THE EFECTIVENESS OF ETHNO-SCIENCE BASED STRATEGIES IN DROUGHT MITIGATION IN MBERENGWA DISTRICT OF SOUTHERN ZIMBABWE

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ABSTRACT

The imbalance between ethno-science and techno-science mechanisms in coping with drought, accompanied by overdependence on external relief and food aid was a motivating factor for this research. The sought to identify and assess the indigenous knowledge based drought coping strategies being practised in Mberengwa District in Southern Zimbabwe.

This was a case study in which both quantitative and qualitative data collection techniques were used. Data collection was done through questionnaires administered to a sample of one hundred and seven household heads constituting both male and female respondents. Focus group discussions were administered to communal farmers from all parts of the study area and three AREX officers operating in the ward were interviewed. Field observations were also carried out to complement other data collection instruments. A variety of ethno-science based drought coping strategies were being implemented in Chingechuru ward and the major ones were multiple cropping, early planting, planting drought tolerant crops, basin tillage, transhumance movement, supplementary feeding, destocking, deep welling, barter trade, selling/hired labour and begging. Barter trade was the most widely implemented strategy at a rate of 66%, followed by multiple cropping (62.8%). The least implemented were basin tillage (15.8%) and abiding to traditional leaders' advice (16.1%). Most of the ethno-science based drought coping strategies were effective, but this was hindered by low levels of implementation. Early planting, basin tillage,

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multiple cropping of drought tolerant crops and maintenance of controlled granaries were recommended in order to deal with the adverse impact of drought. Further research should focus on devising methods that can be used to increase the levels of implementation of ethno-science based drought coping strategies in conjunction with techno-science based drought coping strategies.

Key words: Ethno-science, techno-science, drought mitigation, indigenous knowledge systems

INTRODUCTION

Drought is among the most serious natural disasters affecting many people in several parts of the world. This implies that there is need to plan for the risk given the uncertainties brought about by climate change and global warming. In many countries, drought management strategies are largely based on modern technology at the expense of indigenous knowledge systems. In Zimbabwe much attention tends to be given to techno-sciences and this is manifested through borehole drilling, dam construction and the introduction of irrigation schemes. However, this needs not be construed to mean that such interventions are worthless, but the perennial problems faced by subsistence farmers each time a drought occurs are an indicator of the need for local strategies to be used parallel to the conventional techno-science based methods of coping with drought. In terms of food acquisition during drought induced famines, overdependence on international food aid still characterises the majority of affected areas. In Mberengwa district of Southern Zimbabwe, Ward 33 fits well into this category and there is need for a paradigm shift towards self reliance. This shift could be achieved through maximising ethno-science based drought coping strategies in the area.

The term ethno-science is defined as an organised examination of thought across cultures (W.R.I, 2007). In relation to drought this refers to how farmers perceive, name and classify nature as a first step towards improving decisions and hence ethno-science can uncover clues in designing better decision support systems. According to Mohammad (1992) ethno-science is the term often used for vernacular ‘’local knowledge of the physical environment’’ and to this end, some have used the terms ‘’people’s science’’, ‘’folk science’’, ‘’folk ecology’’, ‘’ecologic populaire’’, ‘’people’s knowledge’’ and ‘’indigenous knowledge’’ (A.D.B, 1993). Currently, the most popular term is Indigenous Knowledge and in many countries the suffix ‘’systems’’ is added and the resultant phrase ‘’Indigenous Knowledge Systems’’ and IKS, has become so popular in a number of settings. Some have also identified ethno-science as African traditional mechanisms for coping with their surrounding environment (ALM, 2009). Indigenous knowledge is believed to be the knowledge that is unique to a given culture or society, which creates the basis for local level decision making in agriculture, health care, food preparation and preservation, education and natural resource management. The general consensus is that ethno-science relates to indigenous knowledge systems (IKS) which are accessible by recall and practices, and passed from one generation to the next. It generally provides a holistic view of how to handle certain issues based on traditional ethical perspectives (Meinderstma, 1997). The terms ‘ethno-science’ and IKS will be used interchangeably in this paper.

