Strategies used by farmers to cope with drought in Machakos County, Kenya

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ABSTRACT

Drought is defined as a prolonged and abnormally dry and hot period which causes a scarcity of water for the normal needs of the affected community and ecosystem. It is a slow onset disaster that is believed to be the primary cause of famine due to crop failure. Droughts present a serious threat to local, national and global development. In Kenya drought affects more than three-quarters of land which is arid and semi-arid. The effects of drought include; death of animals, loss of human lives, cases of malnutrition, crop failure, and famine and water scarcity. To mitigate these effects, farmers have developed various strategies which are both indigenous and modern. Such strategies include: the provision of relief food, out-migrations, destocking-restocking, remittances and donation, market exchanges, and the provision of savings and credit facilities. However, the extent and nature of these coping strategies have not been researched. The study was conducted in Machakos County where farmers experience all types of drought and the listed strategies are used. The overall objective of the study was to investigate farmers coping strategies to drought and their implications to agricultural production. Specific objectives of the study were: to establish socio-economic characteristics of the farmers and types of farming practiced in the study area; to establish farmers knowledge of drought and causes of drought in the study area; to evaluate drought coping strategies used by farmers in response to drought in the study area and to examine the effect of drought coping strategies on farm production in the study area. Both qualitative and quantitative data were collected using questionnaires. These included farmers' views on whether; drought had been noticed, temperature had increased, length of seasons had changed, rainfall had decreased; and frequency of drought, coping strategies and their effects on production. Mixed research design was employed in this study. Study population included 350 small-scale farmers randomly sampled in all the 8 sub-Counties. Collection of data was done by interviewer guided questionnaires and Focus group discussion guides and interview schedules. Data were analyzed using frequencies, percentages, score ranking and presented through cross tabulations, pie charts, tables and discussions. The major findings included: the mean household farm size being 3.05 acres. Thirty four percent (34%) earned between 6001 and 20000, 23% earned between 3001 and 4500, 18% earned 1501- 3000, 15% earned 4501-6000 and 3% of the respondents earned 20001 and above, Ninety nine percent (99%) of respondents were affected by drought and Eighty-six percent (86%) of respondents observed a change in the timing of rainfall. Almost half of the farmers (48%) defined drought as shortage of rain during the rainy season and twenty percent (20%) as cessation of rain during the rainy season. Ninety two 92(%) percent of the respondents attributed planting cassava to improved farm production and 19% (69 farmers) recommended planting of drought resistant variety of crops. Seventy one percent (71%) said that multicropping increased farm production to a large extent. There is therefore a positive relationship between the strategies used by farmers and farm production. The findings of the study are useful to agricultural policy makers, government agencies dealing with drought, organizations working in drought prone areas in their search for solutions to drought impacts in Kenya.

Key words; drought, coping, strategies, resilience

1.0 INTRODUCTION

1.1 Background to the Study

Drought can be defined in a simple conceptual way that it is a prolonged and abnormally dry and hot period when there is scarcity of water for the normal needs of the affected community or ecosystem (EEN, 2004). The general definition can be modified to further develop definitions of specific types of droughts such as meteorological droughts, agricultural droughts, hydrological droughts and socio-economical droughts. Africa's general vulnerability to drought arises from a combination of many factors, including extreme poverty, frequent natural disasters such as

droughts and floods, and agricultural systems (both crop and livestock production) that are heavily dependent on rainfall. Extreme events, including floods and droughts, are becoming increasingly frequent and severe (IPCC, 2001). Between 1973 and 2002 climatic events constituted 53% of all reported natural and technological disasters in Africa (Nyongo, 2005). Droughts have particularly affected the Sahel, the Horn of Africa and Southern Africa since the end of the 1960s. Estimates suggest that one third of people from Africa live in drought-prone areas and that around 220 million people are annually exposed to drought (UNFCCC, 2006). In 2006, a particularly severe drought hit the greater Horn of Africa, plunging some 11 million people areas o the Ethiopia- Kenya –Somalia border were badly affected, with livestock losses of up to 70% and the mass migration of pastoralists out of drought –affected areas. The Humanitarian policy group (HPG) argues that such catastrophic effects can be averted if pastoralist livelihoods are supported with timely and appropriate livelihood- based interventions (Pantuliano and Wekesa, 2009).

