An Assessment of the Existing Early Warning and Response Systems to Disasters in Arero District, Borena Zone of Oromia Regional State

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Abstract: This paper assessed the existing systems of early warning and early responses in the Arero district of Borna zone, Oromia regional state. The assessment was conducted based on data obtained from primary and secondary sources. The primary data were generated through focus group discussions with members of Disaster Management/Early Warning Committee at woreda and kebele levels and community elders. The secondary data were gathered from the review of secondary materials. Community level discussions were also conducted by a means of participatory assessment techniques. The study found that the most severe risks commonly prevalent in the area were drought (food insecurity) due to an acute shortage of rainfall; conflict between Borena and Geri, Borena and Guji, the Digodi and Meria in alliance with Geri against Borena and Guji over resources; and bush encroachments were also identified as threats to the livelihoods of Borena pastoralists. The pastoralist communities predict about the occurrence of risks/disasters based on the existing indigenous early warning systems. There are the Ayyaantu who are people with knowledge of astronomy, and predict the occurrence of an event by looking into the position of stars, sun, and the moon in specific seasons. Besides, Uchuu are gifted people who can predict the occurrence of an event by reading the intestine of fresh slaughtered animal. There are indicators of risks identified by pastoralists in the existing early warning and response mechanisms based on their indigenous knowledge systems.

Keywords: Arero; Assessment; Borena; Disaster; Early warning; Risk
1. Introduction

In Ethiopia, pastoralist communities represent 12% of the total population (Mussa, 2014) and they basically reside in the arid and semi-arid lowland areas of the country which are normally vulnerable to rainfall variability (Ministry of Agriculture of Ethiopia, 2013). They contribute 22% of the country’s cattle population; share 12-16% of Ethiopia’s gross domestic product (GDP) and 30-35% of the agricultural GDP (National Oceanic and Atmospheric Administration, 2002). Despite the tremendous efforts and their rich knowledge of customary institutions regarding forecasting disasters/risks, the resilience capacities of Ethiopian pastoralists remain poor (Adrian and Andy, 2012; USAID, 2011).

A disaster is defined as a serious disruption of the functioning of a community or a society causing widespread human, material, economic, or environmental losses that exceed the ability of the affected community or society to cope using its own resources.

It results from the combination of hazards, conditions of vulnerability, and insufficient capacity or measures to reduce the potential negative consequences of risk (UN/International Strategy for Disaster Reduction, 2004). Therefore, disasters are not unpredictable and unavoidable events but rather unsolved problems of development. Disaster risk management (DRM) refers to the systematic process of using administrative decisions, organization, operational skills, and capacities to implement policies, strategies, and coping capacities of the society and communities to lessen the impacts of hazards and related environmental and technological disasters. This includes all forms of activities, including structural and nonstructural measures to avoid (prevent) or to limit (mitigation, preparedness, and response) the adverse effects of hazards and related environmental and technological disasters. This includes all forms of activities, including structural and nonstructural measures to avoid (prevent) or to limit (mitigation, preparedness, and response) the adverse effects of hazards (UN/ISDR, 2004). DRM is usually divided into three main areas of activity: disaster risk reduction (prevention, mitigation, and preparedness), disaster response (rescue and relief), and disaster recovery (rehabilitation and reconstruction). While these areas of activity are often referred to as separate “phases” or components of disaster management for administrative funding and programming purposes, in reality they overlap and affect each other (The World Bank, June 2008).

In light of the immense human suffering as a result of disasters, humanitarian early warning in recent years has developed knowledge-based models to help decision-makers formulate coherent better strategies to prevent or limit the destructive effects of both manmade and natural disasters (FAO, 2012). The emphasis is less on forecasting, but rather on anticipating the potential for crisis. Extensive literature in this field has provided a range of definitions for early warning, with a number of common elements: collection of information using specific indicators, analysis of information - attaching meaning to indicators, setting it into context, recognizing crisis development, formulation of best and worst-case scenarios and response options and communication to decision-makers.

Besides, it is the systematic collection and analysis of information coming from areas of crises for the purpose of anticipating the escalation of risks/disasters. It is also any initiative that focuses on the six core mechanisms of early warning systems,
namely on systematic data collection, data analysis, assessment for warning or identification of different scenarios, formulation of action proposals, transmission of recommendations, and assessment of early response. Engendering early warning is an important tool that tries to improve the weaknesses of early warning systems since incorporating gender-sensitive indicators into the collection and analysis of processes of early warning makes existing models more comprehensive and the use of a gender-lens enriches early warning analysis and allows for more appropriate response options equally benefiting men and women.

The principles of early warning and the associated focus on conflict prevention and other crisis/disasters can also be applied after conflict has erupted - concentrating on conflict-containment, minimizing human suffering and avoiding spillover conflict - as well as in post-conflict phases, focusing on preventing the resurgence of conflict (Lund 1996; FEWER, 1999; and Schmeidl 2001). What separates early warning from peacebuilding and conflict mitigation is its implied proactive and not reactive character, with a focus on early rather than late action.

Conflict early warning and response (EWR) was conceived as a means of preventing violent conflict in order to protect people’s life. Early warning has three component parts as estimating the magnitude and timing of relative risks of emerging threats, analyzing the nature of these threats and describing plausible scenarios, and communicating warning analyses to decision makers (Woocher, 2008; cited in Herbert and Tobias, 2009). Therefore, this paper tries to assess the indigenous and modern systems of early warning and response mechanisms that are functional in Arero district of Borena zone. The indigenous mechanisms of disaster early warning and response mechanisms in the study area have rich and long years of experiences and are more acceptable and effective when compared to the recent history of modern system of early warning and response system. The promotion and effective implementation of such mechanisms enable the vulnerable pastoral community disaster resilient. Building resilient communities towards recurrent droughts is increasingly becoming an important element in development endeavors, particularly among pastoral communities who are highly vulnerable to disasters/risks and stresses.

