Climate Change Awareness, Adaptation Strategies, and Mitigation Initiatives in Selected Ministries of Benue State Government, Makurdi, Nigeria

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Abstract

Climate change awareness, adaptation strategies, and mitigation initiatives in selected ministries of Benue State Government was studied. Multistate sampling was adopted, with four ministries selected from Makurdi offices while 114 respondents were randomly selected from the study. Personal interview with respondents was done with Google forms containing semi-structured questions for data gathering. Demographic characteristics of respondents showed majority were male (61.4%), within the 36-45 age range (49.1%), and Christians (98.2%). Most respondents were married (79.8%), employed in civil service (96.5%), and had postgraduate degrees (82.5%). Awareness of climate change was high (100%) and adaptation awareness was at 75.4%. There was a high level of awareness (100%). Monitoring systems (56.3%) and government funding (46.4%) were observed as gaps in climate change knowledge. Implementation (90.7%) and capacity building (87.5%) were noted as major challenges related to climate change efforts. Behavioral changes (52.6%), afforestation/reforestation (36.8%), and the implementation of government policies (22.8%) were most common mitigation measures employed by the ministries. Adaptation measures by the ministries include: water resource management (25.4%), community education and awareness (19.3%), and urban planning and design (19.3%). Also, adaptation strategies (32.5%) reported identified as the most crucial method for building resilience. Others include, community engagement (20.2%) and urban/rural planning (19.3%). The study identified increased funding and government responsibility (50.0%), public involvement and support (5.88%), and agricultural support (8.82%) as areas requiring improvement in mitigation climate change. Furthermore, addressing implementation challenges (90.7%) and enhancing capacity building (87.5%) were highlighted as critical factors. Respondents' sources of information were primarily traditional media (TV, newspapers, radio), followed by social media and government publications. Deforestation was identified as the main contributor to climate change (65.8%) in Benue State besides greenhouse gas emissions (26.3%). In conclusion, the findings from this study emphasize the need for enhanced awareness, capacity building, and effective implementation of climate change adaptation strategies to address the challenges posed by climate change.

Keywords: Awareness, Adaptation Climate change, Mitigation, Benue State

INTRODUCTION

Climate change is a global environmental challenge that is driven largely by human activities such as deforestation, industrial emissions, and the burning of fossil fuels (Athanasios, 2022)). Its impacts are increasingly felt at regional and local levels, affecting communities, economies, and ecosystems (UN, 2017). Therefore, understanding the awareness of climate change, the adoption of adaptation strategies, and the implementation of mitigation initiatives at the governmental level are essential for informed policy decisions and sustainable development (Dubois *et al.,* 2019).

Climate change is a pressing global issue that requires immediate attention and action. In Nigeria, the impacts of climate change are becoming increasingly evident, with rising temperatures, sea level rise, and more severe weather patterns affecting various sectors of the economy and the well-being of the population (Onoja, *et al.,*2011; Akpomi, 2016). Benue State, located in the north-central region of Nigeria, is particularly vulnerable to the effects of climate change due to its reliance on agriculture and its susceptibility to extreme weather events (Onoja, *et al.,*2 011).

Several studies have examined the level of awareness about climate change among different segments of the Nigerian population. A study conducted in South-South Nigeria found that only 13% of university lecturers were very knowledgeable about climate change, and 61% had never discussed it among themselves (Akpomi, 2016). Another study in Abia State revealed that the level of awareness about climate change is quite poor, and little effort is made by the government and other agencies to sensitize the public about the issue (Okpokiri *et al.,* 2017). A study among undergraduates at Obafemi Awolowo University in Ile-Ife found that while most students were aware of climate change, they had limited understanding of its causes, consequences, and control measures. Similarly, a study in Jalingo metropolis, Taraba State, assessed the level of awareness among tertiary institution students and found that awareness was generally low (Oruonye, 2011).

Adapting to and mitigating the effects of climate change requires a multi-faceted approach involving various stakeholders, including government, civil society, and the private sector. In Nigeria, some adaptation strategies have been implemented, such as the development of early warning systems, the promotion of drought-resistant crops, and the implementation of flood control measures (Okpokiri *et al.,* 2017). However, more needs to be done to ensure that adaptation strategies are effective and reach the most vulnerable populations. Mitigation efforts in Nigeria have focused on reducing greenhouse gas emissions, particularly from the oil and gas sector, which is a major contributor to Nigeria's emissions (Akpomi, 2016; Dubois *et al.,* 2019).

Overall, assessing climate change awareness, the adoption of adaptation strategies, and the implementation of mitigation initiatives within selected government ministries in Benue State is crucial for informed policy decisions, enhancing climate resilience, and contributing to sustainable development in the region. The specific objectives of the study were to identify the existing climate change adaptation strategies and policies implemented within these ministries; investigate the effectiveness of climate change mitigation initiatives by Government and examine the challenges

faced by government ministries in Benue State in combating climate change awareness, adaptation, and mitigation efforts.

This study is justified due to the urgent need to assess and enhance climate change awareness, adaptation strategies, and mitigation initiatives within key government ministries in Benue State. Given the increasing climate change impacts on the region, this research aims to inform targeted policy improvements and resource allocation, ultimately strengthening the state's resilience and capacity to address this critical global challenge.

