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A CRITICAL ANALYSIS OF THE IMPACT OF DROUGHT ON SUBSISTENCE FARMERS' LIVELIHOODS, FOOD SECURITY AND WELL-BEING

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ABSTRACT

This paper grapples with the question: What is the impact of drought to subsistence farmers' livelihoods, food security and well-being? The main objective of the study was; how subsistence farmers had managed to cope with recurrent droughts and to maintain acceptable levels of drought risk, and realise comparatively better flora and fauna in semi-arid regions of Zimbabwe.

This study employed a Case Study method embedded in interpretivist philosophy paradigm and utilized open ended household questionnaires and interview guide to generate data (administered at household levels and in Focus Group discussions (FGDs). Data generation was guided by the principle of data saturation and qualitative data analysis techniques (using emerging themes and NVivo software to analyse generated data and information). In the field data as generated was analysed in thematic patterns and further analysed utilizing NVivo software.

Participants to the study consisted of household heads and District Authorities as key informants. The Sustainable Livelihood Framework (SLF) was used as the Conceptual Framework for the study with the Theory of Change (TOC) as theoretical framework.

The study revealed that recurrent droughts in Bulilima district had devastating effects on subsistence farmers' livelihoods, food security and well-being. The negative impacts of drought were, inter alia, environmental degradation, broken community social networks, diminished livelihoods, reduced crop production and death of livestock and even loss of human life.

KEY TERMS: *Adaptation, Agriculture, Climate change, Coping mechanisms, Disaster Risk Management, Food security, Hazard, Shocks, Resilience, Capacities and vulnerabilities, subsistence farmers*

INTRODUCTION AND BACKGROUND

Climatically, Zimbabwe has a sub-tropical climate, with four seasons: a cool season from mid-May to August; a hot season from September to mid-November; the main rainy season running from mid-November to mid-March; and the post rainy season

from mid-March to mid-May. The mean monthly temperature varies from 15 degrees Celsius in July to 24 degrees Celsius in November, whereas the mean annual temperature varies from 18 degrees Celsius on the Highveld to 23 degrees Celsius in the Low veldt. The lowest minimum temperatures of 7 degrees Celsius are recorded in June or July, and the highest

maximum temperatures of 29 degrees Celsius in October. However, if the rains are delayed, these tend to persist till November. On the whole, Zimbabwe’s climate is moderated by altitude, with Eastern Highlands enjoying cooler temperatures compared to low lying areas of the Low veldt (Department of Meteorological Services, 2001). According to the Department of Meteorology, such climatic changes in Zimbabwe and Southern Africa have had negative impact on rural subsistence farming communities.

Most if not all rural communities in Zimbabwe depend on subsistence agriculture for their livelihoods and food security (United Nations Development Programme-UNDP, 2009).

Faced with recurrent droughts and living with the risk, subsistence farming communities of Bulilima District of Matabeleland South in Zimbabwe are constantly at risk of food insecurity, loss of livelihoods, disrupted wellbeing, and water stress due to their dependence upon rain-fed subsistence agriculture. Though the Government of Zimbabwe has done a lot and continues to do so, in terms of Civil Protection policies, programmes and strategies in the country, drought continues to impact the Province and Bulilima District negatively (Zimbabwe Vulnerability Assessment Committee (ZIMVAC) report (2002).

Drought is a form of environmental stress that originates from a deficiency in precipitation over an extended period of time long enough to cause moisture deficiency, biotic loss, crop failure, loss of lives both human and livestock in general (Ngaira,

2004). Droughts have direct and indirect effects on livelihoods especially where they are weather dependent. The term livelihood is defined as a means of living, especially of earning enough money to feed oneself; and food security is a situation where people at all times have physical, economic and social access to adequate quantities of food that also meet their dietary requirements and preferences (United Nations-World Food Programme, 2009). In Africa, rural livelihoods are largely derived from rain-fed agriculture with about 70% of the continent's population depending on agriculture for their livelihood (Muthui, 2009). In Zimbabwe over 80 per cent of the population earns their living through farming and employment in agricultural sector (Shumba, 1999). Nonetheless, increasing rainfall variability and frequent extreme climatic events especially droughts and floods, disrupt agricultural production, leading to severe losses of livelihoods and food insecurity.