The main theoretical and conceptual framework of this research was derived from the Disaster Risk Management (DRM) approach promoted by the United Nations through the International Agency for Disaster Reduction - ISDR. One of the main aspects in this approach is that disasters are not seen as events of nature by itself but the product of complicated relationships involving the natural and organizational structure of a society (UN-ISDR, 2005).

Natural disasters are inevitable, cannot be prevented, but the efforts can always be put and be successful in reducing their impacts on people and communities. So, identifying and studying the disaster/risk and taking appropriate and timely actions to control or manage them are our responsibilities. The human intervention with nature has increased the chances of such natural hazards to happen as we disturb the natural processes. As a result, the practice of disaster risk management is very crucial.
Disaster risk management can be described as a collection of measures involving public administration, decentralization, organizational and institutional development (or strengthening), community-based strategies, engineering, settlement development and land use planning. It also takes into consideration environmental issues as part of the risk mitigation and reduction strategies (UN-ISDR, 2002).

The reduction of disaster/risk in the present and control of the future disaster/risk should be achieved by combining structural measures (using technological solutions like flood levees) and nonstructural measures (like legislation, land-use planning and insurance) that foster risk management as an integrating concept and practice which are relevant and implemented during all stages of a community’s development process and not just as a post-disaster response (UN-ISDR, 2002; UNDP, 2004).

Disaster risk management requires a deep understanding of the root causes and underlying factors that lead to disasters in order to arrive at solutions that are practical, appropriate and sustainable for the community at risk (UN-ISDR, 2005).

Risk information management refers to an interactive process of exchanging information and opinions between diverse actors regarding the nature and associated risks of a hazard on the individual or community and the appropriate responses to minimize the risks (IFRC, 2005). The essential, accurate, relevant and timely information on disasters can reduce the loss of life or property in the event of a disaster/risk. The UN-ISDR strategy for risk management senses that there is no single approach that can be considered as highly effective in disaster management. It says that a variety of methodologies and measures developed over the years with an effort to achieve safety.

From the point of view of social capital theory in the context of the occurrence of disaster/risk management, whenever there is a natural and man-made disaster, people help one another before they are supported or replaced by government entities (Schellong, 2007:2). This is referred to as Buusaa Gonofaa (social support system or insurance mechanism) among the Borena pastoralists. Communities and their social networks are very important during and after disasters/risks. The affected community is a direct and active participant at all phases of dealing with a disaster: preparedness, response, recovery and mitigation. According to Schellong (2007:4), out of the four phases above, response phase presents the most socially complex stage of the disaster spectrum. According to Beggs et al. (1996), disaster/risk victims and the subsequent social networks mostly become resources. These informal groups tend to be based on some previously existing social relationships in the community, such as the family, the neighborhood, the school, friendship bonds and work association.

Besides, social networks model realizes social networks in a illustrative manner. They assist each member in creating or seeking a network of friends, acquaintances, people who share the same interests to the members. According to Schellong (2007:4) social capital lowers the transaction costs of information acquisition. The social networks can be used as a podium for sharing and discussing information on disaster management issues. The basics of social capital theory strengthen the principles behind public awareness. The pre-disaster stage may be faster and more effective using social networks (that are predicted by the wise men in the locality).
which will enhance collective actions undertaken by people during emergency situations.

The general objective of the assessment was to assess the existing early warning information and response systems in the study area.

The following were the specific objectives of the assessment of early warning and response systems in the study area: (a) to assess the roles of customary institutions in conflict and natural resource management, (b) to assess the existing disasters/risks prevalent in the area; (c) to explore the existing early warning and early response systems; and (d) to identify the strength and weakness of modern systems in predicting risks.

2. Research Methods
2.1. Description of the Study Area
Arero Woreda is found in the Borena Zone of Oromia Regional State, located 765 KMs south of Addis Ababa along Addis – Moyale road. The total population of Arero Woreda is estimated to be 110,474, of which 50.7% and 49.3% are females and males, respectively. The rural population comprises nearly 87% of the total population while the remaining 13% are urban residents. The topography of Arero Woreda includes a mountain range, and gently undulating & flat plains. The altitudinal range varies from 1,000-1,800 meters above sea level (Arero Woreda Disaster and Preparedness Office Annual Report, 2011).

Rainfall pattern in Arero woreda is bi-modal in character and erratic in nature. There are two rainy seasons in a year. About 60% of the total annual rainfall is received in the long rainy season, which extends from March to May, while the remaining rainfall is received in short rainy season that extends from September to November. The rainfall pattern can be characterized as erratic, unpredictable, and unreliable. Average annual rainfall ranges from 400mm to 700mm with wide variation in area and time. According to Coppock (1994), there is a one in five chances of rainfall in a given year falling below 75% of the long-term average. He also identified that in this ecosystem two consecutive dry years cause drought. Indeed, the delay and/or absence of one rainy season causes widespread livestock mortality, crop failure, and subsequent food and water shortage for the settled and mobile population of the area.

The arid and semi-arid climatic ecosystem of Arero has created two subsistence production systems: pastorals and agro-pastorals, the interactions of which constitute the bases for local food supply, sustainable and subsistence livelihood. Arero is a land of extensive type of livestock production characterized by seasonal movement, and herd diversification, the justification of which are optimum utilization of the scarce rangeland resources (pasture, browse, and water). Livelihood is largely dependent on livestock and livestock products. About 96% of Arero’s pastoral community food is either directly or indirectly obtained from livestock and livestock products. Originally, the lowlanders were exclusively pastoralists, however, fundamental shifts in pastoral style of life are underway today especially cultivation...
of crops are being practiced in areas having high rainfall and water collecting landscapes, which is agro-pastorals.