Livelihood interventions, such as livestock, related initiatives (for example destocking) and water related interventions (including creating and rehabilitating wells and boreholes) contribute both to save lives and to strengthening pastoralist's resilience. By equipping communities with the ability to manage and respond to shocks in the early stages of a crisis, strategic livelihood interventions, allow for more timely and appropriate responses to drought than is possible with typical emergency relief assistance. Planning for the occurrence of drought within an overall framework of assistance to communities' means that dealing with drought becomes part of a long-term strategy to address vulnerability. Such framework would necessarily combine relief and development of policies and activities (Pantuliano & Wekesa, 2009).In some regions, both droughts and floods have been experienced more than once in a year. For example, in 2006, Kenya and Ethiopia experienced flooding followed by periods of extended drought leading to the death of more than 200 people and livestock. In most cases, economic impacts occur in agriculture and related sectors, because of the reliance of these sectors on surface and groundwater supplies. Pantuliano and Wekesa (2009), adds that in addition to losses in yields in crop and livestock production, drought is associated with insect infestations, plant disease, and wind erosion. The incidence of forest and range fires increases substantially during extended periods of droughts, which in turn places both human and wildlife populations at higher levels of risk. Income loss is another indicator used in assessing the impacts of drought. Reduced income for farmers has a ripple effect (Howden, 2009). Hydropower production may also be significantly affected by drought. Environmental losses are the result of damages to plant and animal species, wildlife habitat, and air and water quality, forest and range fires, degradation of landscape quality, loss of biodiversity, and soil erosion. Some of these effects are short-term, conditions returning to normal following the end of the drought. Other environmental effects last for some time and may even become permanent (Howden, 2009). Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity. Social impacts involve public safety, health, conflicts between water users, reduced quality of life, and inequities in the distribution of impacts and disaster relief. Howden (2009) further adds that many of the impacts identified as economic and environmental have social components as well. Population migration is a significant problem in many countries, often stimulated by a greater supply of food and water elsewhere. Migration is usually to urban areas within the stressed area, or to regions outside the drought area. Migration may even be to adjacent countries. When the drought has abated, the migrants seldom return home, depriving rural areas of valuable human resources. The drought migrants place increasing pressure on the social infrastructure of the urban areas, leading to increased poverty and social unrest. However, Gathara (1995) states that drought cycle in Kenya dates back to more than three decades ago. In 1975, widespread drought affected 16 000 people, in 1977 it was 20 000 people affected, in 1980, 40 000 people suffered the effects of drought, and in 1983/84 it affected over 200, 000 people. In 1991/92 in Arid and Semi-Arid Districts of North Eastern Kenya, the Rift Valley, Eastern and Coastal Provinces, 1.5 million people were affected by drought. It was reported that widespread drought affected 1.4 million people in 1995/96 and in 1999/2000, famine affected close to 4.4 million people. In 2004, 3 million people were in dire need of relief aid for eight months from August 2004-March 2005 due to widespread drought. The drought in 2008 affected 1.4 million people. In the late 2009 and early 2010, 10 million people were at risk of hunger after harvests failed due to drought (Downing, 2010).

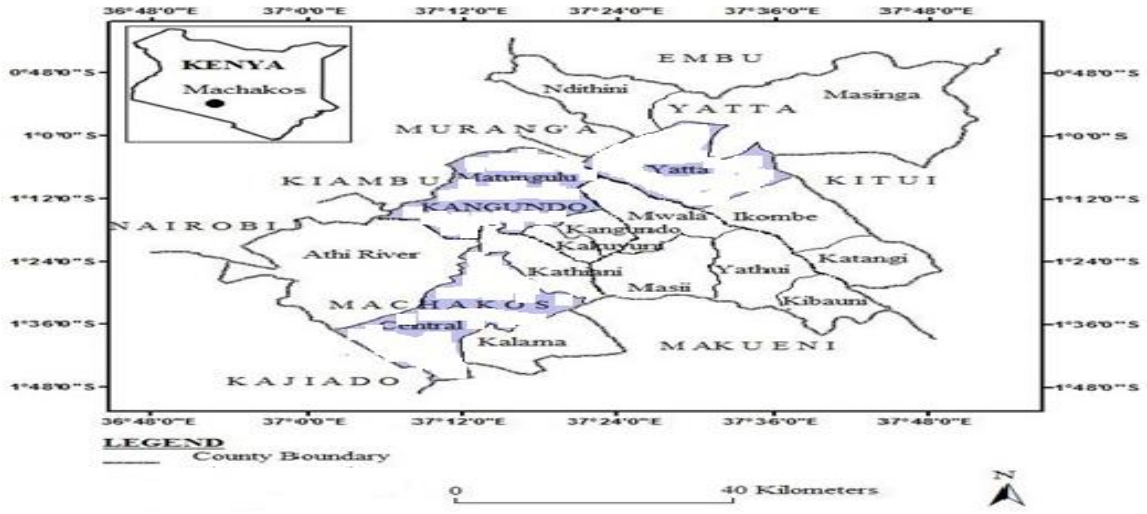
Recent droughts in Kenya

Droughts occur when there is deficiency in precipitation over extended periods of time causing human suffering to about 60% of the world's population (Ngaira, 2004). Since 1960s each drought episode in Africa has been more severe than the previous one (Wang'ati, 1996) causing humanitarian crisis in the continent. According to Ayoti (2008) droughts accounted for 20% of all the natural disasters that occurred between 1970 and 2006 affecting over