This study aims at coming up with useful information on coping with drought in a rural setting that is characterised by semi arid and/or to arid conditions. The specific

objectives include identifying the drought coping strategies that are based on indigenous knowledge systems in Mberengwa, assessing the effectiveness of the ethno-science based drought coping strategies and hence to identify the challenges being faced by the community in implementing ethno-science based drought coping strategies so that relevant recommendations can be made for effective drought mitigation strategies. Drought management itself can benefit from understanding how the societies respond to the extensions of eco-climatic variations and cope with these phenomena. Improvement of food security is more likely to result from strengthening the indigenous coping strategies than reliance only on techno-based strategies. The selection of the study area was based on many factors including the fact that Mberengwa is very much susceptible to drought even when several parts of the country experience minor dry episodes. Mberengwa District is in the Midlands Province of Zimbabwe at an altitude of 1637 metres above sea level, a latitude 20^0 29^1 S and a longitude 029^0 55^1 E. Mberengwa lies in natural region 4 of Zimbabwe's agro-ecological zones where annual rainfall is usually 400 mm to 600 mm. Maximum temperatures rarely exceed thirty-two degrees. Celsius and minimum temperatures are experienced during the winter season. The soils in the area are not uniform throughout, but vary from area to area though loamy sands are the most dominant. For purposes of this research only, the study area was divided into four sections which are: Zibanga, Ruvabvu-Jeka, Chirungubwe-Gobera and Hamandishe-Ndawana. The variations in soils and vegetation across these sections are shown in Table 1.

Table 1. Vegetation and Soils in Ward 33

Section	Vegetation	Soils
Zibanga	Trees along the mountain range Patches of grass across inhabited land	Silty loam and occasional red clays along the east-west mountain range
Ruvabvu- Jeka	Shrubs and grass	Dark loamy clays
Chirungubwe- Gobera	Shrubs and grass	Sandy loam and occasional dark clays
Hamandishe- Ndawana	Shrubs and patches of grass across the uninhabited land	Sandy loam and occasional dark clays

The main economic activities in Mberengwa are rain-fed subsistence agriculture and domestic livestock rearing. A few individuals in the Chirungubwe-Gobera, Hamandishe – Ndawana and Zibanga sections are employed by Sandawana Mines. Illegal emerald mining on the Mweza range constitutes a considerable proportion of the community's livelihood. In the Ruvabvu – Jeka and Chirungubwe – Gobera sections, illegal gold panning along Mwanezi River also accounts for a considerable proportion of the people's livelihood. However, these are seasonal activities due to changes in the market trends and rainfall season that may flood the banks of the river. In all the sections residents are engaged in small scale seasonal gardens due to erratic and variable precipitation that occurs between October and March, but it sometimes terminates prematurely. Tomatoes, onions and vegetables are the most preferred crops in the household gardens. Subsistence rain-fed agriculture and domestic livestock rearing thus remain the predominant economic activities in the ward. Given the current climatic conditions that are ever-changing, the area is exposed to a high risk of frequent

droughts. The need to address the problem remains inevitable. Communities' traditional drought coping strategies need to be encouraged as the basis to integrate any other relevant technologies.

METHODS OF DATA COLLECTION

Questionnaire surveys were the major data collection instrument for the research. Other instruments were also used to compliment the major instrument and these are interviews, focus group discussions and field observations in an effort to ensure validity of the data obtained through the use of questionnaires. Interviews were particularly chosen because of the need to have some views from officials who work with the local people in agricultural concerns, Agritex officers. The kind of data involved and the number of the officers in the area pre- determined interviews the best instruments as there would be need for clarification of some issues. However, interviews have loopholes of researcher's influence on the results due to direct interaction with the respondents. Focus group discussions were particularly important to gain an overview of the respondents concerning ethno-science based drought mitigation strategies in the area. Field observations were carried out in a bid to gain an appreciation of the spatial distribution of water resources, grazing veld as well as the cultivated land units. This technique was essentially useful in validating data that had been collected through questionnaires, interviews and focus group discussions for instance concerning crop varieties and livestock diversity in the area.