2.2. Sampling, Method of Data Collection and Analysis

The study has employed qualitative method in which data were collected using focus group discussions, personal observations and informal discussions. These methods of qualitative data collection have been identified as appropriate (Yin, 2003). The focus group discussions (5 from each ‘kebele’-the lowest administrative unit) were conducted with members of Disaster Management/Early Warning Committees at Woreda and kebele level as well as community elders of both sexes including youth groups. Community level discussions were conducted by a means of participatory assessment techniques. The assessment of early warning and response system was also conducted based on the review of secondary materials such as project documents, progress and assessment reports mainly by Woreda line departments, National Disaster Management Policy guidelines, and related literatures on early warning systems in Ethiopia.

Early warning was used here in a complete system sense encompassing the generation and effective use of advance information on impeding risks. Hence, the assessment focused on reviewing existing early warning systems from the perspective of people-centered early warning system and its four key elements: risk knowledge; monitoring and warning service; communication and dissemination of warnings; and community response capacity. For this purpose, checklists were prepared and used to guide the overall discussion and assessment of the early warning and response systems which were organized in a structured manner. The checklists were categorized for the communities as well as for the governmental and non-governmental officers who were working in early warning and response systems. Accordingly, the assessment design and establishment of people-centered early warning systems were conducted in two kebeles of Arero woreda, namely Wachile and Gadaa as they were more prone to natural and manmade disasters. The two kebeles (the lowest administrative unit) were selected purposively based on the severity of recurrent conflicts and drought situations. Both men, women and youth group of each kebele have been included in the focus group discussions who have had better experience and knowledge about their environment and culture.

Concerning the analysis of qualitative data, the research was based on the theoretical and methodological principles of subjective interpretations (i.e. grounded theory). To this effect, a content analysis technique has been employed to analyze the qualitative data. The analysis technique targets at organizing and reducing of the empirical data into themes or essences through analytical induction. Qualitative data analysis is a process of making sense of data through uncovering themes, concepts, insights, patterns, categories, perceptions and understandings. The analysis involves an iterative, inductive and reductive process of formulating conceptual ordering for data is called coding that facilitates conditions for the constructing themes, essences, descriptions and theories (Walker & Myrick, 2006). According to Miles and Huberman (1994), qualitative data analysis involves three macro processes. These are
data reduction (extracting the essence), data display (organizing for meaning), and drawing conclusions (explaining the findings).

3. Result and Discussion

3.1. Assessing Risks/Disasters, Actors and their Responses

3.1.1. The prevalent disasters/risks in the area

Assessment/identification of risk is to identify the potential risks that might affect a locality and carryout a preliminary assessment about their potential threat to the socio-economic environment. This is done to assess whether there is a chance of any problem. One of the ways to identify such problem is to map the location or to analyze the history of such events. If it is identified that the disaster/risk exists, then there is a requirement of the assessment about whether that disaster/risk disturbs the day to day activities of the affected community. The risk identification process needs to evaluate the mutuality condition posed by both the hazard that threatens an exposed system or individual, and the vulnerability which expresses the possibility that the system or individual exposed is affected by the hazardous event (Cardona, 2003). Disasters/risks and vulnerabilities are dynamic both spatially and temporally.

Some of the disasters/risks (both manmade and natural risks) commonly occurred in the study area are food insecurity due to drought and intermittent rain, conflict, animal diseases, human diseases (malaria, influenza, cholera) and others. The most severe disasters/risks commonly prevalent in the area are drought (food insecurity) due to an acute shortage of rainfall. The second most important disaster/risk is conflict over resources like water, grazing land, forest resources and the like. Bush encroachments (unwanted trees for livestock and grass for goats) are also mentioned as threats to the livelihoods of Borena pastoralists. To mention a few are Gubri and the unknown and unnamed thorny bush which devastates other grass and tree species are the most prevalent threats of bush encroachments. According to the Gadaa kebele community elders, such a phenomenon appeared almost twenty years ago and it becomes more severe in its intensity for the last ten years.

![Figure 1: Threats of bush encroachments (thorny bush)](source: Field inquiry, 2015)

Bush encroachment as a feature of range degradation is characterized by the invasion of undesirable woody species and unpalatable fobs and loss of grass layer. Bush
encroachment is prominent in rangelands where grazing pressure is high. Estimates show that about 50% of the Borena rangeland is covered by unwanted bushes, mainly *Commiphora africana* (Gufa, 1998). It is believed that this species spread rapidly following the ban on the use of fire and due to seed dispersal through camel and goat dung. Traditionally, pastoralists use fire (i.e., rotational burning of the range) as a tool for range management to control undesirable plant species. Burning removes moribund grass, renews the pasture and reduces tree saplings. Following the official banning of fire, the woodlands have thickened, with tree regeneration out-competing the herbaceous layer.

Elder pastoralists in the focus group discussion at Wachile kebele also mentioned that insects on grass that brought disease for camel and livestock is the other newly emerging risks. An insect named *Buketa* is an agent of illness which certainly causes abortion to camels, i.e., locally known as *Siilessa*. When camels and other animals eat the grass and bushes, they (grass and bushes) cause illness. When their dung together with grass is eaten by other animals, it will be transmitted from one area to another. Mobility is mentioned as their primary coping strategy when pastoralists observe such kind of phenomenon. Another coping mechanism adopted by pastoralists is rotation, i.e. burning the bushes so as to control insect infestations and then shift to other safe areas. These problems mainly happen during a severe shortage of rainfall and also after the end of rainy season.

However, there are conditions that endanger pastoralists’ indigenous coping mechanisms. One of these conditions is the introduction of regional boundaries that restricts their freedom of movement when such kinds of natural catastrophes erupt in the area. Population pressure is also an obstacle so as to implement pastoralists’ indigenous ways of coping strategies. Their vast rangeland is almost occupied by pastoralist communities and there is no enough free space to move in to while they burn the area infected with *Buketa*.