80% of the population in Africa. The droughts of 1970 and 1980 decades pushed the Sahara desert south destroying farmland in Nigeria, Niger and Mali (Alleyne, 2009). Severe food shortages were experienced in Niger, Sudan, Ethiopia, Kenya and Mozambique while additional 17 other African countries experienced inadequate food supplies (Farmer and Wrigley, 1985).

One of the worst humanitarian crisis caused by an extreme drought occurred in 2011 in the Horn of Africa (HOA) where over 13 million people were in dire need of humanitarian assistance (Action Aid Report, 2011a).Drought is persistent phenomenon in Kenya. The Arid and semi-arid lands of Kenya make up more than 80% of Kenya's landmass; support nearly half of the livestock population of the country and over 30% of the total human population. Kenya has experienced two worst droughts in recent history, the 2008/9 and 2011 droughts. Yet the focus of the political governance has been on other issues of lesser importance (Action Aid Report, 2011a). The same report also claims that the country has not taken serious mitigation measures for future impacts like those experienced in the 2008/2009 and the drought in 2011 year to avoid similar manifestations. The recent droughts 2008/2009 and 2011 droughts have caused the worst devastation in Kenya's dry lands, with indications showing almost over two thirds of Kenya's beef cattle perished, a significant number of camels and sheep also died (KFSWG, 2011). However, some recent studies have also focused on the resilience of certain species. In a study done by Morton (2005), on pastoralist coping strategies it states that the East African indigenous goat seems to have performed better during the 2008-2009 drought, the goat has become so adapted to all seasons that it survives on whatever is available, including the stands of euphorbia species now used for fencing in many Kenya's dry lands settlements. The same study also notes that camels are also less impacted due to their resilience to drought, though some significant losses were recorded in the 2011 drought. The drought left many pastoralists communities destitute and many others dying of hunger silently in their bomas (homes).The aftermaths of drought in dry lands is almost, always manifested through increased cattle rustling because the little cattle herds still on their hooves in dry lands, have to be shared (UNEP, 2002), and good rains that often follow after severe droughts become too attractive to pastoralists not to ignore and, hence the motivation to raid their neighbors and restock causing another devastation in human life through tribal conflicts. Gathara, (1995) takes the drought cycle in Kenya further by states that the cycles occur every 10 years. This is important because it proposes that need for anticipative strategy for drought management. For examples, the 2004 drought is a replica of the previous cycle of severe droughts that affect the country every decade as experienced in 1974, 1984 and 1994(Gathara, 1995). Some of the cycles with heavy losses were 1983-84 droughts and the 1999-2000 severely resulting in loss of human life and livestock, heavy government expenditure to facilitate response and general high economic losses of unprecedented levels. After the El Nino induced rains of 1997 and 1998 Kenya experienced prolonged drought in many areas leading to famine and starvation. The cycles blurred two rainy seasons in Kenya, the long rains in April to May and the short ones in October to November in most parts in Kenya (Action Aid Report, 2011a) which resulted poor planting timing. The extreme climate and weather conditions are associated with anomalies in the general circulations of the seasonal northward and southward movement of the Inter-tropical Convergence Zone (ITCZ).

Study area



Machakos County has eight (8) sub counties; Machakos Town, Athi-river, Kangundo, Kathiani, Masinga, Matungulu, Yatta and Mwala. The county capital is Machakos town. Temperatures range from a minimum of between 9.1 to a maximum of 26.7 0C and rainfall ranges from 500 mm - 900 mm per annum. The total population in Machakos county is 1,098,584 (Male – 49.4%, Female – 50.6%) comprising of 52% urban and 48% rural population. The population density is 177 people per Km2 and the approximate number of households is 186,297. The natural resources in the county include wildlife, Hills, building sand, water (rivers), pasture and land. The main economic activities and industries are farming, beekeeping, trade, dairy farming, limited coffee, Eco-tourism, Businesses and manufacturing. Agricultural products are such as mangoes, papaws, watermelons; maize, cow peas, beans, pigeon peas and lentils, livestock. Other food crops cultivated include drought tolerant crops varieties such as maize, beans, cowpeas and pigeon peas. The dominant types of livestock kept are goats, cattle, donkey and chicken. Machakos County stretches from latitudes 0º 45' south to 1º 31' South and longitudes 36° 45' east to 37° 45' east. The county has an altitude of 1000 - 1600 meters above sea level.

