	1	.0	10	.2	2	.0	6	.1	0	.0	26	.1
5 to 9	0	.0	0	.0	6	.1	0	.0	0	.0	0	.0	6	.0
10 and above	0	.0	0	.0	5	.1	0	.0	0	.0	0	.0	5	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

301) How many rainy seasons do you have in your locality?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1 do not know	0	.0	1	.0	1	.0	0	.0	0	.0	1	.0	3	.0
Two	57	1.0	56	1.0	56	1.0	57	1.0	57	1.0	56	1.0	339	1.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

301.1) What are the local names for the different rainy seasons?	Woreda name						Total
	Fedis	Metta	Mieso	Midhaga Tola	Oda Bultum	Tullo	

	n	%	n	%	n	%	n	%	n	%	n	%	n	%
I do not know	0	.0	1	.0	1	.0	0	.0	0	.0	1	.0	3	.0
Badheysa and Ganna	49	.9	37	.6	48	.8	53	.9	54	.9	53	.9	294	.9
Muqadama and Ganna	8	.1	19	.3	8	.1	4	.1	3	.1	3	.1	45	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

302.1) At what time of the year do you get these rains? long rainy season	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
I do not know	0	.0	1	.0	1	.0	0	.0	0	.0	1	.0	3	.0
June/July to August/September	57	1.0	56	1.0	56	1.0	57	1.0	57	1.0	56	1.0	339	1.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

302.2) At what time of the year do you get these rains? short rainy season	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
I do not know	0	.0	1	.0	1	.0	0	.0	0	.0	1	.0	3	.0
February/March to April/May	57	1.0	56	1.0	56	1.0	57	1.0	57	1.0	56	1.0	339	1.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

303) Have you observed changes in the rainfall pattern in the past 10/20 years? (if 'NO' go to Q.306)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	0	.0	2	.0	0	.0	0	.0	0	.0	0	.0	2	.0
Yes	57	1.0	55	1.0	57	1.0	57	1.0	57	1.0	57	1.0	340	1.0

Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

304.2) Low in volume(insufficient for planting)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	%	n	%	n	%	n	%	n	%	n	%	n	%	n
No	0	.0	2	.0	0	.0	0	.0	0	.0	0	.0	2	.0
less frequent	12	.2	11	.2	11	.2	20	.4	13	.2	21	.4	88	.3
frequent	29	.5	26	.5	28	.5	18	.3	32	.6	32	.6	165	.5
more frequent	16	.3	18	.3	18	.3	19	.3	12	.2	4	.1	87	.3
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

304.3) unpredictable rain during harvest season	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	0	.0	2	.0	0	.0	0	.0	0	.0	0	.0	2	.0
less frequent	27	.5	31	.5	36	.6	28	.5	41	.7	38	.7	201	.6
frequent	11	.2	20	.4	17	.3	17	.3	14	.2	14	.2	93	.3
more frequent	19	.3	4	.1	4	.1	12	.2	2	.0	5	.1	46	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

304.4) frequent interruption of rain during rainy season	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	0	.0	2	.0	0	.0	0	.0	0	.0	0	.0	2	.0
less frequent	28	.5	15	.3	16	.3	28	.5	17	.3	31	.5	135	.4
frequent	16	.3	29	.5	30	.5	20	.4	34	.6	24	.4	153	.4

more frequent	13	.2	11	.2	11	.2	9	.2	6	.1	2	.0	52	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

305) What do you think are causes for this?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Allah (God's) curse	29	.5	31	.5	30	.5	30	.5	36	.6	29	.5	185	.5
over exploitation of natural resources	20	.4	19	.3	26	.5	24	.4	19	.3	21	.4	129	.4
Allah (God's) curse and over exploitation of natural resources	8	.1	7	.1	1	.0	3	.1	2	.0	7	.1	28	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

306) Have you ever heard about climate change? (if "No", go to Q.401)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	13	.2	9	.2	11	.2	15	.3	11	.2	16	.3	75	.2
Yes	44	.8	48	.8	46	.8	42	.7	46	.8	41	.7	267	.8
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