Table 1. A summary of common animal diseases in the study area

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of the disease</th>
<th>Characteristics of the diseases</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Sombeessa</strong></td>
<td>Lung disease</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td><strong>Harka</strong></td>
<td>Swell/bulge out animal’s shoulder</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td><strong>Siilessa</strong></td>
<td>Trachea disease (a cause for camels’ abortion)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td><strong>Oyyalee</strong></td>
<td>Foot and mouth disease</td>
<td>The most severe</td>
</tr>
<tr>
<td>5.</td>
<td><strong>Summutee</strong></td>
<td>Causes animals to become very slim and thin</td>
<td>No medical treatment</td>
</tr>
</tbody>
</table>

Source: Field inquiry, 2015

According to the Arero community elders, from the 17th of *Gadaa* regimes, only the three *Gadaa* rules-which were based at Negelle-were successful in providing vaccination when such kind of animal diseases erupted. In this regard, the rest of
Gadaa regimes were very bad. The elders also stated that such kinds of animal diseases occurred almost before the 17th Abbaa Gadaa regime (i.e. 17 x 8= 136 years ago).

The pastoralist communities predict/know about the occurrence of such risks/disasters based on the existing indigenous early warning systems. There are the Hayyuu (wise men) who have a special skill to predict such risks based on the existing Abbaa Gadaa regime. The Raagaas are those individuals who possess a spirit called the Ekerra that foretells about the future. Raagaas are risk predictors. There are also men who can predict about risks based on animal intestine. They look into and read the freshly slaughtered animal’s intestine and predict what will happen in the future.

3.1.2. Actors in disasters/risks and their responses

Table 2. Actor identification sheet

<table>
<thead>
<tr>
<th>System actors</th>
<th>Do you see this organization/person as a key actor? (Yes/No)</th>
<th>Why/why not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pastoralists &amp; DRR(^1) committee</td>
<td>Yes</td>
<td>They are directly participating in DRR activities</td>
</tr>
<tr>
<td>Clan leaders</td>
<td>Yes</td>
<td>Responsible for community mobilizations and organizations</td>
</tr>
<tr>
<td>GO’s</td>
<td>Yes</td>
<td>They are major stakeholders in EWRS at different steps</td>
</tr>
<tr>
<td>Pastoral development office at woreda level</td>
<td>Yes</td>
<td>They are the main actors since they give technical backups specially the DPPO desk for the kebeles</td>
</tr>
<tr>
<td>NGOs</td>
<td>Yes</td>
<td>Participate in early warning assessments, responses and monitoring systems</td>
</tr>
<tr>
<td>CBOs</td>
<td>Yes</td>
<td>Participate in mitigating risks as a stakeholder</td>
</tr>
<tr>
<td>Waaccuu(^2) and Ayyaantuu(^3)</td>
<td>Yes</td>
<td>They are responsible in identifying and predicting risks and aware the different stakeholders for an immediate response and preparation for the risks</td>
</tr>
</tbody>
</table>

Source: Field inquiry, 2015

\(^1\) DRR = Disaster and risk reduction

\(^2\) Waaccuu are gifted people who can predict the occurrence of an event by reading the intestine of fresh slaughtered animal.

\(^3\) Ayyaantuu are people with knowledge of astronomy, and predict the occurrence of an event by looking into the position of stars, sun, and the moon in specific seasons.
### Table 3. Actors, their activities and positions in the system summary sheet

<table>
<thead>
<tr>
<th>Actors</th>
<th>Primary activity</th>
<th>Position in the knowledge system</th>
<th>Impact on system performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pastoralists &amp; DRR committee</td>
<td>Chalele (the system of screening the most vulnerable ones to the risk)</td>
<td>Central to the process between the community and decision makers</td>
<td>Early warning and response system will not be efficient and fair if they are not actively participated</td>
</tr>
<tr>
<td>Clan leaders</td>
<td>Facilitation and community mobilization</td>
<td>Administrative unites at clan level</td>
<td>Play important role in community mobilization for the efforts to respond to disasters/risks</td>
</tr>
<tr>
<td>GOs</td>
<td>Early warning, response, mitigating, rehabilitation and monitoring and evaluation</td>
<td>Decision makers, implementers in the response systems</td>
<td>No one is going to predict and aware the community about the upcoming events if they are not present</td>
</tr>
<tr>
<td>Pastoral development office at Woreda level</td>
<td>Give technical backups specially the DPPO desk for the kebeles, data collection, analysis, assessment, monitoring and evaluation</td>
<td>Responsible to bridge the community and higher officials</td>
<td>No one is going to predict and aware the community about the upcoming events if they are not present</td>
</tr>
<tr>
<td>NGOs</td>
<td>Early warning, response, mitigating, rehabilitation, monitoring and evaluation</td>
<td>NGOs like Save USA, SOS Sahel &amp; AFD are committee in EWRS</td>
<td>No one is going to predict and aware the community about the upcoming events if they are not present</td>
</tr>
<tr>
<td>CBOs</td>
<td>Early warning, response, mitigating, rehabilitation and monitoring and evaluation</td>
<td>Main actors of the indigenous knowledge in EWRS in predicting about the future</td>
<td>No one is going to predict and aware the community about the upcoming events if they are not present</td>
</tr>
<tr>
<td>Ayyaantuu and Waaccuu</td>
<td>They are responsible in identifying and predicting risks and aware the different stakeholders for an immediate response and preparation for the risks</td>
<td></td>
<td>No one is going to predict and aware the community about the upcoming events if they are not present</td>
</tr>
</tbody>
</table>

*Source: Field inquiry, 2015*
Table 4. Actors’ task analysis sheet

<table>
<thead>
<tr>
<th>Tasks/actors</th>
<th>Predict risks</th>
<th>Awareness &amp; early warning about risks</th>
<th>Report about risks</th>
<th>Mitigating risks</th>
<th>Humanitarian activities</th>
<th>Rehabilitation</th>
<th>Assessment</th>
<th>Monitoring &amp; evaluation</th>
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<td>GOs</td>
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</table>