OBJECTIVE OF THE STUDY

To evaluate drought coping strategies used by farmers in the study area

METHODOLOGY

Both qualitative and quantitative data were collected using questionnaires. These included farmers' views on whether; drought had been noticed, temperature had increased, length of seasons had changed, rainfall had decreased; and frequency of drought, coping strategies and their effects on production. Mixed research design was employed in this study. Study population included 350 small-scale farmers randomly sampled in all the 8 sub-Counties. Collection of data was done by interviewer guided questionnaires and Focus group discussion guides and interview schedules. Data were analyzed using frequencies, percentages, score ranking and presented through cross tabulations, pie charts, tables and discussions.

RESULTS & DISCUSSION

The strategies used by farmers to cope with drought include; Planted cassava and other indigenous crops, Planting different crops(new),Crop diversification, Different planting dates, Shortening length of growing season, Migrating to a different place , Changing land under cultivation, Switching from crops to livestock, Switching from livestock to crops, Adjusting number of livestock, Switching from farming to non-farming, Switching from subsistence, farming to commercial farming, Increased use of irrigation, Increased use of fertilizers and pesticides, Increasing shading/ sheltering/tree planting.

Twenty one percent (21%) Plant cassava and other indigenous crops: 12% practiced mixed cropping; 10% practiced Crop diversification; 6% staggered planting dates;2% planted short season varieties;8% of farmers Migrated to a different place; 2% Changed land under cultivation;13% Switched from crops to livestock;2% Switched from livestock to crops;8% Adjusted number of livestock;4% Switched from farming to non-farming; 2% Switched from

subsistence farming to commercial farming;2% Increased use of high technology irrigation;4% Increased use of fertilizers and pesticides and 4% increased sheltering. If faced with an onset of drought; sixteen percent (16%) of the farmers said that they would delay farming, 10% said they would stop farming and others as follows: 6% would seek to pray; 11% would plant modern drought resistant variety ; 10% would do early farming; 6% of farmers would switch to irrigation ; 5% would practice cross-ridging; 6% would change to trading; 4% said they would store food; 3% said they migrate to another place; 5% would plant indigenous crops ; 4% would buy food for the drought season ; 12% would sell asset and 2% would do nothing .

5.2 Conclusions

Conclusions drawn from the findings of the study are listed below:

i. Food crops such as maize, millet, green grams, cassava were the major crops cultivated, and potential crop loss was mitigated by planting drought resistant crop varieties such as cassava, yams, sorghum
ii. Farmer's socio-economic characteristics affect the choice of drought coping strategies and there is a relationship between the drought knowledges, strategies employed and the impact on agricultural production. Elderly Farmers use traditional crops such as cassava, yams while higher levels of education led to adoption of irrigation.
iii. While farmers' selection of coping strategies to drought may be intrinsic, this selection tends to be overwhelmingly shaped by diverse factors such as demography, access to information and assets and vulnerability levels
iv. Farmers are aware of drought phenomenon and changes in temperature and rainfall patterns consistent with general scientific predictions. 89% stated they have experienced drought, 97% percent are able to identify drought onset and 23% gave 'no harvest' as an indicator of drought episode.

5.3 Recommendations

Following the above conclusions, the study recommended that there is need to:

i. Drought management literacy should be beefed up among the farmers in Machakos and other ASAL areas. There should be strengthening of the capacity of farmers to identify and assess drought through education to farmers and other relevant stakeholder such as county extension officers.
ii. Strengthening of early warning systems. The relevant Government agencies and stakeholders should strengthen the early warning systems in data collection and dissemination of relevant information to farmers on time
iii. Drought insurance; the relevant Government authorities should support drought insurance policies such as on crops failure and loss of livestock. The government sustainable campaign to encourage farmers to embrace drought insurance.
iv. Water harvesting: Farmers should learn water harvesting techniques by constructing ridges or tied ridges with a series of small basins is a useful technology for the collection and storage of rainwater in dry areas. Farmers should adopt simple technique of cross-ridging to concentrate water and increase yield especially in drought conditions.
v. Integrate sectors through interventions that target agricultural extension, meteorology, academic research and other developmental activities through

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