METHODOLOGY
Study Area
Benue State is located in North Central Nigeria, borders Nasarawa, Taraba, Kogi, Enugu, Ebonyi, and Cross-Rivers States domestically and Cameroon internationally. The Capital City Makurdi with estimated population of 6,141,300 in 2022. Benue State is located in the North Central region of Nigeria, with a latitude of 7° 20′ N and a longitude of 8° 45′ E. The state lies within the lower river Benue trough and shares boundaries with five other states: Nasarawa State to the north, Taraba State to the east, Cross-River State to the south, Enugu State to the south-west, and Kogi State to the west. The average temperature in Benue State is 29.38°C (84.88°F), which is slightly lower than Nigeria's average temperature. The state experiences a tropical wet and dry or savanna climate, with two distinct seasons: the Wet season from April to October and the Dry season from November to March. Benue State receives about 135.2 millimeters (5.32 inches) of precipitation annually, with 160.01 rainy days (43.84% of the time) annually. The rainy season lasts from April to October, with annual rainfall ranging from 100-200mm. The vegetation in Benue State is characterized by a mix of cropland, shrubs, and trees. The state is predominantly covered by savanna, with forests found in the southern parts, which yield trees for timber and provide a suitable habitat for rare animal species. The state also has potential for the development of viable forest and wildlife reserves.
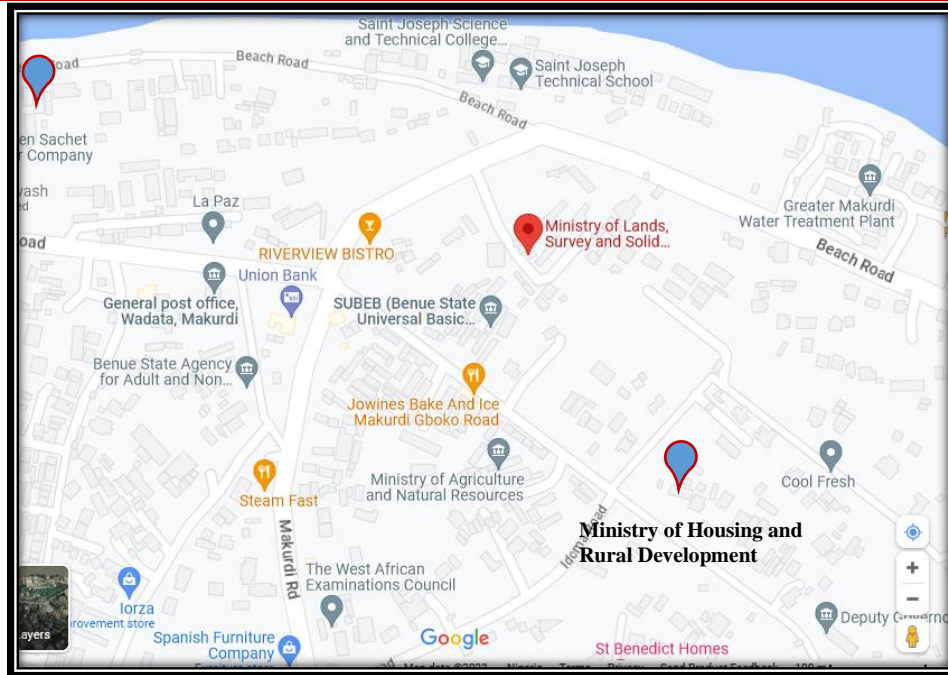
Figure 1: Map of Makurdi showing some State Ministries (Source: google maps, 2023).

Sample and Sampling Size

Multistate sampling Method was used in this study. Four Ministries was selected (Ministry of Agriculture and Natural Resources, Ministry of Housing and Urban Development, Ministry of Lands and Survey, Ministry of Water Resources and Environment, Ministry of Health and Human Resources, Ministry of Education) from Makurdi Benue State.

Eight Directorate/Department below was purposively selected based on those relating to climate change issues. Two (2) Directorate/Department below was selected from the 4 chosen Ministries as listed below 1) Directorate of Agriculture 2) Directorate of Fisheries 3) Public Health Service Department 4) Benue State Aids Control Agency, BENSACA. 5) Town Planning Department 6) Department of Land 7) Department of Environment 8) Department of Forestry.

Table 1: Sampled Benue State Ministries

S/No.	Ministry	Frequency (F)	Percentage (%)
1.	Agriculture and Natural Resources	20	17.5
2.	Housing and Urban Development.	25	21.9
3.	Lands and Survey	5	4.4
4.	Water Resources and Environment.	24	21.1
5.	Health and Human Services.	20	17.5
6.	Education	20	17.5
Total	**6**	**114**	**100**

Data Collection
The study will be based on primary data. The primary data was collected with the aid of a Google form semi-structured questionnaire and personal. The questionnaire was divided into three sections. The population of the study will consist of 200 workers within Benue State.

Data Analysis
Simple descriptive statistical tools such as the mean, frequency and tabular presentation and charts percentage was used to analyze the socio demographic attributes of the respondents.

RESULTS
Demographic characteristics of respondents
Table 2 summarizes demographic data collected from a sample of 114 individuals across various variables. It highlights distributions within categories such as sex, age range, religion, marital status, primary and secondary occupations, and educational status. The majority of respondents were male (61.4%) compared to female (38.6%). Age distribution showed a prevalence within the 36-45 range (49.1%), followed by 26-35 (19.3%). Christianity was the dominant religion (98.2%), while marital status indicated a majority being married (79.8%). Civil service was the primary occupation for a significant portion (96.5%) while secondary occupations were more varied. Educational attainment predominantly included postgraduate degrees (82.5%). This abstract offers a snapshot of the diverse demographics captured in the study.

Awareness of climate change, adaptation, monitoring, funding, implementation challenges, capacity building and polices among respondents in Benue State Ministries
Table 3 presents insights into the awareness levels among respondents within Benue State Ministries regarding key facets of climate change. All respondents (100%) indicated awareness of climate change, with none reporting no awareness or partial awareness. On adaptation Awareness, 75.4% affirmed awareness, while 21.9% indicated no awareness and 2.6% had partial awareness. About adaptation strategies, most respondents (36.6%) were aware, 33.0% were not, and 30.4% had partial awareness. For climate change monitoring and evaluating system, most reported respondent's awareness was reported by 56.3%, while 17.9% were not aware, and 25.9% had partial awareness. Respondents' response to government Funding Awareness shows that 46.4% acknowledged awareness, 26.4% lacked awareness, and 27.3% reported partial awareness. Implementation Challenges: The majority (90.7%) were aware, with 9.3% lacking awareness. Similar to implementation challenges, most 87.5% respondents indicated awareness of capacity building challenges in the ministries with 12.5% lacking awareness. On positive outcomes of Government Policies, only 31.6% reported awareness, while 65.8% indicated no awareness. No partial awareness was reported.