The history of drought in Zimbabwe is well documented and indicated in Table 1: According to CRED (2012), over the years, Zimbabwe has been affected by numerous natural and human induced hazards, including but not limited to floods, droughts, epidemics and violence motivated by politics.

Drought in Zimbabwe is linked to the warm El-Nino-Southern Oscillation (ENSO) in the Pacific Ocean, which has worsened since the 1980s. Among the top 10 hazards that have affected and continue to affect Zimbabwe in varying intensities, drought tops the list (See Table 1.1) (CRED 2012).

Table 1.1 Top Ten Natural Hazards in Zimbabwe 1982-2011

Disaster	Year	No. affected
Drought	2001	6000000
Drought	1991	5000000
Drought	2007	2100000
Drought	2010	1680000
Drought	1982	700000
Epidemic	1996	500000
Flood	2000	266000
Epidemic	2008	98349
Drought	1998	55000
Flood	2001	30000

Source: Centre for Research on the Epidemiology of Disasters (CRED) (2012)

According to CRED (2012), Zimbabwe experiences drought or severe dry spells at least once every two years, but it is chronic in semi-arid agro-ecological regions IV and V and slowly spreading to the rest of the country because of seasonal shifts and increased dryness.

The Province largely falls in agro-ecological regions IV and V, and according to the Department

of Meteorology in Zimbabwe (2001) Matabeleland South receives the least rainfall annually, yet the natives of the area have stayed put for years.

The district (Bulilima district- study area) largely falls under natural agro-ecological region IV and partly V. The natural farming regions IV and V are generally characterised by erratic rainfall and seasonal droughts (See Table 1.2)

Table 1.2: Zimbabwe natural farming regions

Region #	Characteristics
1	1 500mm of rainfall per annum; low temperatures and diversified farming
2	700-1500 rainfall per annum; suitable for intensive farming. Relatively low temperatures
3	500-700mm of rainfall per annum, relatively high temperatures, suitable for semi-intensive farming
4	460-600mm of rainfall per annum, frequent seasonal drought, semi-intensive farming, high temperatures
5	Less than 500mm of rainfall per annum (erratically distributed), extensive farming region, high temperatures

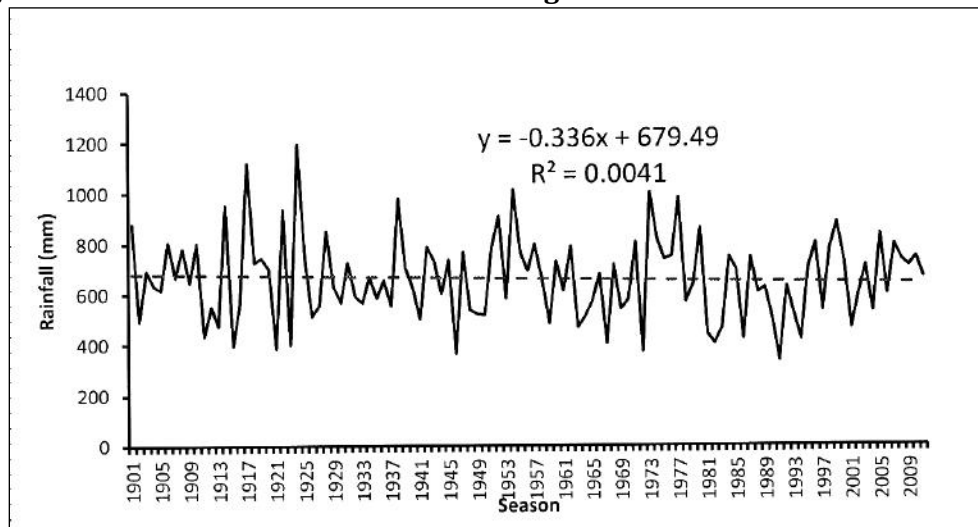
Source: Adapted from Manyena and Bongo, (2015)

Reccurent droughts in the semi-arid regions of Zimbabwe present themselves in the form of erratic rainfall or prolonged dry spells that drastically reduce crop production and demish subsistence farmers’ livelihoods (see Figure 1.1).

