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Analysing Institutional Climate Change Resolution Strategies Implemented by Ministry of Green Economy and Environment: A Case Study of Livingstone District

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Abstract

Climate change poses one of the most pressing challenges of our time, demanding swift and effective responses from governmental institutions worldwide. This research delves into the strategies and initiatives employed by the Ministry of Green Economy and Environment, a key governmental policy formulation and implementation. By conducting a comprehensive case study, this research seeks to provide insights into the Ministry's efforts in addressing climate change at the institutional level. The study employs a multi-faceted approach, combining qualitative and quantitative research methods. Data collection involves document analysis, in-depth interviews with key stakeholders within the Ministry's, and an assessment of policy documents, reports and resolutions related to climate change. This mixed methods approach enables a holistic examination of the Ministry's institutional strategies, their evolution over time and their impact on mitigating climate change and enhancing adaptive capabilities. Key areas of investigations include policy formulation and implementation processes, resource allocation, collaboration with other government bodies and external stakeholders, public engagement initiatives and the integration of climate change considerations into broader environmental agendas. By scrutinizing these aspects, the research aims to provide a nuanced understanding of how a Ministry of Green Economy and Environment navigates the complex landscape of climate change resolution. The findings of this study have implications not only for these specific case of the Ministry under the examination but also for broader discussions on effective institutional strategies for addressing climate change. The research contributes to the growing body of knowledge on climate policy implementation, offering valuable insights that can inform decision makers, researchers and practitioners engaged in climate change mitigation.

1. Introduction

1.1 Background

Climate change, a paramount global challenge, necessitates collaborative efforts for mitigation and adaptation. In Zambia, the ministry of green economy and environment plays a pivotal role in implementing climate change resolution strategies. This proposal scrutinizes the institutional strategies employed by the ministry in tackling climate change, driven predominantly by human-induced factors such as greenhouse gas emissions (World Bank, 2021) [31].

With the repercussions of climate change intensifying globally, addressing these challenges has become imperative. The ministry of green economy and environment in Zambia, entrusted with formulating policies for sustainable development and addressing environmental issues, has embarked on initiatives like promoting renewable energy, reducing emissions and enhancing energy efficiency (Alley, 2003) [14].

Notably, the Zambia national policy on climate change, established in 2016, serves as a guiding framework for coordinated climate programs, aligning with Zambia's vision 2030 (Alley, 1998).

Several institutional strategies have been implemented, including the establishment of a climate change secretariat, development of a national climate change policy, a national adaptation programme of action (NAPA) and a national

communication. These aim to coordinate activities, provide a policy framework, identify priority adaptation measures and furnish information on vulnerabilities, emissions and mitigation options. According to climate links, Zambia emitted 120 million metric tons of greenhouse gases in 2011, with land use change and forestry contributing (Jasper fessmann, 2019) [24].

Significantly Zambia's intended nationally determined contributions (NDC) commits to a 25% reduction in emissions by 2030, relying on domestic efforts with limited international support (UNDP, 2014) [29].

The Ministry of Green Economy and Environment in Zambia is responsible for developing policies and strategies that promote sustainable development and address environmental challenges such as climate change. The ministry has been working on various initiatives to address climate change in Zambia including promoting renewable energy sources, reducing greenhouse gas emissions, and improving energy efficiency (Ministry of green economy and environment, 2023) [26].

Furthermore, the Ministry of Green Economy and Environment in Zambia has implemented a number of institutional climate change resolution strategies to address climate change issues in the country (Jakob skovgaard, 2021) [23].

The Zambia National Policy on Climate Change is a cross-sectoral policy enacted in 2016, whose overall objective is to provide a framework for coordinating climate change programs in order to ensure climate resilient and low carbon development pathways for sustainable development towards the attainment of Zambia's Vision 2030 (Ministry of green economy and environment, 2023) [26].