307) Where did you hear about climate change?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not applicable	13	.2	9	.2	11	.2	15	.3	11	.2	16	.3	75	.2
mass media(radio/TV)	15	.3	12	.2	8	.1	12	.2	12	.2	15	.3	74	.2
family member	2	.0	5	.1	3	.1	1	.0	3	.1	5	.1	19	.1

friends/neighbors	5	.1	4	.1	14	.2	9	.2	9	.2	10	.2	51	.1
extension agents/expert	17	.3	16	.3	4	.1	14	.2	10	.2	8	.1	69	.2
others(friends/neighbors and extension agents/expert, family member and mass media(radio/TV)	5	.1	11	.2	17	.3	6	.1	12	.2	3	.1	54	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
401.1) drought	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	5	.1	4	.1	1	.0	2	.0	2	.0	7	.1	21	.1
less frequent	3	.1	1	.0	5	.1	2	.0	13	.2	27	.5	51	.1
frequent	28	.5	7	.1	12	.2	7	.1	31	.5	21	.4	106	.3
more frequent	21	.4	45	.8	39	.7	46	.8	11	.2	2	.0	164	.5
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
401.2) flood	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	46	.8	41	.7	52	.9	53	.9	26	.5	21	.4	239	.7
less frequent	8	.1	7	.1	2	.0	1	.0	15	.3	20	.4	53	.2
frequent	2	.0	8	.1	0	.0	1	.0	11	.2	14	.2	36	.1
more frequent	1	.0	1	.0	3	.1	2	.0	5	.1	2	.0	14	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.3) off-season rain	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	13	.2	5	.1	22	.4	9	.2	10	.2	17	.3	76	.2
less frequent	17	.3	23	.4	19	.3	23	.4	25	.4	29	.5	136	.4
frequent	18	.3	27	.5	14	.2	7	.1	19	.3	10	.2	95	.3
more frequent	9	.2	2	.0	2	.0	18	.3	3	.1	1	.0	35	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.4) hailstorm	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	20	.4	34	.6	34	.6	44	.8	16	.3	28	.5	176	.5
less frequent	31	.5	20	.4	22	.4	10	.2	25	.4	24	.4	132	.4
frequent	4	.1	2	.0	1	.0	2	.0	15	.3	4	.1	28	.1
more frequent	2	.0	1	.0	0	.0	1	.0	1	.0	1	.0	6	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.5) windstorm	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	29	.5	36	.6	30	.5	47	.8	20	.4	37	.6	199	.6
less frequent	22	.4	17	.3	23	.4	9	.2	22	.4	16	.3	109	.3
frequent	4	.1	4	.1	4	.1	1	.0	12	.2	4	.1	29	.1
more frequent	2	.0	0	.0	0	.0	0	.0	3	.1	0	.0	5	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.6) landslide	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	50	.9	39	.7	51	.9	52	.9	45	.8	45	.8	282	.8
less frequent	5	.1	9	.2	4	.1	3	.1	2	.0	6	.1	29	.1
frequent	0	.0	8	.1	0	.0	0	.0	4	.1	6	.1	18	.1
more frequent	2	.0	1	.0	2	.0	2	.0	6	.1	0	.0	13	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.7) diseases outbreak (livestock)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	26	.5	29	.5	30	.5	24	.4	32	.6	37	.6	178	.5
less frequent	25	.4	1	.0	6	.1	8	.1	11	.2	12	.2	63	.2
frequent	5	.1	15	.3	20	.4	19	.3	11	.2	8	.1	78	.2
more frequent	1	.0	12	.2	1	.0	6	.1	3	.1	0	.0	23	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.8) wild fire	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	50	.9	51	.9	50	.9	48	.8	46	.8	37	.6	282	.8
less frequent	2	.0	2	.0	6	.1	3	.1	4	.1	14	.2	31	.1
frequent	2	.0	1	.0	0	.0	3	.1	5	.1	6	.1	17	.0
more frequent	3	.1	3	.1	1	.0	3	.1	2	.0	0	.0	12	.0

Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.9) emergence of new plant species/weeds	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	5	.1	12	.2	4	.1	7	.1	12	.2	10	.2	50	.1
less frequent	9	.2	6	.1	6	.1	2	.0	14	.2	14	.2	51	.1
frequent	19	.3	24	.4	36	.6	28	.5	20	.4	22	.4	149	.4
more frequent	24	.4	15	.3	11	.2	20	.4	11	.2	11	.2	92	.3
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.10) increasing heat/temperature * Woreda name Cross tabulation