Source: Field inquiry, 2015
3.2. Customary Institutions, Conflict and Natural Resource Management

3.2.1. Conflict scenarios in the study area

Conflict in the pastoral areas is common in their day to day life because of the scarcity of natural resources that lead them to unwanted and destructive violence. A case in point is the conflict between Borena of Arero district, Wachile kebele and Geri of Udet district, Udet kebele. The Borena people are ethnically Oromo living in Borena zone of Oromia regional state while the Geri people are ethnically Somali living in Liben zone of Somali regional state. In addition to the primary actors of conflict, there are secondary actors who made coalition/alliances on both sides. These are the Digodi and Meria Somali clans united with Geri against the Borena. The Kenyan Borena clan usually unites with Ethiopian Borena community to fight against the Geri people and its alliances. There are also conflicts between the Borena and Guji clans of the Oromo ethnic group. In both cases, the major cause is the competition over the scarce natural resources. Besides ethnic identity, disputes over regional boundaries (Somali with Oromia) and politics are considered as causes of conflicts between Borena and Geri. In that case the conflict is more severe and intense than that of the conflict between Borena and Guji in which conflict cases are due to competition of scarce natural resources.

Figure 2: Water points as sources of conflict
Source: Field inquiry, 2015

3.2.2. Customary institutions in managing conflict and natural resources

Sustainable natural resource management (SNRM) is today a well-established concept within international environmental discourse. The concept is also widely adopted within development theory, reflecting efforts to combine issues of social and economic conditions in developing countries and their connection to environmental
degradation. Moreover, the concept brought about an increased interest for community-based natural resource management (CBNRM). With an increased number of failed projects grounded in the traditional approaches, the CBNRM approach raised attention to the role of local stakeholders as well as local level institutions (Ballet, Sirven and Requiers-Desjardins, 2007). Customary institutions are rooted in indigenous knowledge systems which have the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities (Warren, 1991) and are more effective in knowledge production and application particularly among pastoral communities.

There are strong traditional norms and values that pastoral communities have been using to direct and control the behavior of individual member of the society. Customary institutions in pastoral communities are organized to serve the social, economic, security and development needs of its members. They are also in charge of formulating laws, managing resources, and enforcing resource use rules and regulations. They are run by community elders who have had rich and long years of accumulated knowledge of the ecology and adapting the production systems based on experiences as elders have strong social capital and networks. They have well organized structures from top up to grassroots level that enable them to handle different issues near and inside the community members. All community members are expected to adhere to the social norms, values and principles that strength their social capital and networks.

The concept of social capital is defined and understood in various ways and there are disagreements about its nature across disciplines (Streeten, 2002). Social capital is a key asset of the marginalized pastoral communities. When pastoralists’ livelihood systems are vulnerable to disasters/risks, they depend on indigenous mechanisms and social insurance schemes in times of severe stresses and disasters/risks. The Borena Buusaa Gonofaa indigenous welfare scheme is a good example of such strong locally developed social insurance schemes which is neither local reciprocity nor membership in an association rather it is by birth to the Borena clan. Membership to a certain group/association is the measure frequently used in the empirical approach to the analysis of social capital. This is rather problematic in the context of societies that have long-established indigenous institutions such as the Borena Buusaa Gonofaa, where membership is by birth rather than by choice.

The customary institutions involved in natural resource management in Borena are set out in three levels–those with overall customary jurisdiction over land, social and cultural issues (including conflict) in the pastoral lands of Borena; those in the middle with the critical responsibility of regulating seasonal access to grazing and water, and those at the local level of grazing and water management. The head of each institution is referred to as the “Abbaa”, and each has a council of male elders–this is known as the “Jaarsa” at all levels except for the Gaadaa, when it is known as the Raaba Gaadaa (Ann, 2007).

Concerning the overall customary institutions, according to the Seera Aadaa (customary law), all Borena men collectively own Borena land and through their clan
Borena people have access to natural resources. The Seera Aadaa sets out codes of conduct for natural resource management, social relations, food and dress. The Gadaa is the Borena age grade or generation system in which one age set is said to rule before handing over to the next younger age set. The head, the Abbaa Gadaa, is composed of three selected leaders with different social and cultural responsibilities. The “meeting of the multitude”, the Gumii Gaayoo, takes place every eight years mid-point in the Abbaa Gadaa’s time, and at this meeting the successors to the Abbaa are chosen. All Borena men are entitled to attend, speak and be heard all the processes and what is going on.

With regard to mid-level customary institutions, a Dheeda is a customary territorial natural resource management unit, which is sufficiently extensive to allow dry and wet season mobility of cattle. Within one Dheeda, therefore, dry and wet mobility patterns can mean livestock crossing several woreda, and boundaries can shift according to mobility patterns. Jaarsa Dheeda are responsible for decisions about mobility; addressing social disputes and have an important role in conflict resolution. Disputes and conflicts not resolved at Jaarsa Dheeda level are referred to the Raaba Gadaa.

This was to regain control of access to pastures close to Reera, which are used for lactating herds and to prevent fragmentation of grazing areas (Homann, 2005). Reera (composed of homesteads with at least one adult woman) are confined to a limited area, commonly along a line. The Jaarsa Dheeda had a pivotal role in ensuring the organized mobility of herds in the customary pastoral system. Through time, for a number of reasons, this role weakened and established patterns of mobility between wet and dry season grazing areas were not necessarily adhered to by herders. Re-establishing and strengthening the Dheeda in Borena and Guji (and other zones) has been a major focus of NGOs and Government efforts since the 1990’s.

