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Abstract.

A drought is a slow onset climatic event that cannot be totally eradicated but interventions can be made to be better prepared to cope with drought, develop more resilient ecosystems to recover from drought episodes and mitigate the impacts of droughts. Sustainable Development interventions can go a long way in enhancing drought mitigation and adaptation in developing nations and world as well. The two are closely intertwined and efforts in one area build multiple synergies for the other. Drought mitigation measures are those interventions that eliminate or reduce the drought impacts and risks. The objective of this project is to investigate the determinants of implementation of drought mitigation measures Ndalani ward, Machakos County. The specific objectives include investigating the effects of staff skills implementation of drought mitigation measures; to investigate the effects of users' information on the implementation of drought mitigation measures and to investigate the effect of donors on implementation of drought mitigation measures Ndalani ward. A descriptive survey research design was adopted in this study; this enabled the research to give a detailed description of the research variables. The target population was 96 farmers from Ndalani ward in the larger Yatta area. Data collection was done by use of questionnaires with open and closed-ended questionnaires. Data were tallied, analyzed through XLstat and presented using frequency tables and figures. The key findings were as follows: Ninety-two percent (92%) of the respondents hold the view that community participation is a crucial ingredient in the implementation of drought mitigation measures. Only 8% of the respondents disagree that community participation has influenced the implementation of drought mitigation measures. Seventeen seven percent (77%) of respondents agree that user information has an influence on the implementation of drought mitigation measures. Twenty-three percent (23%) of the respondents see no influence of the users' information towards the implementation of drought mitigation measures. Ninety-two (92%) of the respondents stated that donor funding has an influence on the implementation of drought mitigation measures while 8% said that donor funding does not have an influence on the implementation of drought mitigation measures. 65% of the respondents felt that the influence of donor funding on the implementation of drought mitigation measures is very high while 23% felt that the influence is just high. that 30% of the respondents planted cassava and tolerant crops as a drought mitigation strategy, 16% Planting different crops (mixed cropping), 15% practice crop diversification (adding new crops), 13% plant at different dates and 9% Increased use of high technology irrigation and adjusted number of livestock as drought coping strategy. This research study will be significant to CBOs, NGOs, and the County government in learning effective ways of implementing drought mitigation measures. The study gives an insight into effective ways of implementing drought mitigation measures.

1.1 Background

Drought responses, Climate action and Sustainable development concerns are interlinked and consists of synergies that relevant policymakers can exploit and build on. Climate changes have aggravated drought episodes through erratic rainfall patterns, desertification, loss of biodiversity and such. According to IPCC Report¹ (2019) deserts are increasing at an increasing rate estimated to be approximately 12 million hectares of productive land lost per annum. Land degradation alone leads to economic costs estimated to be between US\$ 6.3–10.6 trillion globally between US\$ 870 and 1,450 per

¹ Intergovernmental Panel on Climate Change (IPCC) 2014 Fifth Assessment Report (AR5). Geneva.

person per year². This cost is higher than the mean per-capita income in Africa, which is one of the affected continents in the world⁴. Furthermore, erratic rainfall patterns convert approximately 11m hectares of farming lands into deserts³. Desertification is a major indicator of climate variation globally with majority of effects felt in developing nations. Several studies have indicated that drought episodes are likely to increase unless climate action targets are achieved by 2025. The number of people affected by drought globally will increase threefold (FAO, 2019²) by 2025 and farming lands will reduce by 20% globally. Africa has experienced many drought episodes with 80% of them linked to climate changes due to human activities. The drought mitigation efforts are still underfunded in most affected countries with less than 0.2 % of budget committed to drought adaptation and mitigation even though they affect more than 50% of African population directly or indirectly. In Kenya drought episodes² occur at a frequency of 9 years and data shows the trend is becoming more frequent. Farmers are faced with increasing challenge of meeting food security demands and importation of food items is threatening to push many of them to poverty.

1.2 Objectives

Drought is a known experience in rural areas of ASAL communities and there have been attempts to adopt some local measures to mitigate drought effects. While these measures do not fully protect rural communities from extreme adverse effects of drought they provide a minimal cushion and external efforts are needed to secure posterity of people living in ASAL areas. Over the last century, the efficacy of these strategies has been deteriorating. Many zones across the world are now approaching a state chronic vulnerability to humanitarian disaster³⁴. Government and donor communities have developed a range of responses to drought including destocking, animal health, livestock nutrition and re-stocking strategies. However, in the absence of sufficient warning, most such efforts tend to be reactive rather than pro-active to disaster and hence fail to protect pastoralists from loss of livestock and their key asset. Implementation of these measures at local levels is quite often hindered by a set of factors that have not been appreciated in drought response plans.