Some of institutional climate change resolution strategies implemented by the

Ministry of Green Economy and Environment in Zambia include: The establishment of a Climate Change

Secretariat to coordinate all climate change activities across all sectors, the development of a National Climate Change Policy which provides a framework for coordinating climate change programs. Furthermore, the development of a National Adaptation Programme of Action (NAPA) which identifies priority adaptation measures for addressing immediate and urgent needs (Giddens, 2020) [18].

The development of a National Communication which provides information on Zambia's vulnerability to climate change, its greenhouse gas emissions profile, and its mitigation and adaptation options (Government of the Republic of Zambia, 2020) [19].

In addition, some information on institutional climate change resolution strategies implemented by the Ministry of Green Economy and Environment in Zambia. The Zambia National Policy on Climate Change is a cross-sectoral policy enacted in 2016, whose overall objective is to provide a framework for coordinating climate change programs in order to ensure climate resilient and low carbon development pathways for sustainable development towards the attainment of Zambia's Vision 2030 (Ministry of National Development Planning, 2019) [27].

The Climate Change Secretariat is responsible for coordinating all climate change activities across all sectors. It also provides technical support to stakeholders involved in climate change activities. The National Climate Change Policy provides a framework for coordinating climate change programs. It aims to ensure that all sectors are

involved in addressing climate change issues, and that there is a coordinated approach to addressing these issues. (SADC, 2019) [28].

The National Adaptation Program of Action (NAPA) identifies priority adaptation measures for addressing immediate and urgent needs. It also provides a framework for prioritizing adaptation measures based on their cost-effectiveness. The National Communication provides information on Zambia's vulnerability to climate change, its greenhouse gas emissions profile, and its mitigation and adaptation options. It also provides information on the country's capacity to address climate change issues. According to a factsheet by Climate links, Zambia emitted 120 million metric tons of greenhouse gases in 2011. The land-use change and forestry sector contributed 61 percent to overall emissions, followed by the energy sector (19%), agriculture sector (17%), waste sector (2%) and industrial processes sector (1%) (IFPRI, 2023) [20].

According to a factsheet by Climate links,
Zambia's Intended Nationally Determined Contribution (INDC) commits to reducing carbon dioxide-equivalent emissions by 25 percent by 2030 compared to 2010 base year emission levels. It will achieve this reduction through domestic efforts with limited international support (IFPRI, 2023) [20].

1.2 Statement of the problem
Climate change poses a severe threat, especially to developing countries. Effective adaptation and resilience strategies require robust institutions. The ministry of green economy and environment in Zambia plays a crucial role, but there's limited understanding of its implemented institutional strategies, their effectiveness, and challenges. This study addresses this gap through a case study of choma district, a vulnerable area in Zambia.

1.3 General objective
The general objective of this study was to analyze institutional climate change resolution strategies implemented by the ministry of green economy and environment in Zambia.

1.4 Specific objectives
The specific objectives of this research are (I) identify institutional strategies, (II) evaluate their effectiveness and (III) identify challenges faced by the implementing the strategies.

1.5 Research questions
The research questions of this study were, (I) what are the institutional climate change resolution strategies implemented by the Ministry of Green Economy and Environment Zambia? (II) How effective are institutional climate change resolution strategies implemented by the Ministry of Green Economy and Environment Zambia? (III) What challenges does the Ministry of Green Economy and Environment Zambia face in implementing institutional climate change resolution strategies?

1.6 Conceptual framework
The study employs the theory of change and social learning theory to analyse inputs, activities, outputs, outcomes and impact of the strategies. The institutional theory framework is used for a comprehensive analysis.
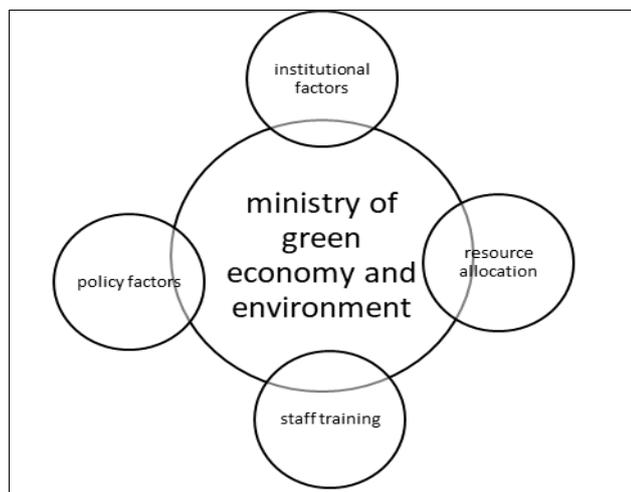
Fig 1: Conceptual framework