Secondary data sources were used essentially for the collection of informaton on the size of the ward, that is, the number of households and total population constituting the ward. The ward councillor's reports were the major secondary data sources consulted during the research. Ward 33 is made up of eight hundred and twenty one households with an average household size of seven people and a total population of five thousand and thirty-three by late 2008. The four sections that make up the study area, Zibanga, Chirungubwe-Gobera,Ruvabvu- Jeka, and Hamandishe- Ndawana (as mentioned earlier in section 1.5) have one hundred and eighteen (118), one hundred and seventy-three (173), two hundred and twenty-seven (227) and three hundred and three (303) households respectively. The temporary division of the ward into sections facilitated an organised working environment which provided distinct units from which both time and resources could be allocated easily and systematically (Table 2).

Table 2. Distribution of villages and households in ward 33 of Mberengwa

Section	Number of villages	Number of households
Zibanga	5	118
Chirungubwe- Gobera	7	173
Ruvabvu- Jeka	9	227
Hamandishe- Ndawana	12	303
Total	33	821

RESULTS AND DISCUSSION

Crops grown in Ward 33

The survey showed that 88% of the households grew maize, 57 % grew groundnuts, 29% grew roundnuts, 33% grew rapoko, 34% grew sorghum, 10% grew millet, 12% grew sugar

beans and 3% grew cow peas. 82% grew at least two types of crops and this was mainly done to produce a variety of basic food crops required at household level, 7 % indicated that they grew maize only during the season and 7 % did not grow any crops during the season probably due to problems such as unavailability of seeds, lack of draught power and poor rains. The most commonly grown crops are thus maize and groundnuts. In many cases two or more crops are grown by each individual. There is a strong link between the type and variety of crops grown in an area and awareness levels of the local agro ecological conditions among community members. This also measures their ability to make accurate forecasts of the quality of the season ahead. Since most of the crops grown during the season are drought tolerant, it shows that the people are aware of the frequent drought conditions that usually affect their areas. Although maize is not so highly tolerant, it is widely grown because it is the staple cereal which everybody needs to have even under less conducive conditions.

The most common drought tolerant crops are rapoko, sorghum, millet and groundnuts. However, the hectrage under which these crops are planted is low, indicating a high level of awareness of relevant crops, but the level of application of the knowledge is low. Multiple cropping seems effective in providing a considerable degree of security when some of the crops fail completely, at least one other crop may succeed. This was especially noted in those 62% of the households that planted maize and rapoko or sorghum and millet and 43% indicated that maize completely failed while rapoko, sorghum and millet had high quantities of expected yield and only 19 % indicated that of all the crops they grew, 11% had very low expected yields whilst the other 8% reported that the crops completely wilted due to drought. Hence planting a wide variety of crops is quite effective in coping with drought.

Abiding to advice from traditional leaders and Agritex officers

In the decision making concerning which types of crops to grow, 16.1% get their advice from traditional leaders, 32.9% just plant the types of crops they prefer, 25.2% utilise the seeds that will be available during the beginning of the season while 27.8% follow the advice from Agricultural officers. Another important source of advice is a combination of tradition and Agricultural officers as they provide details on the appropriate crops based on their forecasts of the quality of that particular season. The percentage of those who use tradition as their basis for decision making is low and this could be probably due to modernisation and religion which tend to wipe out some cultural norms and values as primitive and outdated ideologies. Hence some important aspects of drought coping strategies based on such beliefs are omitted.

Adoption of various farming techniques

Early planting seems to be barely effective since only 57% of the households indicated that they expected high yields especially of maize while 19% indicated that the crops could produce very low yields (less than or equal to 50Kg) and 25% stated that the crops had completely wilted and no yield was expected. It is evident therefore that early planting is an effective measure in reducing the adverse impact of drought on crops. Out of the 15.8% households that practised basin tillage, 11.3% expected moderate to high yields for the crops they grew while 4.5% expected very low or no yields at all showing that basin tillage can be a very effective technique in coping with drought.

