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GLOBAL COOPERATION FOR CLIMATE ACTION

Research report - Zambia - Impulsouth project

Assessment of knowledge, capacity needs and gaps, on the issue of assessing impacts, vulnerabilities and risks of climate change, with an emphasis on gender in Zambia.

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INTRODUCTION

Climate change is an increasing threat to Africa. Its impacts are being experienced across the continent; negatively impacting important sectors for national development such as agriculture, infrastructure development, water development, forestry and energy among others (Bele *et al.* 2011). Impacts are exacerbated by anthropogenic activities. Impacts of climate variability and change on ecosystems and livelihoods are widely recognised (Kalaba *et al.* 2013; England *et al.* 2018), with varying gendered impacts (Chaudhury *et al.* 2012; Rao *et al.* 2019).

Zambia is experiencing climate induced hazards, which include drought and dry spells, seasonal and flash floods and extreme temperatures. Droughts and floods have increased in frequency and intensity over the past few decades and have adversely impacted on the food and water security, water quality, energy and sustainable livelihoods of communities. Zambia is highly vulnerable to negative impacts of climate change due to low adaptive capacity, low resilience and overreliance on rain-fed agriculture for food security and livelihoods (Muema *et al.* 2018). Furthermore, the country has high reliance on natural resources-based livelihood strategies which are susceptible to climate extremes. Studies project increased impacts of climate change due to increased exposure, high levels of vulnerability and low levels of resilience. On average for the period 1950-2016, precipitation has been decreasing by 1.1 mm yr^{-1}, while temperature has been increasing by at a rate of 0.01 ^{o}C yr^{-1} in Zambia (Libanda et al., 2020). With constrained asset portfolios, the impacts of climate change on livelihoods are larger for rural households that depend on rain-fed agriculture (Hamududu and Ngoma, 2020).[1] With a projected significant increase in the number of consecutive dry days over Zambia, especially beginning from the year 2050 to the end of the century, the agriculture sector, ecosystem services and water resources management will negatively be impacted (Libanda and Ngonga, 2018).[2]

Zambia's agricultural sector is the socio-economic backbone of the rural population, with 60 % being dependent on the sector as the main source of income and livelihood. Many of the farmers are poor and engage in low-

1 Hamududu, B.H., Ngoma, H., 2020. Impacts of climate change on water resources availability in Zambia: implications for irrigation development. Environ. Dev. Sustain. 22, 2817–2838. https://doi.org/10.1007/s10668-019-00320-9

2 Libanda, B., Ngonga, C., 2018. Projection of frequency and intensity of extreme precipitation in Zambia: A CMIP5 study. Clim. Res. 76, 59–72. https://doi.org/10.3354/cr01528

productivity rain-fed subsistence farming resulting from inadequate resources for the purchase of inputs, use of inappropriate farming practices and failure to fully develop the irrigation potential. These challenges are exacerbated by increased frequency of extreme weather events such as rainfall variation, floods and droughts caused by climate change, and in the last two years, effects of the Covid pandemic. As a minimal contributor to global GHG emissions, Zambia places significant importance and priority on adaptation to the effects of climate change to enhance the resilience of its population, ecosystems, infrastructure, productive and health systems. The key socio-economic sectors identified as most vulnerable to climate change impacts include: agriculture, water, forestry, energy, wildlife, infrastructure and health. (NDC, 2021).

With the heightened global attention on climate change, more attention is being paid to improving and providing weather and climate information services.

Given that the projected increase in extreme climate events will have far-reaching impacts on agricultural production and food security, especially in developing countries, provision of timely climate information is key to helping vulnerable societies and individuals to prepare for these extreme events (Kadi et al 2011). Relevant and robust climate information is key to successful adaptation measures. The provision of weather and climate information services involves the down-scaling, packaging and dissemination of such information for end users. Such information is key in helping farmers mitigate, adapt and build resilience to extreme weather events (Chiputwa et al 2020).

CONCEPTUAL AND THEORETICAL FRAMEWORK

Building institutional capacity to address climate change is key in climate change adaptation and mitigation. This study used the framework provided by the UNFCCC that organizes capacity issues around three levels involving individual, institutional and systemic (Fig 1), and the IPCC framework for vulnerability and the cross cutting issues of gender and youth. This study focused at the institutional level.