In the local level customary institutions, the Madda is a smaller customary territorial natural resource management unit, comprising of several villages (Ollaa). It is commensurable with the PA. Disputes and conflicts not resolved at Jaarsa Maddaa level are referred to the Jaarsa Dheeda. A Reera is a larger group of residential unit- several families. Each Reera sends an elder to the Jaarsa Maddaa. A Jaarsa Maddaa usually compromised of elders from 14 to 17 Reera. An Ardaa comprises of two or more Ollaa; it is responsible for managing water and grazing land for cultivation. The ollaa is a small family-based residential unit of about ten households. The Jaarsa Ollaa are commonly called upon by the PA to mobilize labor for development projects (such as school, clinic, road construction, etc). Warra or Ibidda is a household. Abbaa Herreegaa is the water manager responsible for the day to day management of a well. The position is not hereditary; the man is chosen by the Jaarsa Ollaa. Konfii is the man who initially excavates a well. Access rights to a well are thereafter organized through the clan.

3.3. Indicators of Disasters/Risks
Disaster disrupts the functioning of a pastoralist’s community or a society causing widespread human, material, economic or environmental losses which exceed the
ability of the affected community or society to cope using its own resources (UNISDR, 2009). It is increasingly becoming global development challenge in many Sub-Saharan African countries. Such recurrent disasters/risks weaken development gains in every setting, especially, dragging the poor and most vulnerable part of communities (UNISDR, 2015) particularly the most vulnerable pastoralist communities. The Borena pastoralists are the case in point. The Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) are extremely challenged in many communities and countries by losses from recurrent disasters, shocks and stress (UN, 2015; UNDP, 2004; UNISDR, 2015; USAID, 2011).

Indicators of disasters/risks in this paper are roughly divided into different categories based on the pastoralists’ observation of animal and human behaviors, plants, sun, moon and stars in response to changes in meteorological conditions and cycles that correspond to long term weather patterns. The movement of astral bodies including the sun, moon, stars, and other planets mark the cycles of natural and manmade disasters.

A) Human behavior
There are the occurrences of recurrent group conflicts of children while they are playing. Children’s conflict within and among the different villages are considered as signs of future pastoralists’ conflicts. Another sign/indicator of future pastoralists’ conflict is the occurrence of theft by adults. It is believed that theft in Borena culture is very unusual and if it occurs it is extremely cursed nuisance. Focus group discussion (FGD) participants at Gadaa kebele asserted that when people insult each other while passing by, it is one of the indicators of future instability and conflicts in the area. When there are disagreements during public assemblies (discussions) and disperse without solutions, the future is uncertain and people fear that there will be conflicts in the near future.

B) Animal behavior
A sign of conflict
Animal behavior is another prediction indicator identified by the community. If cattle sleeps forming a ring on its tail place it on its leg, this is an indicator of the occurrence of conflict in three months’ time. Animals form this ring as a sign of running and migration to avoid the conflict. Cattle avoiding good pasture, and preferring to graze in opposite direction or bad pasture indicates the likelihood of the occurrence of a conflict in the direction of the good pasture, and migration root in the opposite direction. There are also echoes animals make signaling the upcoming of conflicts. A cry from calf warns animal to get back home early in the morning, and this indicates bad future (like conflict and drought conditions).

A sign of drought
The behavior of a bull, particularly avoiding the folks and grazing alone even in good and mating season is a sign of upcoming drought or failure of the main rainy season
in front. It is believed that bulls avoid mating fearing that the newly born calve will die due to the drought. Cattle usually sleep scattered and filling the whole fence when the coming season is normal or good. However, they sleep together and congested near the gate if the condition is so bad, and shows that most of the animals will die from drought. Cattle’s leaking each other’s neck is another prediction indicator showing death of cattle as a result of drought. On the opposite, if they leak each other’s shoulder shows good season in front. Under normal conditions, cattle will not lay down their dungs while sleeping. But, if cattle lay dungs while sleeping, it is a sign of drought occurring in the upcoming year.

C) Stars
The Ayyaantuu (traditional astronomers) are the knowledgeable people in the community that foretell the occurrence of different hazards by looking at the position of different stars during the night. The wise men (Ayyaantuu) look at the stars and predict about the future if they show special features. Stars are one of the prediction indicators used by the Ayyaantuu to determine the conditions of the upcoming year. According to these traditional astronomers, there are seven major and different stars that are visible to the naked eye. The position of these stars changes seasonally and the pattern of change is irregular depending on the season. Hence, this particular positioning of the stars along with the season is used to predict the occurrence of disaster or risk as a result of drought, conflict or disease. Based on this, they will seek for solutions like mobility and prepare for such events. The Ayyaantuu play a critical role in traditional risk management and land use practices. Their function is not limited to forecasting. They also identify areas with better pasture and water and advice communities to take their livestock to those identified areas so as to save the pasture in the immediate neighborhoods for small animals and future use. Besides, the Ayyaantuu along with the Gadaa representatives order the local manager of pasture and water to conduct an assessment of pasture and water availability in the area and other conditions like the issue of peace.

D) Moon
The condition of moon in a particular month also gives a meaning to the Ayyaantuu as to what is coming in the next one year. The Ayyaantuu mainly look at the date of the month and the season in which the moon becomes half and full. If the dates and season of the half and full moon do not coincide with the normal patterns known to the Ayyaantuu, it is a sign of something strange happening to the community. However, the Ayyaantuu clearly predict the occurrence of a specific hazard by combining the results of the moon with other prediction indicators.

E) Animal intestine
Borena pastoralists believe that reading the intestine of a freshly slaughtered animal may tell the occurrence of disaster/risk. According to the Ayyaantuu and Waaccuu, the intestine has different blood vessels, the alignment of which tells the situation community will face in the future, mostly in a year time. The reading is conducted by
naturally gifted people known locally as Waaccuu. Waaccuu are exceptional men who can predict about the future by reading the intestine of freshly slaughtered animals. Even though Waaccuu’s prediction is not as precise as the Ayyaantuu, they still play a major role in providing early warning prediction to the community.