The study was guided by the following objectives: (i)to investigate the effect of community participation on implementation of drought mitigation measures in Ndalani ward,(ii)To investigate the effects of user information on the implementation of drought mitigation measures in Ndalani ward,(iii)To investigate the effects of staff skills implementation of drought mitigation measures in Ndalani ward,(iv)To investigate the effect of donors funding on implementation of drought mitigation measures in Ndalani ward.

1.3 Methodology

The target population comprised of 96 farmers randomly picked from Ndalani ward of Machakos County in Kenya. The average rainfall is between 500 mm and 1300 mm⁵. The short rains are expected in October and December while the long rains are expected in March to May. The highland areas within the County such as Mua, Iveti and Kangundo receive an average of 1000mm while the lowland areas receive about 500mm; ideally,

2FAO. 2019. Proactive approaches to drought preparedness – Where are we now and where do we go from here? Rome.

3 FAO. 2015. The impact of disasters on agriculture and food security. Rome. <http://www.fao.org/3/a-i5128e.pdf>

4. IPCC. 2019. Climate change and land. An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Summary for Policy Makers. Approved draft 7 August 2019.

5 UNOCHA. 2017. Horn of Africa: humanitarian impacts of drought. Issue 9. 10 Aug 2017. [online]. Available at: <https://reliefweb.int/report/somalia/horn-africa-humanitarian-impacts-drought-issue-9-10-aug-2017> (citation 20 August 2019).

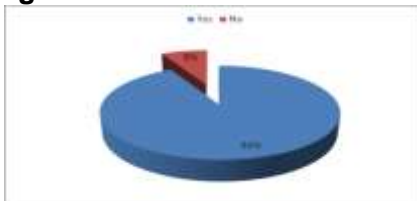
the rainfall within the County is influenced by the latitude. In terms of temperature, July is the coldest month while October and March are the warmest. Temperature varies between 18 degrees Celsius and 29°C throughout the year. Since the area does not experience rain throughout the year, it then means that there are months that experience dry spells. These months are mainly February to March and August to September. Data were collected by the use of questionnaires, which were piloted, presented and translated to local dialect to give required acceptability and reliability. They consisted of open and closed questions. The questions were divided and numbered according to the objectives of the study. The data from the completed questionnaires were crosschecked, coded and entered in the computer XLstat and analyzed using qualitative and quantitative methods. Basic Descriptive statistics were adopted for analyzing and presenting the data in this research. The researcher summarized patterns in the responses from the sample by use of frequency and figures.

1.4 Findings

1.4.1 Community participation

The study sought to find out the influence of community participation on implementation of drought mitigation measures at the local level. Figure one shows clearly that 92% of the respondents hold the view that community participation is a crucial ingredient in the implementation of the drought mitigation measures. Only 8% of the respondents disagree that community participation has influence on implementation of drought mitigation measures. This small percentage may be because of individual based interventions such as those who move to other counties or buy land elsewhere when there is a drought episode. Policymakers should focus on making policies that accelerate effective and deliberate participation of community members in drought and climate action⁵.

Figure 1 Influence of Community Participation.



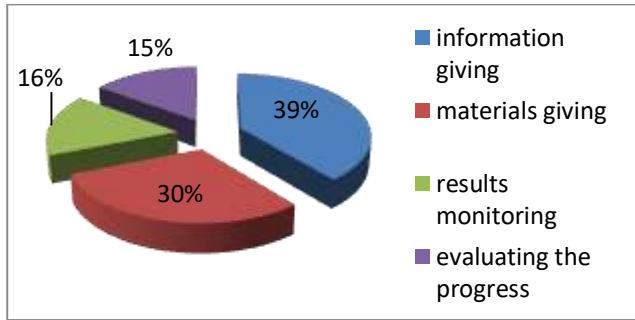
Source: Author (2018)

1.4.2 Areas of participation

The study also sought to enquire ways that the respondents participated in the implementation of drought mitigation strategy and climate action in general.