As shown in Table 1.1, in 2002, over 6,000,000 Zimbabweans were affected by drought. Drivers of disasters triggered by droughts include: poverty and rural vulnerability; increasing water demand due to urbanization, poor soil and water management; and climate variability and change. Besides that drought poses a challenge to Zimbabwe’s agriculture-based economy, it also reduces water supplies for domestic and industrial use, and for power generation affecting cities and non-agriculture sectors. Most vulnerable areas are those found in regions IV and V with women and children, single headed and child headed families likely to be most affected. Livestock, both domestic and wildlife are likely to be affected or lost (United Nations Development Programme-UNDP, 2009).

Wilhite (1999) revealed that Zimbabwe has a relatively strong institutional and technical capacity to prevent, mitigate, prepare, respond and recover from drought-induced disasters. The decentralized local government structures, including the Drought Relief and Civil Protection Committees, ensure wider stakeholders’ participation. The Meteorological Office, National Early Warning Unit (EWU), Famine Early Warning Systems Network (FEWSNET), Drought Monitoring Centre (DMC) and Food and Nutrition Council (FNC) in collaboration with Zimbabwe Vulnerability Assessment Committee (ZIMVAC) assess and monitor drought hazards and maintain early warning systems. Agricultural Extension Services (Agritex) and cooperating partners, particularly Food and Agricultural Organization (FAO), promote drought resistant crops, grazing schemes, water harvesting, expansion of irrigation schemes and moisture conservation. There are also social support mechanisms to protect vulnerable groups through drought relief, cash transfers and food for work programmes.

Figure 1.1 Time series of the national average rainfall for Zimbabwe 1901-2009.



Source: Zimbabwe Meteorological Services Department, (2009).

Farmers in Zimbabwe and other African countries in semi-arid areas have adopted a wide range of drought coping mechanisms and strategies to mitigate and

respond to the effects of recurrent droughts and incessant rains; these are tabulated in Table 1.3.

Table 1.3 Drought coping and management strategies

Dry season coping strategies	Drought management strategies
Pasture management to allow for carryover from the wet to dry season	Invest in developing browse feed resources
Invest in local or adapted breeds	Early weaning of calves
Forage production and conservation	Develop and use boreholes for watering livestock
Forage production and conservation	Allow more time for grazing
Improved utilization of crop residues	Early weaning of cow-calf pairs
Destocking, starting with inferior animals	Use supplements
Use of agro-industry by-products and locally occurring feeds	Diversify livestock types

Source: Adapted from United Nations Development Programme (UNDP), (2012)

Eriksen *et al.* (2005) describe coping mechanism as the actions and activities that take place within existing structures, such as production systems. Kivaria (2007) defines coping mechanisms

as responses of an individual, group or society to challenging situations.

In a survey on drought risk reduction strategies and drought coping mechanisms carried out by Practical Action, (2010) in Zimbabwe, the following results were obtained;

Table: 1.4: Drought risk reduction strategies and coping mechanisms in Zimbabwe

Drought risk reduction strategies	Drought coping mechanisms
Rainmaking ceremonies	Food relief
Indigenous livestock breeds	Remittances
Livelihoods diversification	Selling livestock
Storage of livestock feeds	Reduced meals and meal portions
Grain storage	Wild foods and other food types
Dry/early planting contours	Livelihood diversification
Conservation agriculture	Supplementary feeding
Drought tolerant crops	Sell of productive assets
	Barter trade

Source: Adapted from Practical Action, (2010)