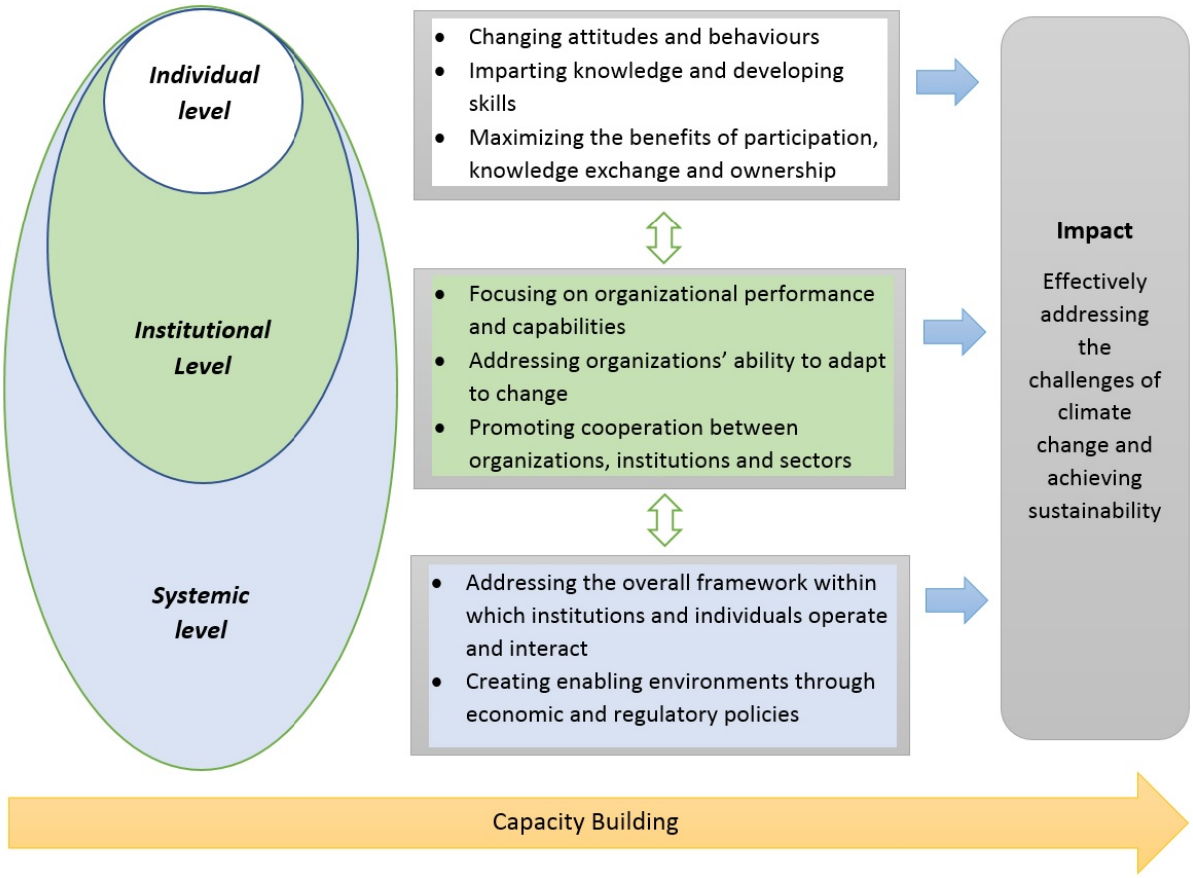

Figure 1. Capacity Building Framework and levels in the UNFCCC. (UNFCCC, 2021)

Examining capacities requires understanding of individual, institutional and systemic perspectives. In this study, capacities were investigated at the institutional level. We examined measures at the institutional level and various policies and institutional framework in the agriculture sector and Department of meteorology to provide insights into climate information systems and agriculture productivity. The climate policy and current

institutional framework will be analysed to assess current gaps and opportunities as they relate to the agriculture sector. Earlier studies in Zambia have highlighted lack of institutional coordination and collaboration in addressing climate change (Kalaba *et al.* 2014). In this study, at the institutional level, the analysis aimed to promote cooperation between organisations, institutions and sectors.

SPECIFIC SCOPE

This study focused on the knowledge and capacity needs and gaps among key Agricultural institutions in Zambia, both government and CSOs which form part of the multi-sectoral institutional framework as established in the national policy on climate change of 2016, in relation to assessing impacts, vulnerabilities and risks of climate change with an emphasis on gender in Zambia.

OBJETIVES

The main objective of this study is to assess the institutional capacity needs and gaps in the Ministry of Agriculture (MoA) and the Ministry of Green Economy and Environment (Meteorology Department; MET Dept) in relation to assessing impacts, vulnerabilities and risks of climate change with an emphasis on gender.