Respondents' Sources of information and main causes of climate change
Figure 1 illustrates respondents' information sources and perceptions regarding the primary causes of climate change. Across sources of information, traditional media (TV, newspapers, radio) emerged as the dominant choice, with 86% of respondents relying on it. Social media and government publications followed, with 42.1% and 34.2% respectively. In terms of causes, deforestation was overwhelmingly cited as the main contributor to climate change (65.8%), trailed

by greenhouse gas emissions at 26.3%. Natural climate variability, solar activity, and other factors were acknowledged by smaller percentages of respondents.

Respondents' perception of environmental impacts of climate change
Figure 2 reflects respondents' perceptions of diverse environmental impacts resulting from climate change. A significant portion acknowledged these impacts, with varying percentages attributed to each. Air quality emerged as a prominent concern, cited by 56.1% of respondents, closely followed by loss of natural resources (52.6%) and rising temperatures (46.5%). Agricultural challenges (47.4%) and loss of biodiversity (43.9%) were also notable concerns. Changing precipitation patterns and vector-borne diseases were identified by smaller percentages, at 19.3% and 16.7% respectively. The data underscores a range of recognized environmental impacts linked to climate change, highlighting the multifaceted nature of concerns held by the respondents.

Table 2: Demographic characteristics of respondents

Variables	Frequency	%
Sex		
Male	70	61.4
Female	44	38.6
Total	**114**	**100**
Age Range		
18 – 25	3	2.6
26 – 35	22	19.3
36 – 45	56	49.1
46 - 50	24	21.1
51 – 55	7	6.1
56 - 60	2	1.8
Total	**114**	**100**
Religion		
Christianity	112	98.2
Islam	1	0.9
No religion	1	0.9
Total	**114**	**100**
Marital status		
Single	19	16.7
Married	91	79.8
Divorced	1	0.9
Widow	3	2.6
Total	**114**	**100**
Primary Occupation		
Civil Servant	110	96.5
Farming	3	2.6
Teaching	1	0.9
Total	**114**	**100**

Secondary Occupation		
Civil Servant	47	41.2
Farming	41	36.0
Teaching	1	0.9
Business	23	20.2
Student	1	0.9
Total	**114**	**100**
Educational Status		
Secondary	7	6.1
Undergraduate	12	10.5
Postgraduate	94	82.5
Non-formal	1	0.9
Total	**114**	**100**

Table 3: Awareness of climate change, adaptation, monitoring, funding, implementation challenges, capacity building and polices among respondents in Benue State Ministries

| S/No	Awareness	Yes		No		Partially	
		F	**%**	**F**	**%**	**F**	**%**
1.	Climate Change	114	100	0	0	0	0
2.	Adaptation	86	75.4	25	21.9	3	2.6
3.	Adaptation strategies	41	36.6	37	33.0	34	30.4
4.	Monitoring and evaluating system	63	56.3	20	17.9	29	25.9
5.	Government funding	51	46.4	29	26.4	30	27.3
6.	Implementation challenges	98	90.7	10	9.3	0	0
7.	Capacity building challenges	98	87.5	14	12.5	0	0
8.	Positive outcomes of government policies	36	31.6	75	65.8	0	0
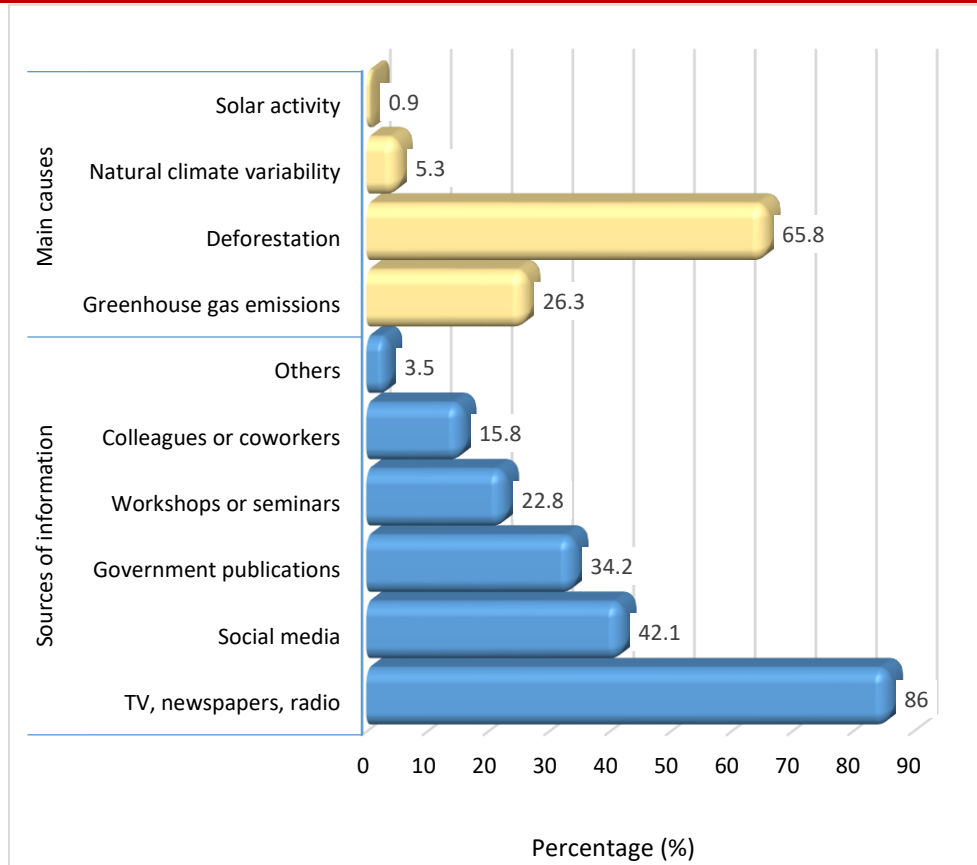
Figure 1: Respondents' Sources of information and Main causes of climate change
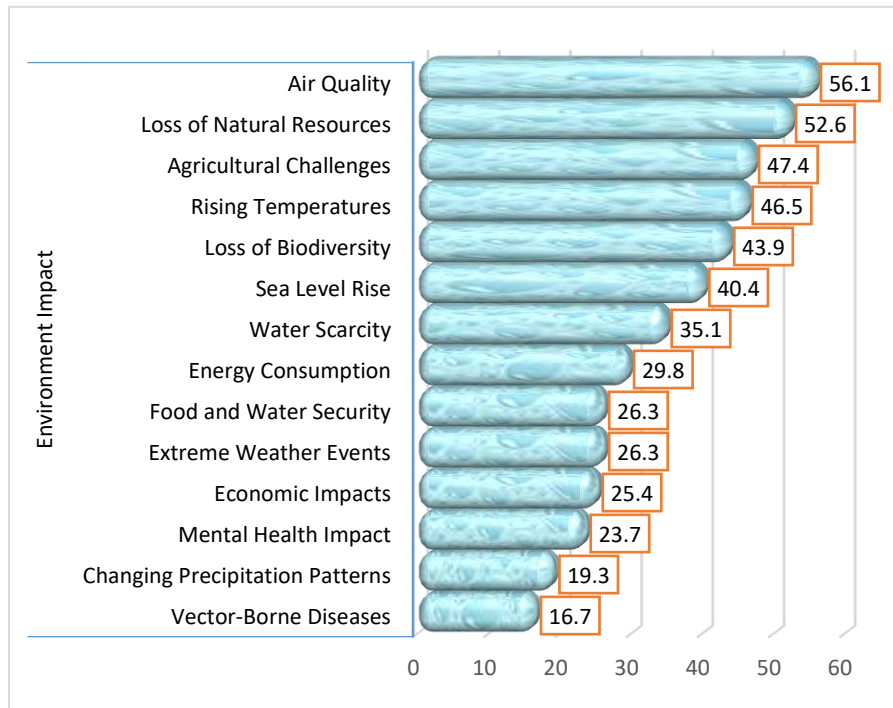
Figure 2: Respondents' perception of environmental impacts of climate change