In a study conducted in South Africa by Olaleye, (2010); on impact of drought on small scale farmers, the following conclusions were drawn. Drought had the following effects or impacts;

- ⇒ Lack of clean water for human and animal consumption
- ⇒ Crop failure
- ⇒ Animal mortality
- ⇒ Partial or total loss of source of livelihood

In trying to cope with above listed effects of drought and others in the study area, the following coping mechanisms were identified:

- ⇒ Sale of assets
- ⇒ Use of mini or hand irrigation systems

- ⇒ Purchase of supplementary feeds for livestock
- ⇒ Change of crop cultivation patterns
- ⇒ Travelling long distance in search of grazing
- ⇒ Seeking alternative sources of income

Findings of the present study are generally consistent with results of past studies on drought coping mechanisms, but on the contrary, migration, seeking alternative sources of food such as wild fruits and animals, sales of assets such as land, farming equipment and personal effects was not experienced in O' level study.

Although some of the farmers tried various ways to manage and cope with different changes and effects brought by drought as stated, most farmers

were unable to cope effectively with the drought mainly because there was lack of information about drought occurrence and drought management as well as lack of resources. In relation to drought coping mechanisms and strategies, varied indigenous drought early warning indicators were observed in order to inform response and drought risk reduction strategies.

United Nations Development Programme (UNDP), (2012), concurs that mobility is an inherent coping strategy of pastoralists to optimize production

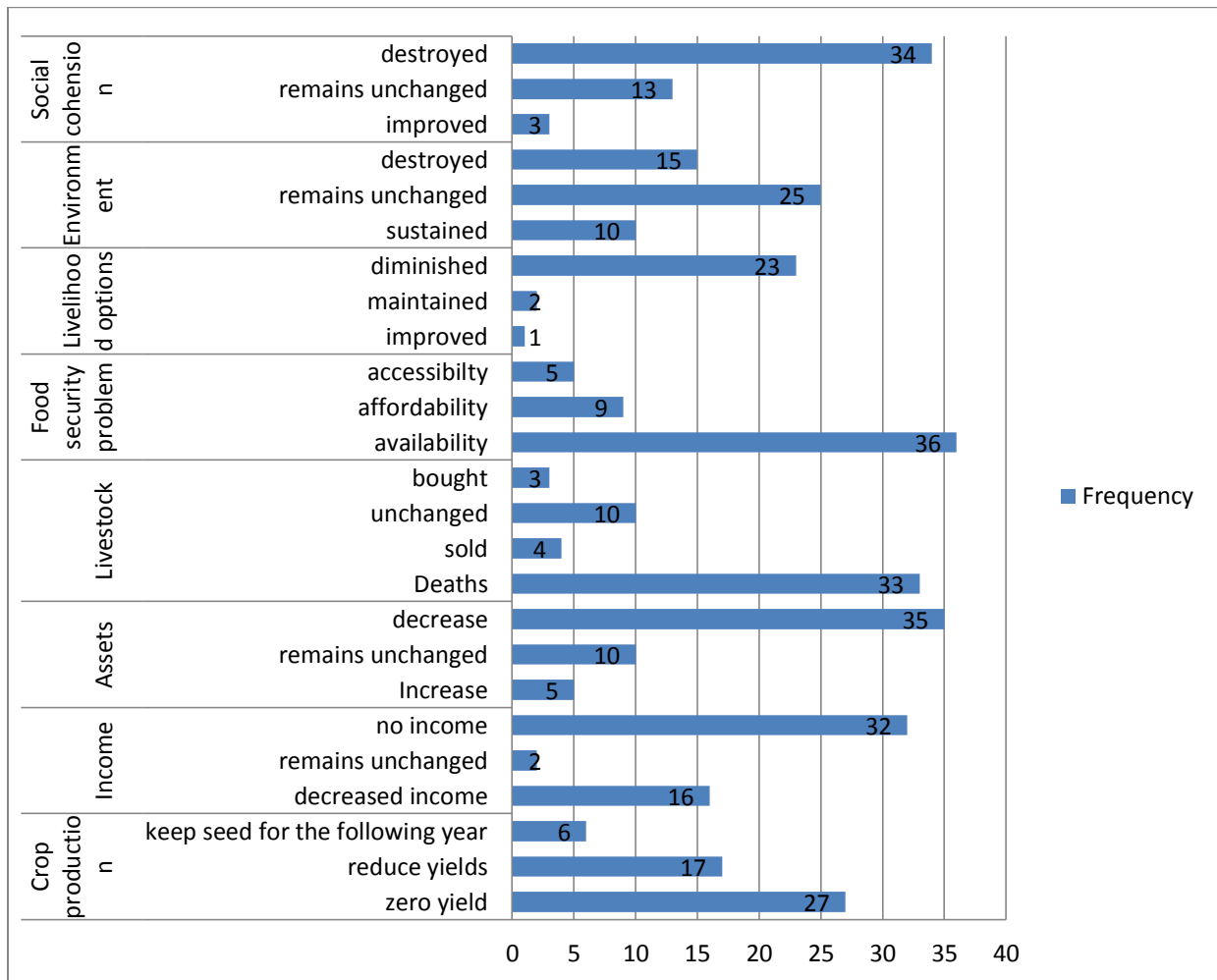
of a heterogeneous, landscape under a precarious climate extreme.