2. Literature Review

2.1 To identify the institutional climate change resolution strategies implemented by the Ministry of Green Economy and Environment

Adams (2019) [1]. Characterized climate change as a profound and enduring alteration in Earth's climate patterns. It encompasses variations in temperature, precipitation, wind patterns and other climatic factors, posing complex environmental, social, economic and political challenges. Notably, global warming, driven by human-induced factors like greenhouse gas emissions, is a critical environmental concern.

Greenhouse gas emissions from burning fossils fuels and deforestation contribute significantly. The consequences are wide ranging, including rising temperatures, melting ice, extreme weather events, ocean acidification and ecosystem disruptions. Mitigating global warming involves transitioning to renewable energy, afforestation, reforestation and sustainable agriculture practices. Solar radiation, absorption, reflection and infrared radiation are pivotal aspects of earth's energy balance.

The natural greenhouse effect, crucial for maintaining the Earth's temperature, is amplified by human activities, leading to an enhanced greenhouse effect. This, in turn results in global warming and climate change. The consequences of an enhanced greenhouse effect are dire, necessitating efforts to reduce greenhouse gas emissions and implemented adaption strategies. Rising global temperatures stand as evidence of the ongoing impact of global warming, driven predominantly by human activities (Jakob skovgaard, 2021) [23].

Climate change can have effects such as the following.

Rising temperatures. Global warming increases average temperatures, leading to more heatwaves, disrupting ecosystems, threatening agriculture, and posing health risks (Jasper Fessman, 2019) [24].

Melting ice and rising sea level. Higher temperatures causes polar ice caps and glaciers to melt, contributing to rising sea levels, threatening coastal communities, biodiversity and causing coastal erosions (Adger, 2016) [2].

Extreme weather events. Global warming is linked to an increase in extreme weather events like hurricanes, floods, droughts and wildfires, causing economic and humanitarian impacts (Adger, 2017) [3].

Ocean acidification. Elevated carbon dioxide levels are absorbed by oceans, leading to ocean acidification, harming marine ecosystem, including coral reefs and fisheries (Canziani, 2007).

Ecosystem disruption. Global warming disrupts ecosystems, affecting plant and animal species eventually leading to extinction and shifts in habitats impacting biodiversity (Adler, 2016) [4].

2.2 To evaluate the effectiveness of institutional climate change resolution strategies implemented by Ministry of Green Economy and Environment

Renewable energy. Transitioning to renewable energy such as solar, wind and hydropower can significantly reduce greenhouse gas emissions from the energy (Agrawala, 2016).

Afforestation and reforestation. Planting trees and restoring forests enhance carbon sequestration, mitigating the effects of deforestation (Agrawal, 2014) [6].

Trapping heat. When infrared radiation is emitted from the earth's surface, greenhouse gases in the atmosphere absorb some of it. They then re-radiate this heat energy in all directions, including back towards the earth's surface. This process effectively traps some of the heat within the atmosphere, preventing it from escaping directly into space

Sustainable agriculture. Putting into practice sustainable agronomic practises reduces emissions from agriculture and enhances soil carbon sequestration (Jacqueline Ashby and Douglas pachico, 2012).

Solar radiation.

The sun emits radiant energy, including visible light and other electromagnetic waves, essential for maintaining suitable temperatures on earth. Solar radiation varies across the earth's surface due to factors like latitude, time of day and atmospheric conditions.