Figure 2 Past areas of participation

⁵ IDMP. 2019d. National drought policies. [online]. <http://www.droughtmanagement.info/drought-policies-and-plans/> Citation 20 August 2019)



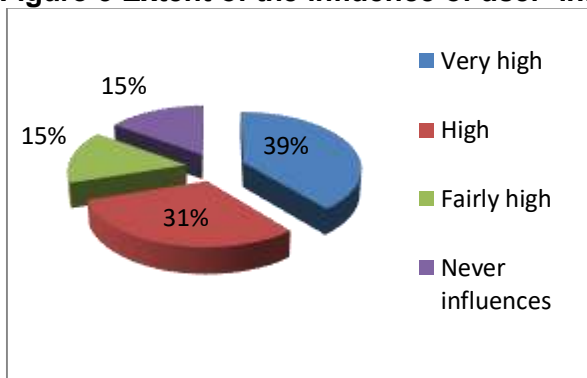
Source: Author (2018)

As shown in the Figure 2, majority (39%) of the respondents participate by information giving during the implementation of drought mitigation measures. Thirty percent (30%) of the respondents participate in materials giving, 16% in drought intervention results monitoring while only 15% of the respondents participate in final evaluation of drought interventions by the government. The nature of community participation is vital to success since it allows community members to gain required experience and skills for future endeavors in drought mitigation. Policymakers and implementers should work to achieve maximum involvement of community members at all stages from the start to the last phase⁶.

1.4.3 User information

Thirty-nine percent (39%) of the respondents rate the influence of users' information towards the implementation of drought mitigation measures to be very high. Thirty-one (31%) of the respondents rated the user information' influence to be high, 15% said the influence to be high, and a similar number (15%) saw no influence of user information towards the implementation of drought mitigation measures. The information supplied to farmers during mitigation measures implementation is vital to success; in total 85% agree to this and approximately 15% were in contrary and this could be attributed to information usage and access concerns. Efforts should be made by Kenya Meteorological services (KMS) to accelerate provision of timely usable climate information to farmers.

Figure 3 Extent of the influence of user' information



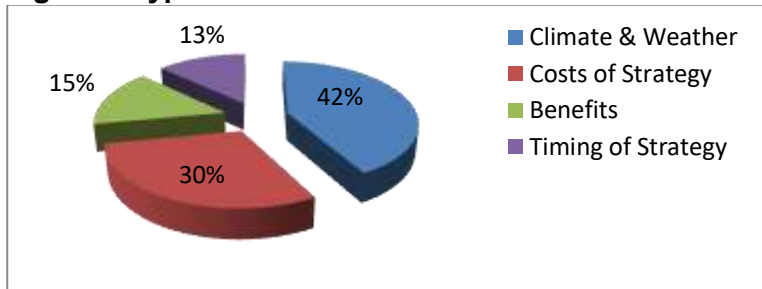
Source: Author (2018)

1.4.4 Type of information

⁶ FAO. 2019. Proactive approaches to drought preparedness – Where are we now and where do we go from here? Rome. P.27-28

The study also sought to establish the type of users' information disseminated during the intervention.

Figure 4 Type of Users' Information



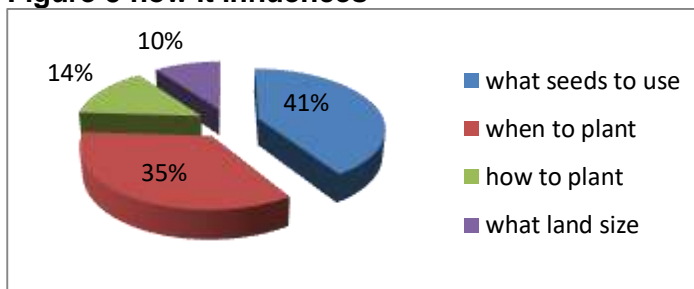
Source: Author (2018)

In Figure 4, Forty-two percent (42%) of the respondents stated the information they require as climate and weather related, towards the implementation of drought mitigation measures. Thirty percent (30%) of the respondents said they require costs of intervention strategy, 15% said they require benefits of the strategy, and 13% require information on timing of strategy. These findings show there is a growing appreciation of climate information among farmers and this is something that county and national government climate action plans and measures can exploit for accelerated benefits.

1.4.5 How it influences

The study sought to know how information supplied influences implementation of drought mitigation measures at household level. The responses were as follows:

Figure 5 how it influences



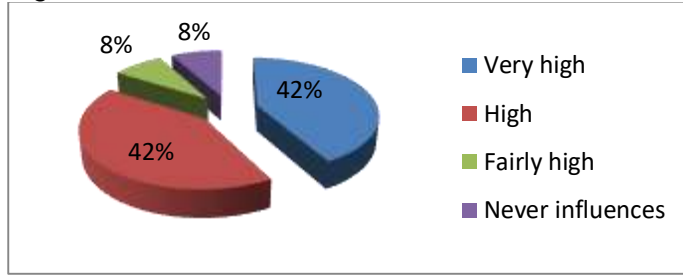
Source: Author (2018)

Figure five (5), shows that 41% of the respondents stated that provision of users' information affects what seeds to use, thirty-five percent (35%) of the respondents said it affects when to plant, 14% said how to plant and 10% the land size to plant. Local adaptive measures involve planting local crops, local animal breeds and alternative sources of income among others. Sustainable Information on resilient crops and local varieties can help achieve maximum results on drought information and indigenous knowledge on drought and climate adaptation should be incorporated in community action plans.