FINDINGS AND DISCUSSIONS

In order to understand the full cross-sectional impact of drought, the study established wide ranging drought impact as experienced by participants over the years.

Figure 1.2 presents direct and indirect impacts of drought on subsistence farmers' livelihoods and food security.

Figure 1.2: Direct and indirect impact of drought



Household questionnaire results indicated that in terms of social cohesion and ties, 34% of households have been destroyed with either one of the household heads having either gone to diaspora in search of job or alternative livelihood for other family members. Such families had such members either gone away for good (*begewukile*), or not playing a role at all to help remaining members of the

family. Adversely this has also increased cases of HIV and AIDS which is said to be high in the district. According to the District Water and Sanitation Coordinator, (2015), over 70% of the boreholes in the district are said to be non-functional due to reduced water table; and major rivers that flow across the district have run dry due to excessive siltation.

Human activity in search of livelihoods has further dented natural environment since due to

increased impacts of drought, community members have tended to turn into 'traditional brick moulding' through digging up the earth surface and cutting down trees for fire wood to use in traditional furnaces to cure bricks.

Over 23% of households reported diminished livelihoods options in the last decade as a direct impact of recurrent droughts; and reported high prices of basic food commodities in the market. There has been massive death of livestock, especially cattle due to diminished pasture and water. Over 30% of households reported complete loss of herds of cattle to drought in the last decade.

Food security has become a major threat as issues of access to food present themselves, local shops fail to stock enough pearl millet thus presenting access challenges. Also, some commodities could be available to shops but the prices keep on increasing for instance in November 2015 the 50kg bag of mealie- meal was priced at R350 during the time of data collection (December 2015), the price had increased to R500.

Drought has had direct impact to household income, assets and crop production. Questionnaire results revealed that over 30% of households have lost their income and have realized zero crop yields as a direct result of recurrent droughts. A participant in Natane Village (whose spouse works as a Security Guard in the City of Bulawayo), said;

'izinto ezitolo lapha azisabambeki, mina sengisenza okokucela ubaba ukuthi ahle asithengele konke khona ko Bulawayo literally translated to mean that food commodities and other items have become extremely expensive in our local shops in such a way that I have had to ask my husband to purchase all we need from Bulawayo. In the same village, one participant also stated that;

'okwemnyaka elitshumi edluleyo ilandelana, akukho umuntu oke waphuma lamasaka edlula amabili emasimini wanala' literally translated to mean that, in the past 10 years, none of the farmers got more than 100 kilogrammes (Kgs) of cereals from their fields (implying that harvest has been reducing to even zero yields for others).

An informal discussion with a Health worker at a Health Center at Mlomwe (Natane village), revealed that rates of malnutrition among infants was very high due to lack of proper dietary diversity.