The literature reviewed emphasizes the intricate interplay of factors contributing to climate change and underscores the urgency by strategic interventions. The subsequent sections delve deeper into the institutional climate change resolution strategies implemented by the ministry of green economy and environment in Zambia, providing a foundation for the ensuring analysis.

Conservation water through low flow fixtures, fixing leaks and using water saving practices in landscaping. This is a practical and impactful way to address water scarcity and reduce our environmental footprint. Low flow fixtures that limit the amount of water flowing through them, without compromising functionality. Conserving water through low flow fixtures helps protect natural resources and ecosystems and aquatic habitats. It reduces the strain on freshwater sources, while are essential for both people and wildlife. Less water consumption means reduced energy usage for heating water. This translates to lower energy bills and smaller carbon footprint, contributing to climate change mitigation. Embracing low flow fixtures aligns with a sustainable and eco-conscious lifestyle. It reflects a commitment to responsible resource management and environmental stewardship (Jasper Fessman, 2019) [24].

Being mindful of water use in daily activities is of paramount importance for several compelling reasons, ranging from environmental conservation to personal responsibility. Many regions around the world are already

experiencing water scarcity due to factors like population growth and climate change. Being mindful of water use helps preserve this finite resource for the future generation. The use of excessive water can harm aquatic ecosystems and biodiversity. Reducing water consumption helps protect rivers, lakes and wetlands, maintain habitats for countless species (Jasper Fessman, 2019) [24].

Infrastructure resilience is a crucial component of climate adaptation strategies, it refers to the ability of physical infrastructure, such as building, transportation networks, energy systems and water supply systems, to withstand and recover from the impacts of climate change related events and extreme weather conditions. Infrastructure can be built to withstand high winds, heavy rainfall and flooding (AGU, 2009) [7].

This can include elevated structures, reinforced building and improved drainage systems. In other areas with high temperatures, building can be built to incorporate heat-resistant materials and cooling technologies to provide safe shelter during extreme heat events (Airame, 2003) [8].

Another example of a resilient structure involves those that are found in coastal areas, people in coastal areas are more vulnerable. Structures may include sea walls, levees, and elevated buildings to mitigate flooding and erosion risks (Akbari, 2001) [9].

Not only does resilient structure refers to buildings, but also roads and bridges, these can be built to withstand extreme flooding and temperatures. These can help build robust public transportation systems that can help communities maintain mobility during and after extreme weather events when private vehicle use may be limited (Akbari, 2001) [9].

Lastly, structures can be designed to withstand storm surges and protect coastal communities from the impacts of hurricanes and cyclones (12. Albrecht, 2009) [11].

Resilient infrastructure can also be used to detect technological solutions where they can be integrated with early warning systems to provide real-time information on weather events, floods and other risks. The use of sensors and data analytics can help monitor and manage infrastructure, improving responsiveness during extreme events. This can help the community to develop resilient plans that prioritize infrastructure projects to protect vulnerable populations (Aldy, 2007) [12].

Investing in infrastructure resilience is essential for safeguarding communities and economies from the increasing impacts of climate change. It not only reduces the immediate risks associated with extreme weather events but also ensures the long term sustainability and functionality of essential services and systems in a changing climate (Allan, 2005) [13].

The protection of ecosystem is a crucial component of climate change adaptation and mitigation strategies. Ecosystems such as forests, wetlands, oceans and grasslands play a fundamental role in regulating the earth's climate and protecting them helps mitigate the impacts of climate change and build resilience to its effects (Akbari, 2001) [9].

Forested and vegetated areas act as carbon sinks, absorbing carbon dioxide from the atmosphere through photosynthesis. Practising in tree planting helps reduce the amount of carbon dioxide from the atmosphere (Akbari, 2009) [10].

Tress also act as a barrier that controls winds or hurricanes that can cause distraction of property and loss life. Protected ecosystems also contributes to food security because it support a diversity of ecosystems. Human depend on these ecosystems for their survivor and livelihood, such as fishing, farming and forestry (Jasper Fessman, 2019) [24].