Specific objectives

a) To assess the institutional strengths and weaknesses in assessing impacts, vulnerabilities, and risks of climate change among personnel of the MoA and MET Dept with respect to helping farmers adapt and build resilience to extreme weather events in Zambia with a special focus on gender and youth.

b) To analyse and appraise the level of cooperation and operationalization of the working framework between MoA and MET with respect to assessing impacts, vulnerabilities, and risks of climate change in order to provide timely early warning systems for the farming communities in Zambia.

c) To assess the extent to which climate information services have been decentralized for early warning to improve assessment of impacts, vulnerabilities, and risks of climate change for improved resilience and adaptation of smallholder agricultural systems in Zambia with a special focus on gender and youth.

METHODOLOGY

This study employed focus group discussions to assess the institutional capacity needs and gaps. Focus groups of between 6 to 12 people were constituted. Focus group discussions were facilitated by the MoA at district level, Provincial, and National level and by the Ministry of Green Economy and Environment (Meteorology Department) at Provincial and National level. Focus group discussions mainly focused on the institutional strengths and weaknesses. In the selection of participants, researchers ensured anequal participation of men and women within all categories.

The Meteorology Department is key in providing weather information for use by extension and farmers. The institutional capacity to provide this vital information for preparedness was interrogated. In the Ministry of Agriculture, current institutional framework are the units responsible for Agronomy, and the Zambia Agricultural Research Institution. In these two key institutions, the research will review the operations especially at programming level at Headquarters in Lusaka at national level.

Focus group discussions were synthesized to identify emerging themes and categories. The emerging themes or categories will be analysed using a discourse analysis.

RESULTS

Focus Group Discussions were conducted with staff from the Ministry of Agriculture District office (Kitwe), the Ministry of Agriculture Headquarters and from the Metrological Department.

Responses from the Ministry of Agriculture – Kitwe District

Table 1 summarizes responses from a focus group discussion with the Ministry of Agriculture Kitwe district office. The Ministry uses top-down planning with limited participation from extension officers and farmers.

Table 1: Strengths, weaknesses, opportunities and threats with respect to planning for agricultural programs

Strengths • The MoA has a defined structure • The MoA has a countrywide presence • The MoA offers demand driven extension advisory services (farmers demand for specific training and advisory services)	**Weaknesses** • Top-down planning with limited participation from extension officers and farmers • Limited interaction between national planners from headquarters and camp/block extension officers and farmers • High farmer-extension ratio • Limited resources at district level (transport, fuel among others) • The MoA has no structure to handle disaster management issues with respect to climate hazards and risks. This responsibility falls under the Office of the Vice President
Opportunities • Well qualified staff • Bottom-up planning (to identify farmer needs)	**Threats** • High cost of agricultural inputs • Lack of mechanization • Climate change

Recommendations

- Bottom-up planning
- Participatory planning (involve extension officers and farmers)

- Increase resource allocation to agriculture

The Ministry of Agriculture has experience in implementing climate smart agriculture. The Government of Zambia adopted conservation farming as a sustainable way of farming in the country. The key responses on the strengths, weaknesses and opportunities are presented in Table 2.

Table 2 Strengths, weaknesses, opportunities and threats with respect to implementing climate smart agricultural programs

Strengths • Readily available climate smart agriculture (CSA) information • The MoA has experience in implementing CSA • The MoA adopted conservation agriculture as a sustainable agricultural system • Generous donation for CSA programs in Zambia • Farmers organized in groups (clubs, cooperatives)	**Weaknesses** • High farmer-extension officer ration • Some agricultural camps have no housing units for extension officers (hence officers live outside the camps) • Poor road network especially in the rainy season • Limited resources • The MoA has no structure to handle disaster management issues with respect to climate hazards and risks. This responsibility falls under the Office of the Vice President
Opportunities • Readily available markets • Availability of service providers (agro companies being an urban district)	**Threats** • There are no threats of implementing CSA

Table 3 Strengths, weaknesses, opportunities and threats with respect to flow of weather information from MET to Agriculture

Strengths • MET publishes monthly crop monitoring survey (done from November-May)	**Weaknesses** • Poor communication between MET and district • Districts rarely receive weather bulletins from MET • No interaction between MET and district staff • MET offices not in all districts • Weather forecasts are sometimes unreliable
Opportunities	**Threats** • Frequent extreme weather events

• There is need to establish a working framework between MET, MoA headquarters, MoA district and farmers • MET officers to be stationed in each district to help downscale and disseminate weather information to extension officers and farmers • Increased availability of information (online and via phones)	• Unreliable weather forecasts