1.5 Influence of climate skills

Majority (88%) of the respondents claimed that staff skills have an influence on successful implementation of drought mitigation measures as shown in figure 6. Twelve percent (12%) of the respondents said that the staff skills have no influence on the implementation of drought mitigation measures. This dissenting voice may be because of access to timely information and technicality in application of information supplied.

Figure 6 Extent of the Influence of Staff Skills



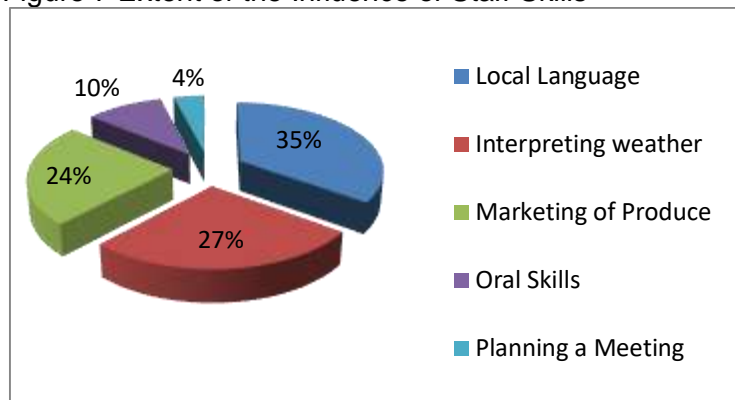
Source: Author (2018)

Forty-two percent (42%) of the respondents stated that staff skills have a very high influence on the implementation of drought mitigation measures while a similar number rate the influence to be high as shown in figure 6. Eight percent (8%) rate the influence to be high and another 8% said that staff skills have no influence at all towards the implementation of drought mitigation measures.

1.5.1 EXTENT OF SKILLS

The study also sought to establish the skills they deemed important in the implementation of drought interventions.

Figure 7 Extent of the Influence of Staff Skills



Source: Author (2018)

According to Figure 7, 35% of the respondents stated that knowledge of local language is vital for the implementation of drought mitigation measures, 27% stated it is weather interpretation skills, while 24% said that marketing of farm produce and 4% planning skills. These findings indicate a need to use local communication channels in getting climate information to the farmers in a timely and usable way. National climate and drought communication strategy should consider local media as a key element in achieving climate communication effectiveness locally.

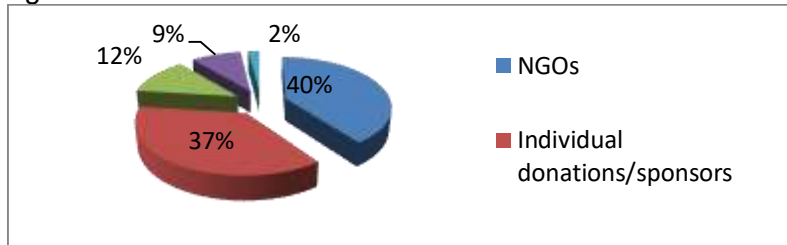
1.6 DONOR FUNDING

Ninety-two (92%) of the respondents stated that donor funding has an influence towards the implementation of drought mitigation measures while 8% said that donor funding does not have influence on the implementation of drought mitigation measures. Some of the key drought interventions at the local level are funded by external sources independently or in conjunction with CBOs and/or local authorities. Approximately 65% of the respondents felt that the influence of donor funding on the implementation of drought mitigation measures is very high while 23% felt that the influence is just high. 4% of the respondents said that the influence of donor funding on the implementation of

drought mitigation measures is fairly high while 8% of the respondents felt that donor funding has got no influence at all on the implementation of drought mitigation measures.