Ecosystem protection is not only an environmental imperative but also a social and economic one. It requires a combination of conservation of efforts, sustainable land management practices, and policy support to ensure that ecosystems continue to provide their invaluable services in the face of a changing climate (Jasper Fessman, 2019) [24].

2.3 To identify challenges faced by the Ministry of Green Economy and Environment in implementing institutional climate change resolution strategies

Another challenge is the political will to implement institutional climate change resolution strategies. Climate change policies can be politically sensitive, and policymakers may be reluctant to support initiatives that could have negative impacts on certain industries or constituencies. This can lead to delays in implementing policies or even the abandonment of certain initiatives altogether (IPCC, 2014) [21].

Stakeholder engagement is also a critical factor in implementing institutional climate change resolution strategies. Engaging stakeholders such as local communities, NGOs, and industry groups can help to build support for initiatives and ensure their success. However, engaging stakeholders can be challenging, particularly in cases where there are competing interests or differing viewpoints (IRENA, 2019) [22].

Another study by Global Carbon Capture Storage Institute (2019), narrates that addressing these challenges, this study will recommend strategies such as developing alternative funding sources, building political support for climate change initiatives, and fostering stakeholder engagement. Alternative funding sources could include partnerships with the private sector or leveraging climate finance mechanisms such as the Green Climate Fund. Building political support for climate change initiatives could involve educating policymakers on the economic and social benefits of such initiatives, as well as building coalitions with other stakeholders. Fostering stakeholder engagement could involve using innovative approaches such as social media and citizen science initiatives

3. Methodology
3.1 Overview
This study will use a case study research design to analyse the institutional climate change resolution strategies implemented by the Ministry of Green Economy and Environment.

Multiple institutions will be target and conduct a comparison among the institutions to see the difference, similarities and best practices.

The changes in strategies and outcomes over time will also be considered

3.2 Research design
This study will use a case study research design to analyze the institutional climate change resolution strategies implemented by the Ministry of Green Economy and Environment.

A case study research design is a qualitative research that involves an in depth examination of a single case or a small number of cases. It is typically bounded by time and place. The case study research design is typically useful for

exploring the complex, real life phenomenon and for gaining a much better understanding of the context and dynamics of the case (Yin, 2014) [32].

Multiple institutions will be target and conduct a comparison among the institutions to see the difference, similarities and best practices.

The changes in strategies and outcomes over time will also be considered

3.3 Target population
The target population for this study is the forest department that will represent the work and strategies put in place by the Ministry of Green Economy and Environment and its stakeholders, including local communities and ngos

3.4 Sampling design
The study will use purposive sampling to select key informants from the Ministry and its stakeholders. Purposive sampling will allow for the selection of individuals who have relevant knowledge and experience in institutional climate change resolution strategies.

3.5 Sampling size determination
The sample size will be determined based on the principle of saturation, which means that data collection will continue until no new information is being obtained.

3.6 Data collection methods
Data collection is the process of collecting and measuring information from various sources to meet a specific objective. This process involves the identifying the data that is relevant and required data elements, the appropriate collection methods and collecting the data in a systematic and structured manner (Kumar, 2014) [25].

Data will be collected through semi-structured interviews with key informants from the Ministry and its stakeholders. The interviews will be audio-recorded and transcribed for analysis.

Data will also be conducted through the use of questionnaires that will be given to employers and other workers of the forest department to be filled in.

3.7 Data analysis
Analyzing data is the processing of cleaning, inspecting and modelling the data into a useful information. This can involve a statistical and analytical techniques to identify patterns, trends and relationships (field, 2013) [17].

It can be classified into two main categories namely quantitative and qualitative data analysis. Quantitative analysis use a mathematical approach to identify trends in a data collected while qualitative analysis involves non-use of mathematical approach to identify the relationship between variables (field, 2013) [17].