Respondents awareness of climate changes adaptation strategies in their Ministries
Figure 3 outlines varying degrees of awareness among respondents regarding different climate change adaptation strategies within their Ministries. Some strategies, like water management, agricultural adaptation, education, and resilient building codes, were more familiar, noted by higher percentages ranging from 21.9% to 28.1%. However, strategies such as green finance and risk transfer had particularly lower awareness levels, registering only 1.8% among respondents. This categorized overview sheds light on the diverse levels of awareness concerning climate change adaptation strategies within Ministries.

Effectiveness of existing climate change adaptation strategies in Benue State Ministries
Figure 4 delineates the percentages of respondents' awareness regarding various climate change adaptation strategies within their Ministries. The data underscores diverse levels of awareness across strategies, with some, such as agricultural adaptation and water management, being highly recognized (28.1% and 25.4%, respectively). In contrast, strategies like green finance and risk transfer exhibit notably lower awareness levels, registering only 1.8% each among respondents. This categorized overview provides insights into the varied degrees of awareness concerning climate change adaptation strategies within Ministries.
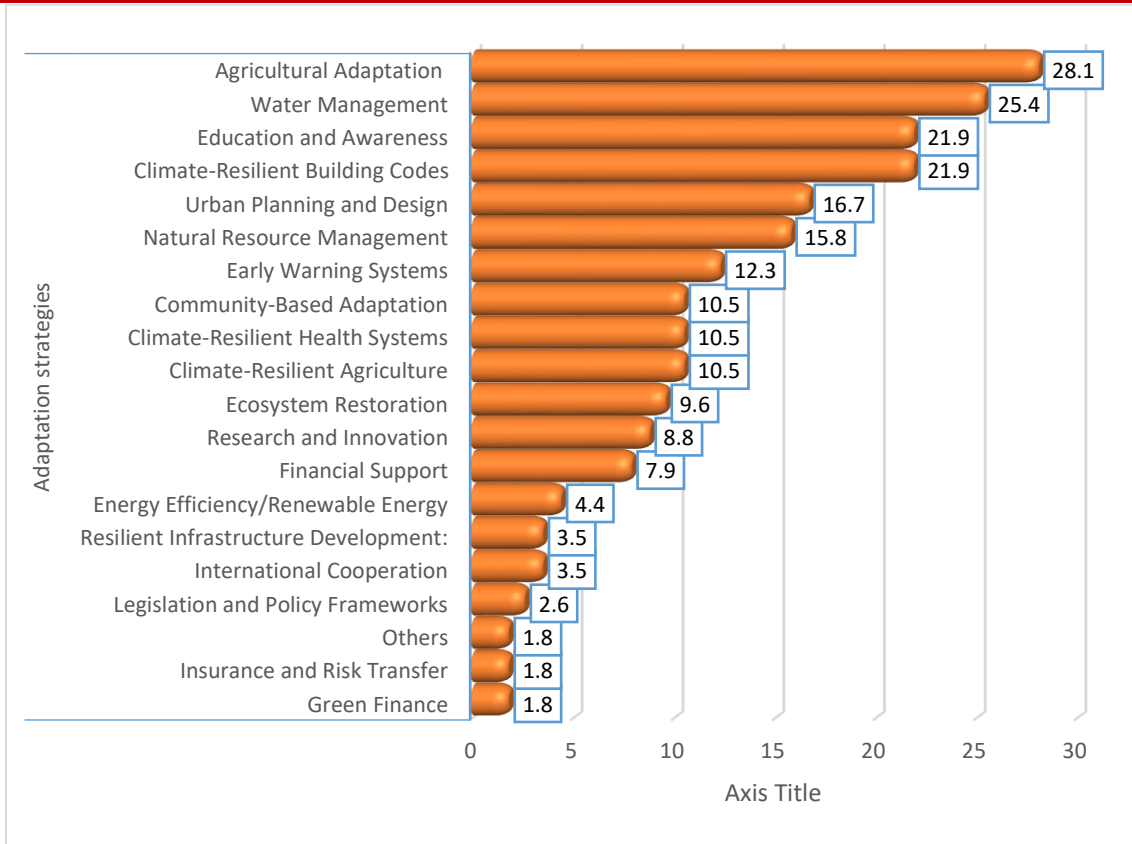
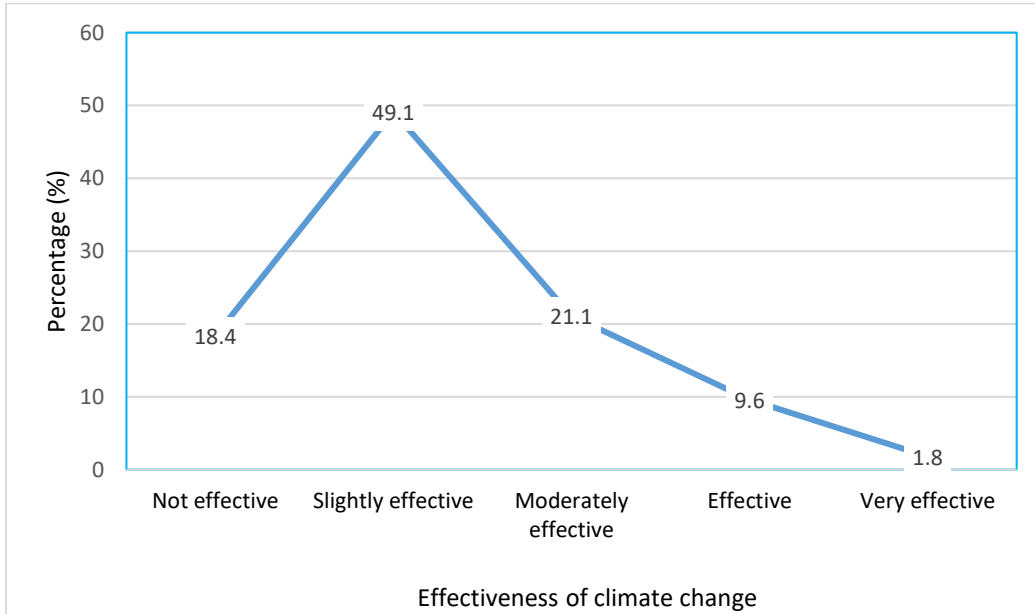**Figure 3: Respondents, awareness of climate changes adaptation strategies in their Ministries**