Coping strategies for shortages of water and pasture

Thirty-seven percent of the households in Ward 33 tracked water resources together with their livestock (transhumance movement) while 16% dug wells along the river to the maximum possible depths to get household water and filled large dishes or containers so that their livestock could drink. In most cases different sites were selected, one for household water and the other for livestock. 14% stated that they relied on borehole water for both household uses and their livestock. However, this strategy could be less appropriate in some cases when the boreholes were not functioning or dried up due to drought. The next possible option could be tracking water resources despite the long distances of travel. 7%t noted that they reduce the numbers of their livestock as soon as they notice any indicators of serious drought. This form of destocking could be by way of selling or slaughtering some of the livestock thus reducing the risk of loss that would be incurred if the livestock were left to die of starvation. In many cases, people lose some of their livestock during drought periods. 3% indicated that they loaned some of their livestock to their relatives or friends who resided in areas less susceptible to drought. Pastures depend on the availability of water and in places where water is scarce there is less pasture.

Coping strategies for shortages of household food during drought

There are various ways of acquiring food for the households during drought induced famines and these include barter trade, begging, and selling/slaughtering livestock, selling labour, and adding wild fruits to the usual diet. While some people indicated that they used at least two of the above strategies, barter trade and addition of wild fruits to usual diet were the most widely practised strategies among most households. The most common wild fruits that provide supplementary food for human beings in the area are *uapaca kirkiana* and *parinari curatelli-folia.* Some of the respondents claimed they would cook fruits like *uapaca* during

drought periods. Thirty-five percent of the households did not abide by traditional drought coping strategies as 24 % indicated that they could buy food and 11% stated that they relied on remittances. Begging tends to be the least practised resort and in most cases it will be from chieftaincy grain reserve or from relatives.

Challenges faced in implementing ethno-science based drought coping strategies

A number of problems hinder the successful implementation of ethno-science based drought coping strategies. Abiding by advice from traditional leaders is affected by religion, modernisation and lack of trust of the mediators. Most Christians view traditional leaders as ungodly people and thus do not take their advice seriously. Modernisation drives many people to think that certain ways of planting and certain types of crops are old fashioned and outdated or primitive. For example crops like rapoko and millet are usually planted by the elderly. Unavailability of seed was identified by 62% of the respondents as negatively influencing people's efforts to implement ethno-science based drought coping strategies like early planting and planting drought tolerant crops. Lack of co-operation by other members of the community is also one of the problems affecting the successful implementation of ethno-science based drought coping strategies. This may be accompanied by laziness that leads to late planting despite the availability of seed, avoiding extra duties such as herding livestock outside the cultivated areas. These are also the same people who leave their livestock invading the cultivated fields and devouring the crops for other members of the community who would have planted earlier.

The problems associated with barter trade include lack of standard valuation of livestock and other assets. In some cases livestock may be exchanged for very small quantities of grains that cannot sustain the household. Selling livestock particularly cattle and goats is problematic because the market is not always available. Selling labour is also

sometimes less practical when the drought becomes so severe. Access to wild fruits such as *uapaca kirkiana* and *parinari curatelli-folia* is a problem to people from other areas as compared to those residing nearby. An example is that of the two households in Ruvabvu fenced in the *uapaca* trees close to their homesteads so as to restrict free access to these fruits by other non family members. The fruits are also seasonal and hence not available during certain times of the year.