Data analysis will involve a thematic analysis of the interview transcripts. Themes will be identified based on the research questions and the theoretical framework.

3.8 Ethical considerations
Ethical considerations will be taken into account throughout the research process. Informed consent will be obtained from all participants, and their anonymity and confidentiality will be maintained throughout the study. Any potential risks to participants will be identified and minimized, and the study will comply with relevant ethical

guidelines and regulations.

4. Findings and Discussions
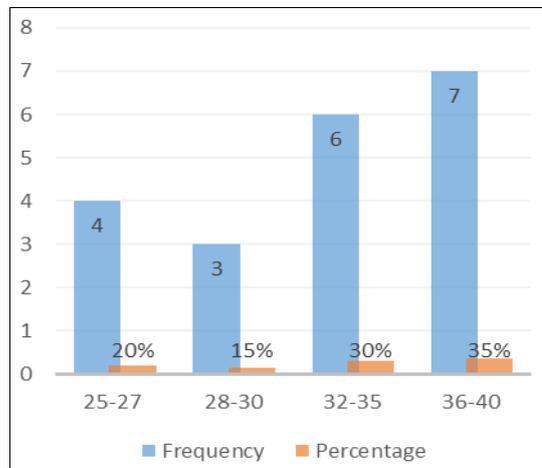### 4.1 Characteristics of respondents
This section

Fig 2: Age of respondents

In the table above, it has been narrated that out of 20 respondents, 20% indicated that there were between 25-27 years, 15% were between 28-30 years, 30% are between 32-35 years and 35% are between 36-40 years.
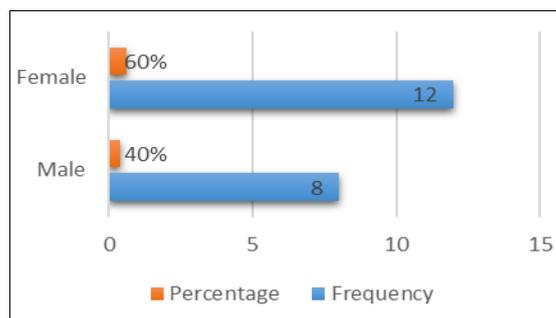

Fig 3: Gender of respondents

The table above shows that out of 20 respondents, 40% were male and 60% were female.

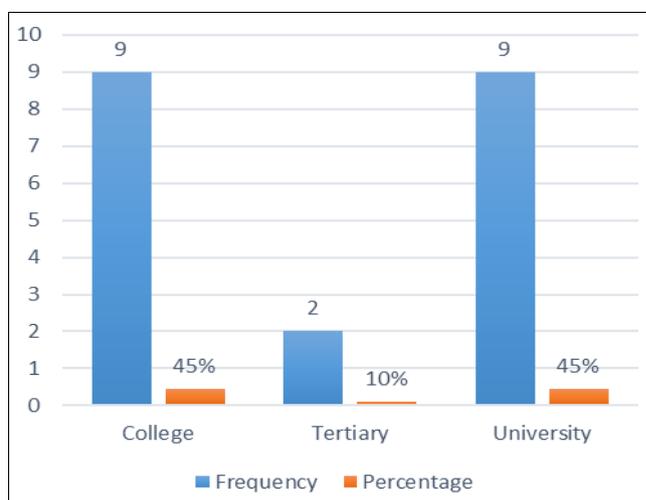## 4.2 Level of education of respondents

Fig 4:

The above table displays the respondent's level of education of which 45% had indicated gone to college, 10% had indicated gone to tertiary and 45% had indicated gone to university.

4.3 The Institutional climate change resolution strategies implemented

Table 1:

Strategy	Frequency	Percentage
tree planting	5	25%
tree nursery	5	25%
public awareness	6	30%
Crop diversity	3	15%
Forest management	1	5%
Total	20	100%

The table above displays the climate change strategies that were implemented by the ministry of green economy and environment. 25% of the respondents indicated tree planting, 25% of the respondents indicated tree nursery, 30% of the respondents indicated public awareness, 15% of the respondents indicated crop diversity and 1.5% of the respondents had indicated forest management.