401.10) increasing heat/temperature	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	n	n	n	n	n	n	n	n	n	n	n	n	n
No	13	.2	7	.1	1	.0	8	.1	9	.2	15	.3	53	.2
less frequent	8	.1	11	.2	7	.1	3	.1	22	.4	30	.5	81	.2
frequent	23	.4	27	.5	24	.4	25	.4	17	.3	10	.2	126	.4
more frequent	13	.2	12	.2	25	.4	21	.4	9	.2	2	.0	82	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

401.11) tribal conflict	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	45	.8	33	.6	1	.0	8	.1	33	.6	46	.8	166	.5
less frequent	7	.1	16	.3	1	.0	32	.6	17	.3	5	.1	78	.2

frequent	1	.0	5	.1	13	.2	12	.2	4	.1	6	.1	41	.1
more frequent	4	.1	3	.1	42	.7	5	.1	3	.1	0	.0	57	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
401.12) insects/pests infestation	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	15	.3	15	.3	6	.1	16	.3	17	.3	14	.2	83	.2
less frequent	20	.4	13	.2	6	.1	21	.4	11	.2	18	.3	89	.3
frequent	11	.2	21	.4	21	.4	15	.3	19	.3	18	.3	105	.3
more frequent	11	.2	8	.1	24	.4	5	.1	10	.2	7	.1	65	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
401.13) human diseases outbreak	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	24	.4	30	.5	27	.5	28	.5	29	.5	34	.6	172	.5
less frequent	30	.5	22	.4	27	.5	28	.5	21	.4	15	.3	143	.4
frequent	2	.0	5	.1	0	.0	1	.0	4	.1	7	.1	19	.1
more frequent	1	.0	0	.0	3	.1	0	.0	3	.1	1	.0	8	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.1) drought	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	0	.0	0	.0	0	.0	0	.0	1	.0	6	.1	7	.0

less severe	5	.1	2	.0	7	.1	1	.0	16	.3	19	.3	50	.1
severe	25	.4	7	.1	14	.2	3	.1	19	.3	28	.5	96	.3
highly severe	27	.5	48	.8	36	.6	53	.9	21	.4	4	.1	189	.6
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.2) flood	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	52	.9	46	.8	51	.9	54	.9	29	.5	24	.4	256	.7
less severe	5	.1	6	.1	0	.0	1	.0	9	.2	14	.2	35	.1
severe	0	.0	4	.1	4	.1	0	.0	7	.1	18	.3	33	.1
highly severe	0	.0	1	.0	2	.0	2	.0	12	.2	1	.0	18	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.3) off-season rain	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	20	.4	11	.2	43	.8	16	.3	19	.3	26	.5	135	.4
less severe	10	.2	16	.3	1	.0	12	.2	19	.3	14	.2	72	.2
severe	20	.4	26	.5	12	.2	11	.2	16	.3	17	.3	102	.3
highly severe	7	.1	4	.1	1	.0	18	.3	3	.1	0	.0	33	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.4) hailstorm	n	%	n	%	n	%	n	%	n	%	n	%	n	%

not severe	18	.3	38	.7	38	.7	47	.8	19	.3	28	.5	188	.5
less severe	21	.4	15	.3	17	.3	7	.1	23	.4	17	.3	100	.3
severe	10	.2	4	.1	2	.0	3	.1	6	.1	12	.2	37	.1
highly severe	8	.1	0	.0	0	.0	0	.0	9	.2	0	.0	17	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.5) windstorm	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	29	.5	43	.8	31	.5	51	.9	27	.5	41	.7	222	.6
less severe	19	.3	10	.2	24	.4	4	.1	17	.3	14	.2	88	.3
severe	5	.1	4	.1	2	.0	2	.0	4	.1	2	.0	19	.1
highly severe	4	.1	0	.0	0	.0	0	.0	9	.2	0	.0	13	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.6) landslide	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	52	.9	42	.7	56	1.0	50	.9	47	.8	49	.9	296	.9
less severe	3	.1	9	.2	1	.0	3	.1	2	.0	8	.1	26	.1
severe	1	.0	4	.1	0	.0	2	.0	3	.1	0	.0	10	.0
highly severe	1	.0	2	.0	0	.0	2	.0	5	.1	0	.0	10	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

402.7) diseases outbreak (livestock)	Woreda name						Total
	Fedis	Metta	Mieso	Midhaga Tola	Oda Bultum	Tullo	