Drought management in Zimbabwe

70% of Zimbabwe's population derives its livelihood from rain-fed subsistence agriculture and other rural activities. However, the major threats are natural hazards such as the frequent droughts and floods. Drought has particularly become more frequent over the past two decades with devastating effects on food security (Matondo, 2000; Matondo, 2006; WRI, 2007; Wolmer, 2007). Different ethnic groups in the rural areas have different ways of coping with the changes in climatic conditions around them, but these ethno-based strategies are being neglected and substituted by modern technological innovations which on their own continue to fail to eradicate the problems caused by drought (WRI, 2007). This is evidenced by the fact that the majority of recipients of food aid out-number self-reliant groups during times of natural disasters such as flooding and drought. During the 1991-92 drought 5 602 568 people were on the drought relief program and this is about 74% of the rural population. People in the low-veld communal areas are also among the most frequent recipients of drought relief in the form of food-for-work schemes and loans. An example is Chiredzi district where during the droughts in 1983/84 and 1992/93, the number of people receiving food aid was 34 437 which was about 55% of the total population of the district. This means the communities are highly susceptible to drought despite the efforts that have since been made by government and non- governmental organisations over the past years. The Action by

Churches Together (ACT) is one of the organisations that provide relief during several drought emergencies and it embraces organisations such as the Lutheran Development Service (LDS). The LDS has assisted several families in districts such as Mberengwa, Zvishavane, Chivi, Mwenezi, Gwanda and Beitbrigde in the 1991/92, 1995/96, and 1998/99 droughts. The forms of aid provided include food-for-work schemes, supply of seed packs and school feeding schemes (CIDI, 2002). Efforts by government, non-governmental organisations and local communities including traditional drought coping strategies negatively affected by the unprecedented shifts that are currently occurring to the World's climate. The ever changing climatic conditions are believed to be responsible for the high frequency of drought in most parts of the world including Zimbabwe. Given these circumstances, certain traditional weather forecasting techniques and other drought coping strategies that have proved to be useful in the past are disrupted and rendering the various efforts to cope with drought less successful and hence leaving communities with very limited options which consequently lead to the reliance on external relief and food aid (Chenje and Johnson, 1996).

An analysis of ethno-science as the basis for drought mitigation

Ethno-science is a precious national resource that can facilitate the process of disaster prevention, preparedness and response in cost effective, participatory and sustainable ways. It cannot be disputed that a blend of approaches and methods not only from science and technology, but also from traditional knowledge as well leads to better decision making on disaster prevention, preparedness, response and mitigation (Oba, 2001). Local adaptive strategies, when reinforced by appropriate policy and technology, can lead to sustainable livelihoods and reduce community vulnerability to harsh environmental changes like drought, the situation that is currently prevailing in Ward 33. Incorporating indigenous knowledge can

add value to the development of sustainable climate change mitigation and adaptation strategies that are rich in local content, and planned in conjunction with the local people. For instance, in the Malian Sahel, it has been proven beyond doubt that communities have developed coping strategies that have improved their ability to cope with uncertainties resulting from climate change (ALM, 2009; Sarre and Blunden, 1996; Villers, 1999). This should also be encouraged in Zimbabwe's rural communal areas especially the southern and south- eastern districts that are usually affected by drought.

Globally, there is increasing acknowledgement of the relevance of indigenous knowledge as an invaluable and underutilised knowledge reservoir, which presents developing countries particularly in Africa with a powerful asset in environmental conservation and natural disaster management. IISD (1999) ascertains that from time immemorial, natural disaster management in Africa has been deeply rooted in local communities which apply and use indigenous knowledge to master and establish early warning indicators of their own benefit and future generations. In Zimbabwe, this knowledge and strategies differ from location to location and from each ethnic group to the other (Moyo, 2008). Ethno-science based drought coping strategies have also been upheld in African countries such as Kenya, Uganda, and Tanzania (ALM, 2009). While it cannot be disputed that each drought results in the dislocation of the poor despite the massive handouts of famine relief by governments and donors, in the Makueni, Marsabit and Turkana districts in Kenya, the greatest form of dislocation has been eradicated by developing and implementing extensive mitigation and adaptation strategies that have enabled them to reduce their risk or vulnerability to the impacts of drought through their indigenous knowledge systems. Agro-