Responses from the Ministry of Agriculture - Headquarters

Strengths and weaknesses with respect to implementing climate smart agricultural programs

Strengths	**Weaknesses**
• Availability of CSA technologies (conservation agriculture, agroforestry) • Zambia Agriculture Research Institute (ZARI) has been breeding varieties for heat and moisture stress • MoA is piloting a project of improving weather forecasts in 16 districts. Of the 16 districts have one automatic weather station.	• Farmers rarely adopt all the 3 principles together • CSA is mostly donor driven in Zambia • CSA practices are rarely subjected to research for local suitability • Lack of mechanization for reducing the high labour demands consistent with CSA practices • All camps had rain gauges but they were poorly managed, hence all have been lost

Weather information

Strengths	**Weaknesses**
• MoA qualified staff • MET qualified staff • MoA and MET normally cooperate on some projects	• Farmers rarely access weather forecast information • Weather information from MET is never downscaled (into farmer recommendations) for farmer update. (Farmers are interested in

• MET produces and sends 10 days weather information to MoA headquarters	knowing: the onset of rainfall, duration of rainfall (rainfall days), distribution of rainfall) • MoA has no mandated staff to receive weather information from MET at HQ and downscale and distribute to provinces and districts • There is poor working framework between MET and MoA with respect to flow of weather information

Responses from the Meteorological Department

Strengths • MET has qualified staff • MET produces 10 days crop weather bulletin which is shared with the MoA HQ and shared with the press	**Weaknesses** • Understaffing (most MET positions are vacant) • Limited weather stations to cover the whole country for accurate weather forecasting • Limited funding (hence limited interaction with agriculture and few weather stations among others) • Weak collaboration between agriculture and MET • Agriculture with presence countrywide doesn't participate in collection of weather data • Lack of infrastructure (inadequate servers) to support collection and storage of weather data at national and local level • MET doesn't have presence in all districts
Opportunities • MET could increase weather stations (could tap staff from MoA which has countrywide presence) • Increased number of weather stations for the whole country • There is need for prompt and accurate useful weather information for the whole country	**Threats** • Extreme weather events in the absence of enough weather stations for production of accurate weather forecasts

DISCUSSION

Knowledge on the strengths and weaknesses of the MoA and MET, their cooperation for provision of timely early warning climate information and decentralization of early warning climate information with respect to assessments of climate change impacts, vulnerabilities and risks is vital. The responsibility to assess climate change impacts, vulnerabilities and risks falls under the Office of the Vice President in the Disaster Management and Mitigation Unit (DMMU). With the huge mandate of the MoA of ensuring food security in the midst of frequent extreme weather events, the ministry should have a permanent structure that should be tasked with the responsibility of managing and mitigating climate change disasters through effective and efficient assessments of impacts, vulnerabilities and risks. Currently, the MoA has representation at Sub-district, District level and Provincial level.

Since planning in the MoA is top-down with limited involvement of field officers and the primary stakeholders' farmers, it is assumed that the assessments of impacts, vulnerabilities and risks is weak. Field officers and farmers, especially vulnerable groups such as women andyouth are well aware of the level of exposure (vulnerabilities) to hazards, hazards risks (disaster risks) as well as what capacity they have or require to handle such risks. The local community can actively contribute to the development of a greater understanding of core problems associated with vulnerability. Therefore stakeholder participation in the assessments of impacts, vulnerabilities and risks; and in the planning and implementation of programs that help farmers adapt and build resilience and provide timely early warming is crucial.

Reliable climate information is key to building robust strategies to adapt to climate change. The agriculture sector being very sensitive to climate change requires collaboration with MET department to build resilience of local people. Findings of the study however show a lack of integration of climate information in agriculture decision making. While the Ministry of Agriculture collaborates with the Meteorology Department in receiving weather forecasts, the Ministry of Agriculture lacks a laid down process in the dissemination of information from the national to the community level. Weather and climate information services are gaining prominence and they are vital for helping farmers to adapt to climate variability. There is therefore a need to develop systems for collection and dissemination of weather information. The dissemination of weather information could tap into mobile technologies to help improve service delivery to smallholder farmers (Baumuller 2018). The weak

cooperation between MoA and MET generally limits the effectiveness of assessments on impacts, vulnerabilities and risks due to data and information deficiencies emanating from the weak cooperation.