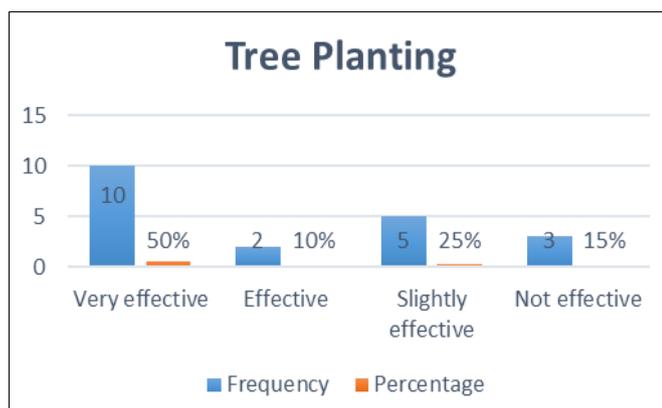## 4.4 Effectiveness of climate change resolution strategies

Fig 5

The diagram above displays the respondents' opinion of the effectiveness of tree planting. 50% indicated very effective, 10 percent indicated effective, 25% indicated slightly effective and 15% indicated not effective.
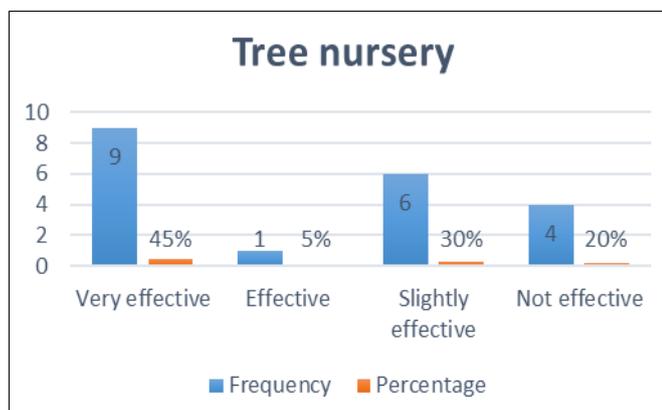

Fig 6

The diagram above displays the respondents' opinion of the effectiveness of tree nursery. 45% had indicated very effective, 1% had indicated 5%, 30% had indicated slightly effective and 40 indicated not effective.
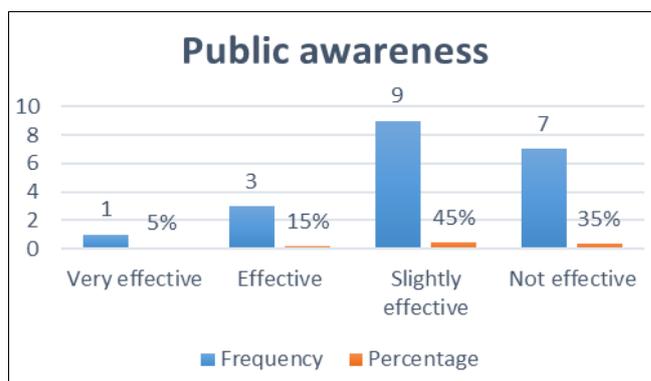

Fig 7

The diagram above displays the respondents' opinion of the effectiveness of public awareness. 5% indicated very effective, 15% indicated effective, 45% indicated slightly effective and 35% indicated not effective.
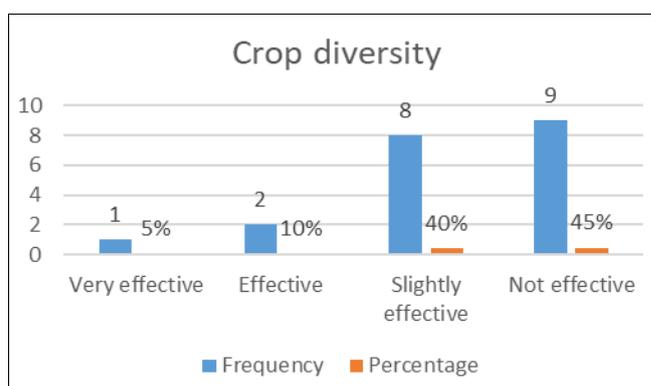

Fig 8

The diagram above displays the respondents' opinion of the effectiveness of crop diversity. 5% indicated very effective, 10% indicated effective, 40% indicated slightly effective and 45% indicated not effective.