**F) Sun rise and sun set**

Sunrise and set is also used as a prediction indicator along with its position within a particular season. For instance, if it rises south east during rainy season and changes its position regularly and proportionally across each month until it reaches north east during dry season and repeats the same pattern to the south, then it is a sign of normal season (i.e. there will not be drought conditions). However, if the sun stays longer on the north east, it is a sign of prolonged dry season and failure of rain in the main season. This prediction only works for drought. Ayyaantuu can also predict about the future if conflict, drought and other calamities will happen based on sun’s position.

All the above activities are solely performed by males. How pastoralist communities manage/control such kinds of risks they face? When there are risks, there will be an immediate assembly of elders’ council. A total of 30 men (elders) will meet to pray to God by slaughtering oxen. Either shoe or Mar Theresa (also pronounced as Maria Theresa⁴) will be added if men are less than 30 in number which are considered as the remaining men to the assembly (FGD with community elders at Arero, March 2012).

**G) Birds sound (song)**

There are many types of birds that are serving the Borena communities as traditional early warning indicators. Interpretation and analysis are undertaken based on the sounds the birds make, position they lie while singing (right, left, back or front side) and based on the species of the birds. For example, if the bird’s position is back and left side the situation will be bad while the rest indicates better. While some other birds indicate war, some others herald rainfall and still a few others signal both. For instance, birds like Roobdhayeesa, Sololiyaa, Burduddee, Raphicha and Uummoo are indicators that show there will be rain in different ways. Birds like Lakamii and Urunguu are indicators of war. In a special case, Urunguu (owl) is used to forecasting poverty. Lakamii is used to predicting both war and rainfall. If the male Lakamii cries and the female keeps silent, it indicates the coming of rain. On the other hand, if all Lakamiiis cry at the same time, it indicates that there will be war in the future.

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⁴ The Maria Theresa Thaler (MTT) is a silver bullion coin that has been used in world trade continuously since it was first minted in 1741. It is named after Empress Maria Theresa, who ruled Austria, Hungary, and Bohemia from 1740 to 1780 and is depicted on the coin. The MTT is first recorded as circulating in Ethiopia from the reign of Emperor Iyasu II of Ethiopia (1730–1755) (Richard, 1968: 468).
H) Wild life sound

Alike livestock, the Borena pastoralists make use of wild animal’s sound and feeding habits as event predictors. It is widely believed among the Borena communities that the sound of hyenas and foxes indicate a situation in which there is war and conflict in the future.

3.4. Responses and Structure of the Existing Early Warning System

The existing early warning system that operates in Arero woreda has five main parts from top to the local level, namely the Disaster Prevention and Preparedness Agency (DPPA) at federal level, the Disaster Prevention and Preparedness Commission (DPPC) at regional level, the Disaster Prevention and Preparedness Office (DPPO) at Zonal level, the Disaster Prevention and Preparedness Office (DPPO) at Woreda level, and the Early Warning Committee at each kebele level. The early warning and early response information flow system in the study area in particular and Oromia regional state in general operates in the following ways. First, there is the DPPA at Federal level, next the DPPC at Regional level, followed by the DPPO at Zonal level, and then the DPPO at Woreda level, and finally the Kebele level (Early warning committee). The early warning and response information flow in both directions. Besides, the early warning committee at kebele level has five active members who are believed to be representatives to the various sections of the community at Arero woreda. It consists of the kebele administrator (chairman of the committee), the kebele development agent (member), the kebele health extension worker (member), the Waaccuu/Ayyaantu (member), and the kebele school director (member and secretary). They are responsible for overseeing the forthcoming natural and manmade disasters in their locality, communicate information to the concerned offices on time, and suggest possible solutions by consulting local knowledgeable persons, namely Waaccuu and Ayyaantu. Besides, they crosscheck that information with the predictions obtained from the Ethiopia Meteorology Agency.

In line with this, the International Decade for Natural Disaster Reduction (IDNDR) and now its successor the International Strategy for Disaster Reduction (ISDR) point out the need to move from top-down management of disaster and vice-versa in a cycle. This stresses rehabilitation and preparedness to disasters, towards a more comprehensive approach that tries to avoid or mitigate the risk before disasters occur and at the same time fosters awareness, public commitment, knowledge sharing and partnerships to implement various risk reduction strategies at all levels (UN-ISDR, 2005) from federal to kebeles. This concept has been referred to as ‘risk management cycle’, in which learning from a disaster can kindle adaptation and modification in development planning rather than a simple reconstruction of pre-existing social and physical conditions (DFID, 2005).

With regard to information exchange and communication between the different actors at each level in the early warning and response system through their networks, the kebele head has a duty to report to the woreda DPPO based on their indigenous early warning knowledge systems. The task forces at woreda and zonal levels in turn report to the regional office based on the report of the local communities and finally
to the federal agency. At federal level, based on the risk financing approach the committee check the nature of the report and respond to it. The *woreda* and zonal task forces are assigned for the response system based on *Calallii* (the indigenous system of screening the most vulnerable and affected groups of individuals in the community which is a participatory approach). *Calallii* is done by the elders in the early warning committee at community level. There is safety net program named ‘*food for work*’ working with the most vulnerable groups. The program is targeted to the most vulnerable groups so as to rehabilitate and survive the risks they encountered. Public awareness is genuine learning in that individuals are prepared to take actions to promote safety. They also point to the fact that ordinary people (pastoralists in this context) already have some knowledge and experience in protecting themselves from disaster/risks that is why risk communication should be in the form of dialogue (Wisner *et al.*, 2006).