Figure 4: Effectiveness of existing climate change adaptation strategies in Benue State Ministries

Reason for policy effectiveness of existing strategies and policies in Benue State Ministries
Table 4 delineates the reasons contributing to the effectiveness of existing climate change strategies and policies within Benue State Ministries. Among the identified reasons, environmental impact assessment and policies hold the highest frequency, accounting for 26.67%. Efforts directed towards addressing climate change challenges, climate change awareness and adaptation, and specific strategies and their impacts share equal percentages at 20.00% each. Additionally, policy implementation status is cited as contributing to effectiveness, albeit with a slightly lower percentage of 13.33%. This data offers insights into various factors recognized as instrumental in the effectiveness of climate change policies within the Ministries in Benue State.

Reasons why existing climate change strategies are inefficient and are not fully implemented in Benue State Ministries
The respondents outlined various reasons behind the inefficiency of existing strategies and the incomplete implementation of policies (Table 5.) In terms of strategy inefficiency, predominant issues included poor policy implementation and effectiveness, cited by 45.00%, signifying a significant hindrance. Other concerns encompassed inadequate observations and acknowledgment of positive impacts (5.00%), challenges in education and public awareness (5.00%), poor general compliance and government attitude (15.00%), and policies lacking clear or directional purpose (25.00%).

Regarding incomplete policy implementation, the primary obstacle identified was the lack of funds and financial challenges, significantly noted at 31.71%. Additionally, deviations from the Master Plan (14.63%), specific instances of challenges (12.20%), lack of political will and interference (9.76%), lack of proper coordination and sensitization (7.32%), agreement issues (4.88%), and project challenges and abandonment (4.88%) collectively represented challenges obstructing the comprehensive execution of existing policies. These varied issues, spanning financial limitations, strategic deviations, organizational hurdles, and political influences, underscore the need for comprehensive approaches to address these impediments for effective policy implementation and strategy efficiency within the context of Benue State Ministries.

Stakeholder Engagement involved in the development and implementation of the climate change adaptation strategies and policies in Benue State Ministries
Stakeholder engagement within the development and execution of climate change adaptation strategies and policies within Benue State Ministries portrays diverse involvement (Figure 5). Local communities actively participate, contributing significantly at 28.4%. Businesses organizations and local NGOs exhibit lower but notable engagement at 2.8% and 20.2%, respectively.

Foreign NGOs are heavily involved, representing a substantial engagement rate of 56.9%. Meanwhile, governmental stakeholders play pivotal roles, with the State Government contributing

at 30.3% and the Federal Government leading with extensive involvement at 54.1%. This collective engagement illustrates a diverse spectrum of stakeholders, both local and international, actively involved in driving climate change adaptation strategies and policies within Benue State Ministries.