	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	16	.3	21	.4	21	.4	20	.4	22	.4	24	.4	124	.4
less severe	35	.6	13	.2	17	.3	14	.2	17	.3	26	.5	122	.4
severe	5	.1	14	.2	18	.3	18	.3	18	.3	7	.1	80	.2
highly severe	1	.0	9	.2	1	.0	5	.1	0	.0	0	.0	16	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.8) wild fire	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	49	.9	49	.9	48	.8	54	.9	54	.9	49	.9	303	.9
less severe	5	.1	2	.0	4	.1	0	.0	1	.0	6	.1	18	.1
severe	2	.0	2	.0	5	.1	1	.0	1	.0	2	.0	13	.0
highly severe	1	.0	4	.1	0	.0	2	.0	1	.0	0	.0	8	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.9) emergence of new plant species/weeds	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	7	.1	12	.2	3	.1	5	.1	5	.1	11	.2	43	.1
less severe	6	.1	6	.1	6	.1	4	.1	15	.3	19	.3	56	.2
severe	19	.3	21	.4	33	.6	30	.5	22	.4	17	.3	142	.4
highly severe	25	.4	18	.3	15	.3	18	.3	15	.3	10	.2	101	.3
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

402.10) increasing	Woreda name	Total

heat/temperature	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	12	.2	3	.1	1	.0	3	.1	5	.1	12	.2	36	.1
less severe	6	.1	6	.1	12	.2	6	.1	31	.5	28	.5	89	.3
severe	26	.5	32	.6	22	.4	32	.6	13	.2	17	.3	142	.4
highly severe	13	.2	16	.3	22	.4	16	.3	8	.1	0	.0	75	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.11) tribal conflict	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	40	.7	41	.7	2	.0	11	.2	53	.9	48	.8	195	.6
less severe	16	.3	10	.2	4	.1	40	.7	1	.0	7	.1	78	.2
severe	1	.0	6	.1	11	.2	5	.1	1	.0	2	.0	26	.1
highly severe	0	.0	0	.0	40	.7	1	.0	2	.0	0	.0	43	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
402.12) insects/pests infestation	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	12	.2	14	.2	6	.1	13	.2	11	.2	10	.2	66	.2
less severe	15	.3	13	.2	7	.1	15	.3	12	.2	18	.3	80	.2
severe	17	.3	23	.4	23	.4	20	.4	20	.4	21	.4	124	.4
highly severe	13	.2	7	.1	21	.4	9	.2	14	.2	8	.1	72	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

402.13) human diseases outbreak	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not severe	22	.4	25	.4	25	.4	24	.4	22	.4	24	.4	142	.4
less severe	35	.6	29	.5	28	.5	33	.6	35	.6	29	.5	189	.6
severe	0	.0	3	.1	2	.0	0	.0	0	.0	4	.1	9	.0
highly severe	0	.0	0	.0	2	.0	0	.0	0	.0	0	.0	2	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

403) In your opinion how these weather extreme events did affected your crop farming?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not applicable	0	.0	1	.0	0	.0	0	.0	1	.0	3	.1	5	.0
reduced productivity	35	.6	33	.6	52	.9	44	.8	45	.8	40	.7	249	.7
reduced quality	14	.2	21	.4	1	.0	9	.2	5	.1	7	.1	57	.2
increased input cost	8	.1	2	.0	4	.1	4	.1	6	.1	7	.1	31	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

403.1) Please prioritize the effects of weather extreme events you mentioned above	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Not Applicable	0	.0	1	.0	0	.0	0	.0	1	.0	3	.1	5	.0
1st Reduced productivity 2nd Reduced quality 3rd Increased input cost	21	.4	29	.5	38	.7	36	.6	33	.6	32	.6	189	.6

1st Reduced productivity 2nd Increased input cost and 3rd Reduced quality	15	.3	4	.1	14	.2	7	.1	12	.2	8	.1	60	.2
1st Reduced productivity 2nd Increased input cost and 3rd Not Applicable	0	.0	0	.0	0	.0	1	.0	0	.0	0	.0	1	.0
1st Reduced quality 2nd Reduced productivity and 3rd Increased input cost	11	.2	16	.3	0	.0	5	.1	3	.1	5	.1	40	.1
1st Reduced quality 2nd increased input cost and 3rd Reduced productivity	2	.0	5	.1	1	.0	4	.1	2	.0	2	.0	16	.0
1st increased input cost 2nd Reduced productivity and 3rd Reduced quality	6	.1	2	.0	2	.0	2	.0	4	.1	6	.1	22	.1
1st increased input cost 2nd Reduced quality and 3rd Reduced productivity	2	.0	0	.0	2	.0	2	.0	2	.0	1	.0	9	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