pastoralists in these districts hold indigenous knowledge on indicators of rainfall variability. This knowledge is the equivalent of weather prediction models and forecasts in techno-science mechanisms. To several pastoralists, indigenous knowledge forms the basic knowledge frame with which agro-pastoralists adapt their practices in anticipation of indigenous knowledge based forecasts partly due to the conditioning actors to the high rainfall variability characteristic of the area and partly due to lack of resources (Kemp, 1990; Pearce and Gumbo, 1993; Springer, 2007). Hence, it has been possible to ensure food security at the household level which is also aided by ensuring survival of the livestock herds on which they depend and their economy is largely rooted. Such is the scenario in Zimbabwe's rural communities and thus the success of such strategies in Kenya may point to the potential success of IKS based drought coping strategies in Ward 33.

Drought has been studied in Southern Africa for over a hundred years (Chenje and Johnson, 1996) and is recorded in text and in oral history dating back many generations. As noted by Springer (2004), drought is a recurrent phenomenon in dry land Africa. It has been observed that droughts are not always the same. Oba (2001) acknowledges that droughts are not always the same: some are localised while others are widespread; some affect grass production while others affect crops. The World Disaster Report of 2004 ascertained that drought and famine have proven to be the deadliest disasters of the decade worldwide, accounting for at least 275 000 deaths since 1994. According to the Food and Agricultural Organisation (FAO) extensive droughts have afflicted Africa with serious episodes since independence in 1965-66; 1972-74; 1981-84; 1986-87; 1991-92 and 1994-95. The 1991-92 episodes in Southern Africa are largely remembered as the worst drought in living memory.

The consequence was that the number of food insecure households among communal farmers in Zimbabwe more than doubled, especially in semi-arid zones. A major concern arises from the fact that drought produces a web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. It is inevitable to cite that drought results in the dislocation of the poor, despite the massive handouts of famine relief by governments and donors (Oba, 2001; CIDI, 2002; IISD, 1999). Indeed drought survival involves survival of the fabrics of the social security systems that depend on survival of livestock, the ability to grow crops, and marketing of the produce as well as sharing the resources. These further lead to low income for farmers and agribusiness, increased prices of food and timber, unemployment, reduced tax revenues because of reduced expenditures, increased crime, foreclosures on bank loans to farmers and agribusiness, and migration and disaster relief programs (Abbot, 2006; ALM, 2007; Derman et al 2007; IISD, 2002; Springer, 2004).

The aggregate impact of drought on the economies of Africa accounted for 8-9% of the Gross Domestic Product (GDP) of Zimbabwe and Zambia in 1992, 4.6% of GDP in Nigeria and Niger in 1984(ALM, 2007). During the 1991-92 droughts in Southern Africa, regional grain production fell 60% short of the expected levels and food stocks were depleted (Chenje and Johnson, 1996). This meant that more food had to be imported into Southern Africa. The level of the reservoir at Kariba Dam fell below the level required to generate hydro- electric power to Zambia and Zimbabwe (ALM, 2009). Water shortages, electricity shortages and rationing, input supply difficulties, reduction in demand and macro-economic constraints led to a 9% reduction in manufacturing output in Zimbabwe with a 6% loss in foreign currency earnings (Wolmer, 2007).

Zimbabwe has been affected by a number of droughts in the recent past in the years 1982-83; 1986-87; 1991-92; 1994-95; 2002-03 and 2007-08 (Moyo, 2008) with the 1991-92 episodes being the worst of them all. Mberengwa district lying in the Southern region of Zimbabwe, in natural region four of Zimbabwe's agro-ecological zones, has witnessed all the above-mentioned drought conditions or even many more during that particular period. The district is thus significantly exposed to the risk of frequent droughts and the most serious consequences are felt in reduced crop production as well as forest productivity, which consequently culminate into food insecurity by both human beings and livestock. As the community's economy is strongly rooted in rain-fed subsistence agriculture and livestock rearing, a downward spiral of debt and poverty results as families end up selling their entire herd which is their source of wealth. In Ward 33, the situation is made even worse by the limited number of water points, that is, only two rivers- Mwenezi and Mutsime rivers being the physical boundaries for the ward, and Chingechuru dam that is not centrally situated for access by almost all the households in the ward. Droughts resulting in complete crop failure are common in Eastern and Southern Africa and crop failure related to drought are threatening millions of people in the region. Several governments including Zambia, Tanzania, Uganda and Kenya have always sought for strategies for dealing with drought and these evolve around ensuring food security for the affected communities. This is usually in the form of food –for –work programs (WRI, 2007). It has been observed that mismanagement of one drought leads to reduced productivity and greater susceptibility to the next drought (Chenje and Johnson, 1996). In most cases the responses by governments in Africa to drought resulting in famine are centred towards alleviating food shortages. FAO