Table 4: Reason for policy effectiveness of existing strategies and policies in Benue State Ministries

Reason for effectiveness climate change policies	Frequency	Percentage
Environmental impact assessment and policies effectiveness	4	26.67
Efforts towards addressing climate change challenges	3	20.00
Climate change awareness and adaptation	3	20.00
Specific strategies and impact	3	20.00
Policy implementation status	2	13.33

Table 5: Reasons why existing climate change strategies are inefficient and are not fully implemented in Benue State Ministries

| Respondents' Reasons why existing strategies are inefficient	Frequency	Percentage (%)
Poor policy implementation and effectiveness	9	45.00
Inadequate observations and acknowledgment of positive impact	1	5.00
Challenges in education and public awareness	1	5.00
Poor general compliance and government attitude	3	15.00
Polices have no clear or directional purpose	5	25.00
Reasons why existing policies are not fully implemented		
Lack of funds and financial challenges	13	31.71
Deviation from the Master Plan	6	14.63
Specific instances of challenges	5	12.20
Lack of political will and interference	4	9.76
Lack of proper coordination and sensitization	3	7.32
Agreement issues	2	4.88
Project challenges and abandonment	2	4.88
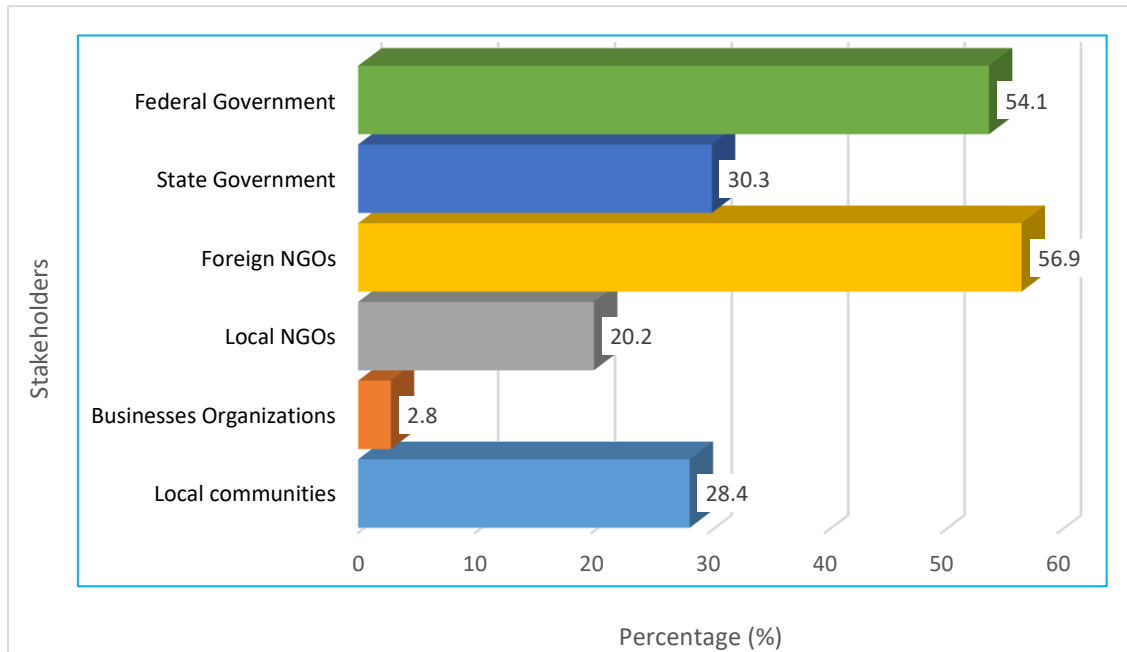
Figure 5: Stakeholder Engagement involved in the development and implementation of the climate change adaptation strategies and policies in Benue State Ministries

Respondents perception that Stakeholders were actively involved in the development and implementation of the climate change adaptation strategies and policies in Benue State Ministries

Figure 6 illustrates the diverse spectrum of perceptions among respondents concerning the active engagement of stakeholders in formulating and executing climate change adaptation strategies and policies within Benue State Ministries. The showcases varying opinions: a minority of respondents, at 3.6%, strongly disagree with the notion of active stakeholder involvement, while a larger fraction, 19.8%, expresses disagreement. The most substantial viewpoint, observed at 43.2%, reflects a neutral stance among respondents, indicating a significant segment that neither confirms nor denies the active involvement of stakeholders.

Means of monitoring and evaluation climate change in Benue State Ministries

Figure 7 comprehensively outlines the diverse array of means employed for monitoring and evaluating climate change adaptation strategies within Benue State Ministries, shedding light on the multifaceted approaches adopted in this process. Data Collection and Reporting emerges prominently at 32.5%, reflecting a robust emphasis on gathering and documenting relevant information. Adaptive Management shares the same percentage, indicating a substantial focus on flexible strategies that evolve based on ongoing assessments. Community Feedback follows closely at 24.6%, highlighting the significance placed on engaging local perspectives and insights.

Stakeholder Engagement (12.3%), Clear Objectives and Indicators (17.5%), and Review and Reporting (13.2%) also hold notable positions, underlining the importance attributed to involving stakeholders, establishing clear goals, and consistently reviewing progress.
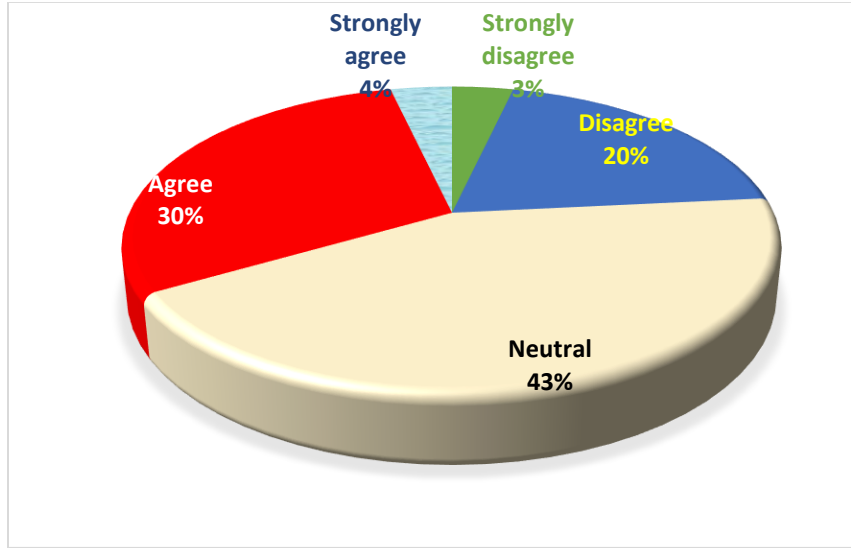