404) In your opinion how these weather extreme events did affected your livestock production?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not applicable	0	.0	1	.0	0	.0	0	.0	3	.1	7	.1	11	.0
reduced livestock productivity	11	.2	10	.2	8	.1	9	.2	2	.0	7	.1	47	.1
reduced livestock quality	6	.1	5	.1	0	.0	5	.1	2	.0	8	.1	26	.1
increased cost of feeding	13	.2	4	.1	2	.0	7	.1	7	.1	5	.1	38	.1
increased disease	1	.0	4	.1	1	.0	1	.0	1	.0	0	.0	8	.0

shortage of food	20	.4	26	.5	41	.7	27	.5	37	.6	27	.5	178	.5
death of livestock	6	.1	7	.1	5	.1	8	.1	5	.1	3	.1	34	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

404.1) Please prioritize the effects of weather extreme events you mentioned above	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Not Applicable	1	.0	1	.0	0	.0	0	.0	3	.1	7	.1	12	.0
1st Reduced livestock productivity 2nd Reduced livestock quality and 3rd Increased cost of feeding	5	.1	8	.1	19	.3	6	.1	12	.2	4	.1	54	.2
1st Reduced livestock productivity 2nd Increased cost of feeding and 3rd Reduced livestock quality	9	.2	0	.0	1	.0	0	.0	1	.0	0	.0	11	.0
1st Reduced livestock productivity 2nd Increased disease and 3rd Increased cost of feeding	0	.0	3	.1	6	.1	3	.1	3	.1	4	.1	19	.1
1st Reduced livestock productivity 2nd Death of livestock and 3rd Increased cost of feeding	24	.4	25	.4	7	.1	19	.3	14	.2	20	.4	109	.3
1st Increased cost of feeding 2nd Reduced livestock productivity and 3rd Reduced livestock quality	6	.1	1	.0	1	.0	8	.1	3	.1	4	.1	23	.1
1st Shortage of food 2nd Reduced livestock quality and 3rd Reduced livestock productivity	1	.0	3	.1	1	.0	5	.1	3	.1	0	.0	13	.0

1st Shortage of food 2nd Reduced livestock productivity and 3rd Increased cost of feeding	3	.1	0	.0	1	.0	1	.0	3	.1	8	.1	16	.0
1st Shortage of food 2nd Reduced livestock productivity and 3rd Increased disease	3	.1	5	.1	2	.0	3	.1	4	.1	3	.1	20	.1
1st Shortage of food 2nd Reduced livestock productivity and 3rd Death of livestock	3	.1	7	.1	13	.2	7	.1	5	.1	0	.0	35	.1
1st Shortage of food 2nd Increased cost of feeding and 3rd Reduced livestock productivity	2	.0	4	.1	6	.1	5	.1	6	.1	7	.1	30	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

601) Have you ever heard of weather forecasts being broadcasted by Ethiopian Meteorology Agency (EMA)? (if "No", go to Q. 701)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	10	.2	9	.2	7	.1	10	.2	7	.1	11	.2	54	.2
Yes	47	.8	48	.8	50	.9	47	.8	50	.9	46	.8	288	.8
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

602) If yes for Q.601, what type of weather forecasts do you get that is disseminated by the agency?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not applicable	10	.2	9	.2	7	.1	10	.2	7	.1	11	.2	54	.2
I do not get the information	18	.3	14	.2	11	.2	17	.3	20	.4	21	.4	101	.3
daily forecast	5	.1	5	.1	4	.1	3	.1	2	.0	7	.1	26	.1

seasonal forecast	17	.3	25	.4	34	.6	24	.4	23	.4	17	.3	140	.4
both daily and seasonal forecast	7	.1	4	.1	1	.0	3	.1	5	.1	1	.0	21	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