Studies have shown that mobile phones are useful in providing smallholder farmers with agricultural information using mobile technologies (Caine et al 2015) Findings of this study have indicated that to benefit from climate information generated, there is need for deliberate programs to produce and translate climate data into tailored information for use by farmers in each area. Participatory approaches in the provision of tailored climate information and advisory services can lead to higher update and impact (Chiputwa et al 2020)

Weather information is one of the requirements for effective climate change adaptation (Feleke et al 2015). In Ethiopia, adaptation capacity of farmers using weather information was constrained by language problems, difficulty in understanding forecast information, absence of a centre for coordinating and downscaling weather information at local level (Feleke et al 2015). Access to climate information such as weather forecasts has been identified as a potential enabler for improved adaptation (Henriksson et al 2021). Climate services for smallholder farmers have increasingly been acknowledged to be one of the ways to build resilience by supporting adaptation to variable and changing climate (Yegbemey and Egah 2021).

CONCLUSION

Climate change impacts are projected to increase causing negative impacts on the agricultural sector among others. Adaptation to climate change will require improved access to climate information by local farmers. This is premised on collection of robust, reliable and representative data which will be important in planning for risks. While collaboration between the MOA and MET exist at national level, gaps exist at sub-national level. Additionally, MET departments have no institutional structures at the district level. To enhance the collection of weather information, there is a need for acquisition of equipment and establishment of more weather stations. The study recommends establishment of MET department at district level and engagement of farmers in collecting weather information. Farmer's access to weather information is key preparedness and must be packaged appropriately to include onset of rains, duration of rainfall and rain days.

Table 1: Main capacity needs and knowledge gaps and recommendations in relation to assessing impacts, vulnerabilities and risk of climate change

Capacity needs and knowledge gaps	**Recommendations**
MoA has no permanent established structure responsible for assessing impacts, vulnerabilities and risks of climate change for enhanced disaster management and mitigation	MoA to establish a structure from HQ, Provincial and District level for responding to climate change related issues
Top-down planning with limited participation from field officers and farmers hence limiting the usefulness of findings from assessments of impacts, vulnerabilities and risks	Bottom-up planning
Limited resources at district level for effective assessment of impacts, vulnerabilities and risks	More funding for district level activities
High farmer extension ratio	Recruit more extension officers
MoA has no mandated staff to receive weather information from MET at HQ and downscale and distribute to provinces and districts	Appoint an MoA staff to receive, downscale and disseminate climate information to farmers
There is poor working framework between MET and MoA with respect to flow of weather information	Enhance the cooperation between MET and MoA
Weather information from MET is never downscaled (into farmer recommendations) for farmer update. (Farmers are interested in knowing: the onset of rainfall, duration of rainfall (rainfall days), distribution of rainfall)	Downscale weather information so that its useful to farmers
Understaffing (most MET positions are vacant)	Recruit MET staff
Limited weather stations to cover the whole country for accurate weather forecasting	Procure more weather stations for enhanced accuracy of weather forecasts

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Annex: Focus Group Discussion Participants

FDG conducted with the Ministry of Agriculture headquarters staff		
Name	Position	Institution
Rasford Kalamatila	Deputy Director	Ministry of Agriculture
Michael Lwaile	Chief Agricultural Research Officer	Ministry of Agriculture
Brian Ng'andu	Senior Economist	Ministry of Agriculture
Andrew Chilombo	Chief technical Advisor	Envirosmart Solutions
Morton Mwanza	Principal Vegetable Production Officer	Ministry of Agriculture
Joseph Phakati	Chief Agricultural Specialist Farm power and mechanisation	Ministry of Agriculture
Chilungu	Meteorology Officer	Zambia Meteorology Department
Caristo Nkhumalo	Provincial Metrological officer	Zambia Meteorology Department
Christopher Imakando	Researcher	Copperbelt University
Joy Sinyangwe	Principal Agricultural Specislist	Ministry of Agriculture
FDG conducted with Ministry of Agriculture district (Kitwe district) staff		
Joyce Kapaya	Block Extension Officer	Ministry of Agriculture
Deophister Kakungu	Camp Extension Officer	Ministry of Agriculture
Eunice Mulenga Imakando	Camp Extension Officier	Ministry of Agriculture
Jennifer Chimbukuma Mwansa	Subject Matter Specialist – Farm Management Officer	Ministry of Agriculture
Makumba	Senior Agricultural Officer	Ministry of Agriculture
Paul Mbale	Subject Matter Specialist – Crops Officer	Ministry of Agriculture
Muyunda Muyunda	Camp Extension Officer	Ministry of Agriculture
Facilitator	Donald Zulu	Copperbelt University
Facilitator	Christopher Imakando	Copperbelt University