Fig 9

The diagram above displays the respondents' opinion of the effectiveness of forest management. 40% indicated very effective, 25% indicted effective, 20% indicated slightly effective and 15% indicated not effective

4.5 Challenges faced in implementing climate change resolution strategies
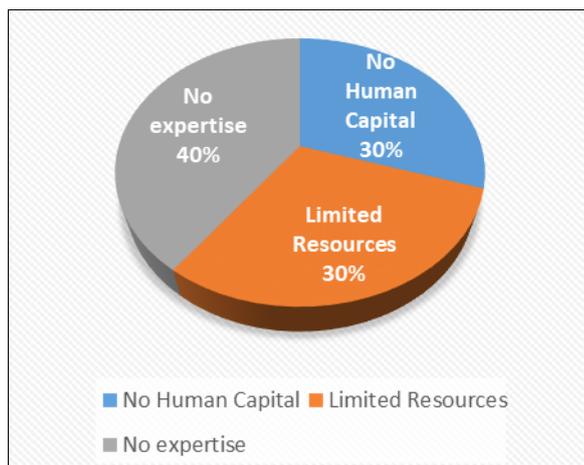

Fig 10

The diagram above illustrate the challenges that respondents face on during implementation of the resolution strategies. 40% indicated no expertise, 30% indicated no human capital and 30% indicated limited resources.

4.6 Discussion of findings

The key findings of this study provides valuable insights into the demographic characteristics of the respondents, their level of education, and their opinion of climate change strategies implemented by the ministry of green economy and environment.

The findings of this study indicated that the majority of the respondents which is 35% are between the ages of 36 to 40 years, followed by 30% who are between 32 to 35 years old. 60% of the respondents indicated that there were female while 40% of the respondents were male. 55% of the respondents attended college and 45% of the respondents attended university. The data above shows that the respondents had a relatively high level of education.

The respondents were also requested to state the resolution strategies that were implemented. 25% of the respondents indicated tree planting, 25% of the respondents indicated tree nursery, 30% of the respondents indicated public awareness, 15% of the respondents indicated crop diversity and 1.5% of the respondents had indicated forest management.

A study that was conducted by the intergovernmental panel on climate change (2014) also found that climate change strategies such as public awareness and education are one of the effective strategies that were implemented to combat climate change.

Thereafter, the respondents were also requested to state if the strategies implemented were effective or not. It was seen that tree planting, tree nursery and forest management were effective while crop diversity and public awareness were not effective.

Lastly, the respondents were requested to state the challenges which they faced when implementing the climate change resolution strategies. 40% indicated no expertise, 30% indicated no human capital and 30% indicated limited resources.

The United Nations development programme (2019) found that when it comes to implementing climate change strategies, challenges that are seen to be setbacks were lack of access to resources, lack of human capital and lack of expertise

5. Conclusion

The purpose of this thesis is to analyse the results and give an overview on the resolution implementation of the climate change strategies by the Ministry of Green Economy and Environment and see how effective they are. From the questionnaires received, there are quite a number of implemented strategies in the forest department that are that heavily welcomed by the people of Livingstone, southern province. Strategies include tree planting and awareness or alertness. These strategies mentioned are very important in land restoration as well as the ecosystem only that there are hindered by challenges such as limited resources.

While the strategies showcase promise, challenges like limited resources and expertise were identified. The need for strategic planning, resource mobilization, and capacity building emerged as crucial factors for overcoming these obstacles effectively.

6. Acknowledgements

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