603) Where do you get this information (which source do you use to get weather forecast information?)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not applicable	28	.5	23	.4	18	.3	27	.5	27	.5	32	.6	155	.5
solely radio	7	.1	14	.2	17	.3	11	.2	18	.3	16	.3	83	.2
radio/TV	7	.1	7	.1	1	.0	5	.1	4	.1	5	.1	29	.1
DA/expert	9	.2	5	.1	13	.2	7	.1	5	.1	3	.1	42	.1
friends/neighbors	3	.1	8	.1	6	.1	7	.1	2	.0	1	.0	27	.1
others (DA/expert, friends/neighbors and radio)	3	.1	0	.0	2	.0	0	.0	1	.0	0	.0	6	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

604) How frequent do you get this information?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not applicable	28	.5	23	.4	18	.3	27	.5	27	.5	32	.6	155	.5
daily	2	.0	5	.1	2	.0	0	.0	0	.0	5	.1	14	.0
weekly	0	.0	3	.1	2	.0	2	.0	2	.0	5	.1	14	.0
monthly	6	.1	4	.1	7	.1	7	.1	6	.1	4	.1	34	.1
seasonally	21	.4	22	.4	28	.5	21	.4	22	.4	11	.2	125	.4
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

605) Do you use the information you get on weather forecast?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	13	.2	19	.3	18	.3	14	.2	9	.2	10	.2	83	.2
Yes	16	.3	15	.3	21	.4	16	.3	21	.4	15	.3	104	.3
not applicable	28	.5	23	.4	18	.3	27	.5	27	.5	32	.6	155	.5
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

606) How do you use this information on planning your agricultural activities?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
not applicable	28	.5	23	.4	18	.3	27	.5	27	.5	32	.6	155	.5
plan activities based on EMA's weather forecast	4	.1	4	.1	6	.1	2	.0	2	.0	3	.1	21	.1
sometimes plan activities based on EMA's weather forecast	12	.2	11	.2	15	.3	14	.2	19	.3	12	.2	83	.2
do not plan activities based on EMA's weather forecast	13	.2	19	.3	18	.3	14	.2	9	.2	10	.2	83	.2
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

607) If you donotuse EMA's weather information for your agricultural practices, why not do not?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
I am using EMA's weather forecast	16	.3	15	.3	21	.4	16	.3	21	.4	15	.3	104	.3
have local knowledge and experience of weather to make	2	.0	4	.1	0	.0	1	.0	1	.0	1	.0	9	.0

decision														
I do not have time to pay attention EMA's weather Information	4	.1	4	.1	5	.1	2	.0	4	.1	0	.0	19	.1
EMA's predictions do not come true and have caused losses	6	.1	5	.1	7	.1	4	.1	1	.0	4	.1	27	.1
the weather forecast is not made for our locality	1	.0	6	.1	6	.1	7	.1	3	.1	5	.1	28	.1
Not applicable	28	.5	23	.4	18	.3	27	.5	27	.5	32	.6	155	.5
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

701) Do you know of any traditional ways of predicting the weather (e.g., when the rainy season starts, when flood occurs, and so forth)? (if "Yes", go to Q.704 and back to 702)	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	7	.1	4	.1	5	.1	8	.1	4	.1	3	.1	31	.1
Yes	50	.9	53	.9	52	.9	49	.9	53	.9	54	.9	311	.9
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

702) Are these methods used to predict weather mentioned above is still reliable today?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
No	29	.5	32	.6	26	.5	26	.5	28	.5	22	.4	163	.5
Yes	20	.4	21	.4	24	.4	22	.4	21	.4	29	.5	137	.4
I do not know	8	.1	4	.1	7	.1	9	.2	8	.1	6	.1	42	.1
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

703) If not, why not, what are the implications for your lives?	Woreda name												Total	
	Fedis		Metta		Mieso		Midhaga Tola		Oda Bultum		Tullo			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Not applicable (I am using)	20	.4	21	.4	24	.4	22	.4	21	.4	29	.5	137	.4
Endogenous knowledge is not passed to us properly from our ancestors	5	.1	0	.0	2	.0	8	.1	1	.0	3	.1	19	.1
Only Allah (God) knows what will happen in future	26	.5	32	.6	19	.3	21	.4	34	.6	23	.4	155	.5
Disappearance of local indicators (like Birds, Trees and Wild animals)	5	.1	2	.0	7	.1	4	.1	1	.0	1	.0	20	.1
Modern science and religious influence are pressuring us to abandon our traditional way of dealing with our environment	1	.0	2	.0	5	.1	2	.0	0	.0	1	.0	11	.0
Total	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	57	1.0	342	1.0

-- End of Indigenous Knowledge & Practices Assessment Report --