In other words, prevalence of food insecurity in the district has had a direct impact on the nutrition status of children and infants. The key food security outcomes are linked to food availability, access and utilization (and these have been directly impacted by recurrent droughts), as follows, and as depicted in the food security framework below;

- **Food Availability:** Little to non-availability of own stock of key staple commodities were reported, 97% of the subsistence farmers reported no stock at the time of data collection, impacting availability of food both at household level.
- **Food access:** The prices of key food commodities were reported to be escalated at the time of data collection, presenting food access constraints, moreover the population accessed food mainly from remittances and in normal years from own production. Food access is further constrained by poverty; 98% of population live in poverty; as measured by asset-ownership wealth ranking. With dwindling remittances in the last 10 years, communities are further constrained in purchasing basic food commodities whose prices are ever increasing as drought severity intensifies.
- **Food Utilization:** Some 98% of the population reported inadequate food consumption levels and did not meet the minimum required standard of 21, 00 kilocalorie per person per day. Access to drinking water from protected sources was deplorably low at about 20%.
- **Stability:** In the face of recurrent droughts, vulnerable households struggle to maintain optimal food access. Results indicated worsening household food consumption/security and nutrition as households regressed to more severe coping and desperate mechanisms.

Diminished livelihoods options have reduced household ability to cope with droughts as such loss come without any compensation or insurance. The research showed that most households retained the livestock in face of drought and end up losing to droughts. They are also reluctant to sell off the animals as it symbolize their wealth than mere souvenirs and cattle are ordinarily not easy to sell when their condition has deteriorated. The number of households without income increased in the face of drought as most relied on rain fed agricultural systems thus no sales to make an income. Crop production systems reliant on rain fed agriculture have shown serious vulnerability to rain fall swings as zero yields expose farmers to hunger and starvation. Some farmers resort to keeping seed for the following season while others wash and consume it.

Literature has well documented (Mburu, 2010, FAO, 2007, Dube, 2013, Ndlovu, 2010,

Gwenzi, 2010); that in Africa and parts of Asia, over 70% of rural poor rely on rain-fed subsistence agriculture; and this fact makes such communities susceptible to climatic variables and change.

The discussion of the results of this study cannot be devoid of the Sustainable Livelihood and related Frameworks, which is the conceptual framework underpinning the study. The framework (SLF) provided a basis for livelihood trends and the impact of drought and possible pattern of response by vulnerable subsistence farmers. According to Department for International Development (DFID) (2001); a livelihood is made up of assets, activities and access to assets modified by institutions, organizations and social relations. It is the dimensions of livelihoods as defined by DFID, (2001) that have been impacted by recurrent droughts and therefore informed this analysis.

According to results as presented on Figure 4.14, recurrent droughts negatively impacted means of production; for example land has been rendered unproductive and rivers heavily silted. The socio-economic aspects have been also negatively affected as evidenced by results on Figure 4.14 where 16% and 32% of households have indicated dwindling to no income respectively. The result is supported by Wisner, et al, (2004), who states that vulnerability to natural disasters is a function of asset base, and the root causes of vulnerability are typically lack of access to resources and to power structures that define and allocate such resources.

A study conducted by Mburu, (2010) in East Africa, established that the severe the drought (using Severity Drought Index), the more the impact on crop production and livelihoods. The findings by Mburu, (2010), are similar to the findings as indicated on Figure 4.14 that 17% of households in Bulilima reported reduced crop yields and 23% reported zero crop yields as a direct result of drought. Yet, 23% and 35% of households respectively, reported diminished livelihoods and asset depletion.