Figure 6: Respondents perception on the fact that Stakeholders were actively involved in the development and implementation of the climate change adaptation strategies and policies in Benue State Ministries
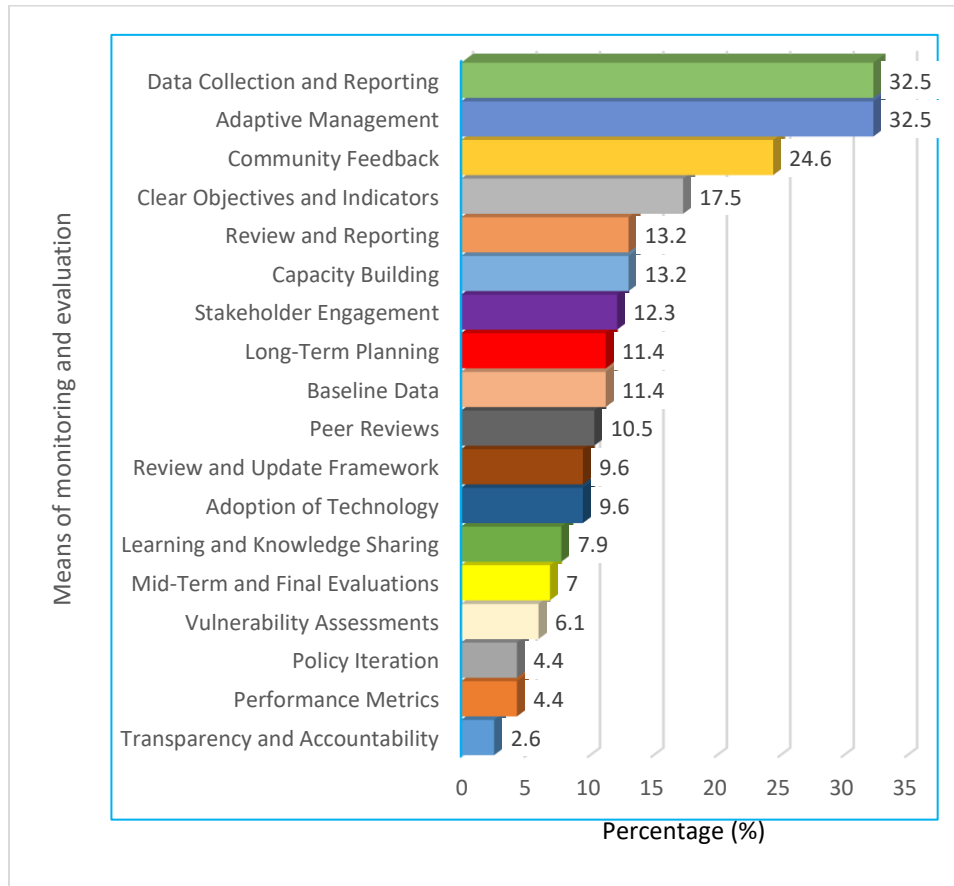
Figure 7: Means of monitoring and evaluation climate change in Benue State Ministries

Respondents' suggestions on improvements, funding and resource allocation for climate change initiatives in Benue State Ministries

Table 6 shows that majority of respondents (50.0%) suggested increased funding and government responsibility as the most important improvement area for climate change initiatives. This highlights the need for greater financial resources and stronger government commitment to effectively address climate change challenges in Benue State. While not as prominent, suggestions for public involvement and support (5.88%), agricultural support (8.82%), and creation of concern and awareness (5.88%) also received support. These suggestions emphasize the importance of engaging the public, supporting farmers who are particularly vulnerable to climate change impacts, and raising awareness about the issue to promote collective action.

Challenges faced by respondents in adapting to climate change

The challenges in adapting to climate change within the Benue Ministries are presented in Figure 8: Financial Challenges emerge as the most predominant, registering a substantial rate of 64.9%.

Following closely is Behavioral and Societal Challenges at 28.1%. Resource constraints (27.2%), economic challenges (25.4%) and natural and environmental challenges (19.3%) also feature prominently. other challenges faced by the ministries include: political and policy challenges (16.7%), infrastructure challenges (13.2%), and technological challenges (14.9%), emphasizing hurdles within governance, infrastructure readiness, and technological limitations, respectively. Adaptation-mitigation trade-offs (7%), and global cooperation challenges (7.9%) reflect broader systemic challenges.

Table 6: Respondents' suggestions on improvements, funding and resource allocation for climate change initiatives in Benue State Ministries

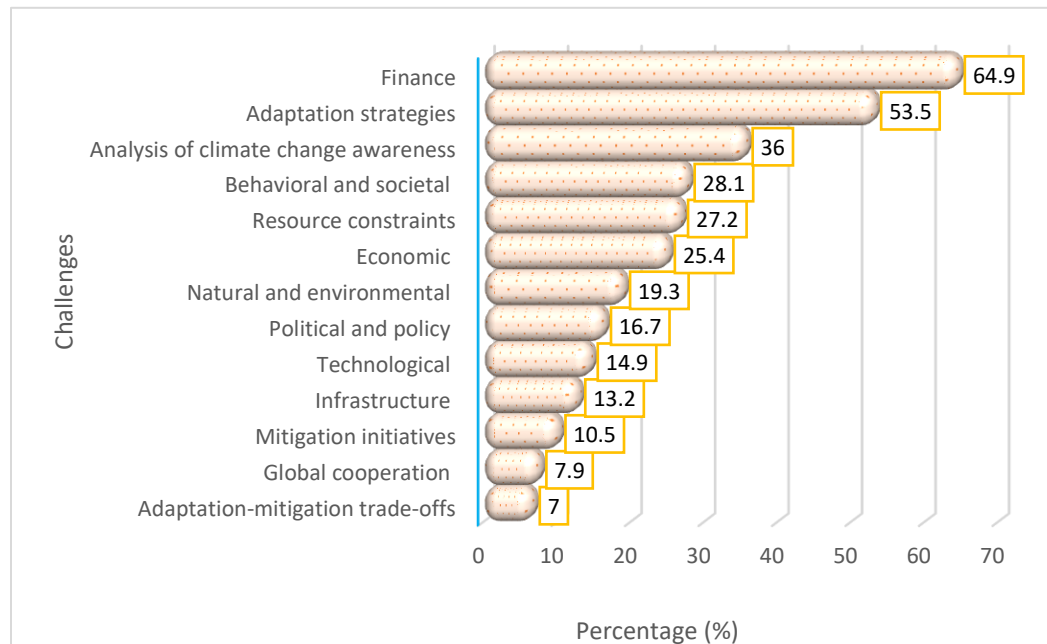| Suggestion on improvement	Frequency	Percentage
Funding and government responsibility	17	50.00
Public involvement and support	2	5.88
Agricultural support	3	8.82
Creation of concern and awareness	2	5.88