1.6.1 SOURCES OF FUNDS

Figure 8 Sources of Funds



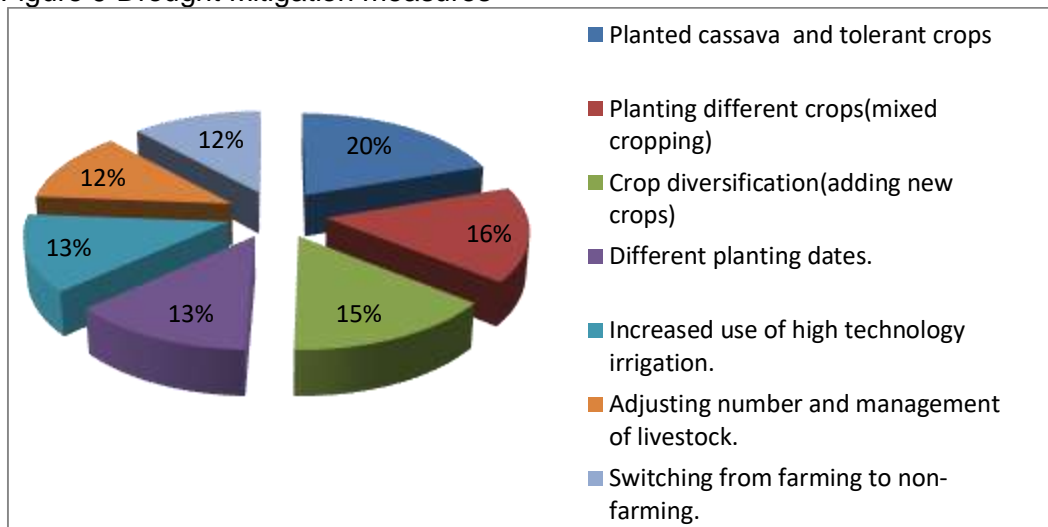
Source: Author (2018)

According to figure 8, 40 % of the respondents said NGOs provide funds for the implementation of drought mitigation measures while 37% said individual sources and sponsors, 12% percent indicated government funding, while only 2% indicated sales of assets. There are various CSOs conducting drought intervention in the area, which reveals a high level of dependency. National and county government should diversify sources of funding in order to minimize financing risk because over relying of donor funding.

1.7 DROUGHT MITIGATIVES MEASURES

The study sought to analyses drought intervention measures the farmers use in the area.

Figure 9 Drought Mitigation measures



Source: Author (2018)

Figure 9 evidently shows that 30% of the respondents planted cassava and other tolerant crops as a drought mitigation strategy, 16% Planting different crops (mixed cropping), 15% practice crop diversification (adding new crops), 13% plant at different dates and 9% Increased use of high technology irrigation and adjusted number of livestock as drought coping strategy. The policy makers and implementers at county and national level should seek to local reinforce and incorporate local measures along with national climate and drought action plans.

1.8 Conclusions.

The study led to the following conclusions:

1. Farmers participation in drought and climate actions, though vital for accelerating results and benefits from such interventions has not been optimized in the area.
2. Timely drought and climate information put in a language and format understandable to farmers is vital for achieving effective local response to drought and climate actions.
3. There is a growing appreciation of climate information among farmers and this is something that county and national government climate action plans and measures can exploit for accelerated benefits.
4. The status of drought and climate action capacity at the local level is not sufficient to achieve optimal results for climate and drought interventions.
5. There is too much reliance on external financing sources for local climate and drought action in the area. This could lead to local dependency, which can be unsustainable.

1.9 Recommendations

The findings from the study implicate the need for the government policymakers (National and County), donor and Aid agencies, CSOs and other key stakeholders should take cognizance of those variables that have been found to influence the implementation of the drought mitigation. Specifically,

- i. Policymakers should focus on making policies that accelerate effective and deliberate participation of community members in drought and climate action which incorporate indigenous climate and drought knowledge.
- ii. The nature of community participation is vital to success since it allows community members to gain required experience and skills for future endeavors in drought mitigation. Policymakers and implementers should work to achieve maximum involvement of community members at all stages from the start to the last phase based on full climate information disclosure.
- iii. Efforts should be made by Kenya Meteorological services (KMS) to accelerate provision of timely usable climate information to farmers.
- iv. Sustainable Information on resilient crops and local varieties can help achieve maximum results on drought information and indigenous knowledge on drought and climate adaptation should be incorporated in community action plans.
- v. National and County strategy need to exploit local communication channels in getting climate information to the farmers in a timely and usable way. National climate and drought communication strategy should consider local media as a key element in achieving climate communication effectiveness locally
- vi. National and county government should diversify sources of funding in order to minimize financing risk because over relying of donor funding.
- vii. The policy makers and implementers at county and national level should seek to local reinforce and incorporate local measures along with national climate and drought action plans.

2.0 Suggestions for Further Study.

This study focused on Determinants of implementation of drought mitigative measures in Kenya. The nexus between drought measure and climate action should be established and synergies can be harnessed to maximize benefits, which should be disaggregated along gender lines.

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