The results revealed that drought has had a negative impact on asset base of vulnerable subsistence farmers. The majority of household interviewed (35%), own mainly goats in terms of livestock and hardly any cattle. An interview with the District Agritex Officials revealed that cattle have been dying in large numbers as a result of drought; when asked he (Agritex Officer) said these words;

'In the last three years, about 7000 herd of cattle have been lost in the past 3 years' (Agritex, 2015)

In his study in the Horn of Africa, Mburu, (2010), established that; in Calculation of Pearson's Product Movement Correlation Coefficient showed positive relationship between drought severity and number of livestock losses. For example at 95%

coefficient interval, the relationship were equals to 0.987 for cattle and 0.947 for shoats. In other words, as established in this study, more cattle are likely to die in severe drought situations compared to goats and sheep. In line with the study results; a study conducted by OXFAM, (2006) in Maasai Pastoralist area of Kenya concluded that drought had the following impacts;

- diminished pasture quality and quantity
- high prevalence of drought related diseases
- destruction of livelihoods and environment

In this study there was no particular livestock disease prevalence reported in Bulilima district but environmental impact was apparent in the form of diminished pasture and dry water sources, and massive siltation of major rivers running across the district. In his study in Kenya, Mburu, (2010), found out that there was high prevalence of tick borne and contagious Caprine Pleuropneumonia (CCPP) as severity of drought heightened.

As a result of river siltation, major rivers that run across the district quickly dried up. In his study in Matabeleland South of Zimbabwe, Dube and Phiri, (2013), established that as a direct result extreme climate events and climate change, several wetlands and springs in the locality had since dried up; and in general there was severe reduction of wet agricultural seasons in Matabeleland South; and consequently reduced crop production.

The results on memory of drought years in Bulilima district indicate that communities have been living with drought phenomenon for time immemorial, but in varying intensities; with the last decade being severe. This is in line with what Dube and Phiri, (2013), established that climate change and extreme climate events have been intensifying in recent years, impacting food security, crop production and livelihoods of farmers; it is clear from the results that the district ideally receives an average of 500mm of rainfall, but this has been reducing steadily over the last 15 years to an average between 350-400mm. According to FGDs with subsistence farmers at Hingwe and Natane, it was clear that there was hardly wet agricultural season in the last 15 years.

A study conducted by the Drought Monitoring Center (DMC), (1992), concluded that droughts lead to;

- reduced crop yields
- reduced household and national food security
- reduced agricultural related revenue
- declined livestock numbers

The results further show that droughts bring about social impacts. About 34% of household participants indicated that their families had been

destroyed because some family members, and at times spouses had left for search of jobs outside Zimbabwe, and had never returned (abandoned families). The family and community cohesion and social safety nets were therefore disrupted through distress migration in search for jobs and alternative livelihoods or in search for pasture for livestock. In his study on social impact of drought; Coleen, et al; (2006), established that drought;

- leads to decay and destruction of social community ties
- destruction of natural habitats of both people, livestock and wild life
- social institutional stress

CONCLUSIONS AND RECOMMENDATIONS

From the findings and empirical evidence, it is clear that droughts have severe impacts in arid and semi-arid regions of Africa and Zimbabwe in particular. Such impacts directly hold Governments (primary players) and communities' accountability.

The Government should shift paradigm by not focusing on drought response but on drought risk reduction in order to enable the whole District, Province, Region and the country to cope better with the impact of drought. In fact the Government should consider establishing a specialised institute for drought risk management for predictable leadership and accountability. Further the Government should Government should make use of traditional crop varieties found in low rainfall semi-arid areas to develop hybrid seeds. People of Bulilima district are endowed with a variety of skills and their land has a number of natural resources. The Government should explore opportunities for profiling such skills and developing them; and through the Communal Areas for Management Programme for Indigenous Resources (CAMPFIRE) establish Vocational schools and centers in order to create and promote livelihoods. There is also need to evaluate the CAMPFIRE programme in order to determine how it is benefiting the indigenous residents and how it is enhancing their resilience to drought and other shocks. The subsistence farming community should take the initiative to promote and value small grain varieties at the local level so as to strive for acceptable production and food security levels. They should also lobby Government to recognize value of these varieties and provide incentives for their production. This could be a process that is led by Chiefs and the whole of traditional leadership at the local and district levels.

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