Generally, disaster management requires more complex organizational structure, not only at government level, but at community level as well. Community should be active participants in the decisions that affect their livelihoods. In other words, they should be leaders in the implementation of early warning and response programs. According to the social capital theory, individuals are linked to one another in networks such as public gatherings and ceremonies, which share and reinforce their common knowledge and values (McGonigal *et al*., 2005:13). Such networks can be horizontal connecting agents of the same status and power; as well as vertical connecting unequal agents in uneven relations of hierarchy and dependence (Dowla, 2006: 115).

### 3.5. Pastoralists Own Responses to Disasters/Risks

Pastoralists have their own indigenous systems of coping and adaptation mechanisms in response to the existing disasters and have their own early warning mechanisms. Some of such responses are the following. First, there is mobility of pastoralists to areas where there are better pasture and water in times of crises. Second, there is a practice of the culture of destocking of pastoralists’ livestock both in number and in kind so as to ease the heavy burden on the limited pasture and water. Third, the pastoralists also opt for slaughtering some of their animals for their meat in order to decrease the large number of their livestock. Fourth, Borena pastoralists have well established self-help associations (locally named as *Buusaa Gonofaa*) as mutual support mechanisms in which individuals contribute one cow/ox/goat for the most vulnerable ones so as to restock his/her livestock and rehabilitate soon. This is pastoralist’s indigenous self-help association and insurance systems. The fifth one is the practice of slaughtering/killing of the calves in order to survive the cows, and among others.

### 3.6. The Strengths and Weaknesses of Modern Early Warning Response Systems

Discussions were held with the stakeholders with regard to the weaknesses and strengths of the existing early warning and response systems in Arero district.
A. Weakness
From the discussion with the concerned stakeholders with regard to the weakness and strengths of the existing early warning and response systems in Arero district, the following are some of the weakness identified so far. The response system and aid distribution in the locality are not always fair. Different organizations and individuals’ responses to risks and disasters have been disappointing; there has been a delay in their responses. Supplies of food, medicine and other aids by governmental and non-governmental organizations were inconsistent. There is community task force for safety net program but the modern form of community early warning system in the area is almost non-existent. The early warning system has been operating only at kebele level and therefore has to go down to the community level. According to the community elders, there has been delays in response time at woreda level. The task forces do not respond immediately. They added there were corrupt practices and lack of transparency, i.e., relief supplies sometimes may not reach to the most vulnerable groups.

B. Strengths
It is also identified that the existing early warning and response system has its own strengths. For instance, an action was taken when the people were in urgent need of water during severe drought in the area. Water supply for the community at Wachele kebele was constructed by Action for Development (AFD), which is a Non-Governmental Organization working in the area. During severe drought conditions, pastoralists faced acute problems of pasture for their livestock, and government & non-governmental organizations brought hay from Addis Ababa and assisted them. The screening committee at kebele level is trustworthy and responsible who are able to easily identify the most vulnerable groups from the community.

4. Conclusion
The customary institutions are considered as key partners in all intervention attempts such as development, social change, environmental protection, socio-political issues, etc. as long as they are maintained and promoted. If the indigenous knowledge system is capitalized on, these institutions provide means of minimizing and if possible avoiding disasters/risks that are recurrent in the pastoral communities and affect their day to day life. In most cases, government institutions are replacing the functions of such traditional leadership in most customary institutions. But effective natural resources and conflict management and pastoral development could be achieved through integration of the customary/indigenous institutions with government structures. The customary/indigenous institutions have vital roles to play in empowering the capacity of the local communities and assume greater responsibilities in managing conflict and natural resources and in decision-making regarding basic services such as water and pasture.

However, the customary/indigenous systems in the study area are challenged by several factors. The roles of customary institutions in conflict and natural resource management are declining mainly due to the introduction of modern institutions, the
influence of globalization, and increased natural resources degradation. This in turn affects their functional principles to rebuild the capacity of the local communities so as to assume greater responsibilities towards these efforts. The declining roles of the traditional system of management of conflicts and natural resources is associated with politicization of ethnic/clan identity and increased natural resources degradation as well as recurrent drought in pastoral areas. Natural resources degradation has also been intensified due to lack of alternative means of survival. Therefore, effective natural resources management could be achieved through integration of the indigenous institutions with government structures that ensure the sustainability of natural resource management and food security.

5. Recommendations

Based on the results of the assessment of the existing early warning and response systems, the following recommendations are forwarded to the governmental and nongovernmental organizations as well as the communities themselves so as to curb disasters/risks and timely respond to the existing risks.

5.1. What is expected from the GOs and NGOs?

There should be commitment and devotion from the governmental and nongovernmental organizations in their response to the different risks at various times.

There should be the practicality of what is written on paper (both customary and modern systems). For example, there is a customary system that if someone steals a cow/an ox, he/she is forced to return ten cattle extra.

The community have been in urgent need of tools such as axes, sickles, choppers, etc for clearing bush encroachment so that grasses will grow if they are able to clear and manage the unwanted bush encroachments.

Regional boundaries limit pastoralists’ free movement in search of pasture and water. Community elders suggest that during severe drought, the government should recognize their free movement irrespective of regional boundaries so that they can survive the risks/disasters they face. The regional constitutions of Ethiopia state that although all peoples who live in the region are recognized, the ownership of the region belongs to indigenous ethnic groups. This means that residents from other ethnic groups are considered settlers or outsiders and are alien. One way to manage the situation is through a constitutional amendment to ensure that every Ethiopian can live anywhere in the different regions regardless of their ethnic origin.

5.2. What is expected from the Community Themselves?

The practices of the management of resources for dry and wet seasons by the community should be strengthened and widely practiced.

The concerned community members should perform periodic clearances of the unwanted bush encroachments before those toxic and unwanted bushes have invaded their surroundings and spread’ to their grazing lands.
Enhancing pastoralists’ water management skills, bond digging and water harvest (reserve runoff water for dry season) practices and technologies should be encouraged, supported and promoted by the concerned institutions.

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