postulated that food crises as a result of crop failure resulting from drought expose nations to reliance on food aid as shown in Table 3.

Table 3. Regional summary of countries on food aid

African region	Expenditure on food (% of consumption)	Food aid (crops, Kg per capita)
Northern	42	18
Sudano - Sahelian	42	13
Gulf of Guinea	39	6
Central	39	3
Eastern	37	4
Southern	57	15
Indian Ocean	57	12
Total	57	10

Source: ALM (2009).

According to Table 2 southern Africa receives the most food aid. During the 1984-85 droughts in the region, food aid was the major resort (ALM, 2009). The total emergency food and non-food requirements sourced through the DHA/SADC appeal process exceeded US$ 950 000 000 for ten southern African countries. The trend continued during the 1991-92 episode which saw five times more food being imported into the region than had been imported in the previous one (Springer, 2004).

In Chingechuru ward, almost all the significant features of coping with drought exist- that is, a dam, three boreholes and one irrigated garden close to the dam. However, these cannot provide total efficiency as the boreholes experience long downtime periods and the gardens are too small to accommodate a large number of the inhabitants. In this regard, it

becomes problematic to satisfy human needs, livestock requirements and agricultural concerns even during dry episodes that may be regarded as insignificant in other communities within the district and beyond. Dependence on food aid is therefore inevitable given such circumstances. According to Oba (2001) local communities need assistance to re-enforce their indigenous coping strategies to deal with problems such as drought.

CONCLUSION

Management of drought in Mberengwa District of Southern Zimbabwe is largely based on relief and famine handouts by the government, non-governmental organisations and other donors. Although some of the local inhabitants are endowed with traditional forecasting skills, adoption of the concepts tends to be minimal. At the same time droughts are increasing in frequency from one in three to five years in the 1980's to one in two to three years since 2005 and hence drought relief and food aid continue to characterise the communities' way of life. This should not be misconstrued to mean that the local people do not have their own drought coping strategies, but rather, the adoption of the IKS based drought coping techniques is declining and this may be responsible for the community's overdependence on relief and food aid during drought induced famine. The traditional drought coping strategies identified in Ward 33 were multiple cropping, planting drought tolerant crops, basin tillage, transhumant movement, supplementary feeding, destocking, deep welling, barter trade, selling/hired labour, additions to the usual diet and begging. The effectiveness of strategies such as early planting, basin tillage and planting drought tolerant crops was mainly limited by the low levels of application of the strategies in most cases due to unavailability of seeds and draught power as well as lack of co-operation among the community members.

RECOMMENDATIONS

There is need to increase the area under which the most drought tolerant crops like rapoko, millet and sorghum are planted in order to increase the yield for small grains and improve the levels of security when less drought tolerant crops fail completely due to drought in southern districts of Zimbabwe such as Mberengwa. Early planting should be encouraged among all the community members so as to increase their levels of co-operation particularly in livestock herding as soon as the rainy season commences. In order to counteract the problems of shortage of draught power, local people need to be mobilised to maximise basin tillage farming techniques accompanied by close monitoring by the Agritex officers. Controlled granaries need to be always maintained so as to provide food during times of scarcity and these can also be used as seeds for the next season when the supply runs out.

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