Figure 8: Challenges faced by respondents in adapting to climate change

Climate change mitigation, Adaptation and Resilience adopted by Benue Ministries

Table 7 shows results of climate change mitigation, adaptation and resilience adopted by Benue Ministries. Most respondents (52.6%) chose behavioral changes as the most important climate change mitigation measure, followed by afforestation/reforestation (36.8%) and government policies (22.8%). Water resource management (25.4%) was the most commonly adopted adaptation measure, while community education/awareness and urban planning/design were

equally emphasized (19.3% each). Adaptation strategies (32.5%) were identified as the most important resilience method, followed by community engagement (20.2%) and urban/rural planning (19.3%). These findings suggest a comprehensive approach to tackling climate change in Benue State, encompassing mitigation, adaptation, and resilience strategies.

Table 7: Climate change mitigation, Adaptation and Resilience adopted by Benue Ministries

Climate change mitigation measures	Frequency	Percentage (%)
Behavioural Changes	60	52.6
Afforestation and Reforestation	42	36.8
Government Policies and regulations	26	22.8
Community-Based Initiative	25	21.9
Waste Reduction and Recycling	13	11.4
Research and Innovation	11	9.6
Carbon Capture and Storage	9	7.9
Improved Industrial Practices	7	6.1
International Agreements and treaties	4	3.5
Public and active Transportation	4	3.5
Energy Efficiency Improvement	3	2.6
Sustainable Agriculture	3	2.6
Electrification of Transportation	2	1.8
Transition to Renewable energy sources	2	1.8
Climate change Adaptation measures		
Water Resource Management	29	25.4
Natural Resource Management	25	21.9
Drought and Flood Preparedness	23	20.2
Adaptive Social Safety Nets	22	19.3
Community Education and awareness	22	19.3
Urban Planning and Design	22	19.3
Climate-Resilient Building codes	15	13.2
Climate-Resilient Agriculture	11	9.6
Biodiversity Conservation and mitigation corridors	9	7.9
Climate-Resilient Housing and shelter	7	6.1
Research and Data Collection	7	6.1
Ecosystem Conservation and restoration	6	5.3
Healthcare and Public Health adaptation	6	5.3
International Cooperation and funding	6	5.3
Climate-Resilient Transportation	4	3.5
Crisis Communication and public information	4	3.5
Insurance and Risk Transfer machoism	2	1.8
Resilient Infrastructure Development	2	1.8

Climate change Resilience methods

Adaptation Strategies	37	32.5
No response	26	22.8
Community Engagement	23	20.2
Urban and Rural Planning	22	19.3
Education and Awareness	19	16.7
Early Warning Systems	13	11.4
Social Safety Nets	13	11.4
Biodiversity Conservation	12	10.5
Risk Assessment and Preparedness	10	8.8
Healthcare and Public Health care resilience	7	6.1
Research and Data Collection	7	6.1
Ecosystem Resilience	6	5.3
Infrastructure and Building resilience	4	3.5
International Collaboration	4	3.5
Cross-Sectoral Integration	3	2.6
Insurance and Risk Transfer	3	2.6

Discussion

This study revealed that majority of respondents were males and predominantly Christians. This agrees with the findings of Banmeke et al., (2012) on a similar study. The finding suggests more males were employed in Benue State Ministries than females. The involvement of females in economic and social empowerments is paramount to development of any nation or society. The study also found that all respondents were aware of climate change, indicating a strong understanding of the concept. However, awareness levels were lower for adaptation strategies and monitoring/evaluation systems. This advocates a need for more education and training on these specific aspects of climate change. Related studies have found similar high levels of general climate change awareness, but lower awareness of adaptation measures. For example, Onyekuru and Marchant (2017) reported 88% of respondents had perceived climate change, only 36.6% were aware of adaptation strategies. Another study by Pugliese and Ray (2009) across 128 countries found that while a majority were aware of climate change, awareness was lowest in sub-Saharan Africa at 44%.

In this study, mixed awareness of government funding for climate change, with 46.4% acknowledging awareness, 26.4% lacking awareness, and 27.3% having partial awareness were observed among respondents. This suggests a need for better communication about available funding in government ministries. Ricart, *et al.* (2023) reported funding and resource constraints were commonly cited barriers to climate change adaptation in developing countries. Improving awareness of funding sources could help address this barrier.

The current study shows that traditional media (TV, newspapers and radio) was the most common source of information, used by 86% of respondents in Benue State Ministries. Social media and government publications were also significant. A related study on climate change awareness and

misinformation by Adetayo et al. (2023) found that traditional media remains a vital information source despite the rise of digital platforms. This aligns with the 86% reliance on traditional media noted in the findings. In this study also, deforestation was recognized the primary cause of climate change by 65.8% of respondents while Greenhouse gas emissions was recognized by 26.3%. This agrees with the assertion of Ross et al. (2010) that deforestation plays a significant role in climate change by contributing to increased atmospheric CO_2 levels and altering surface energy balances, leading to local and global climate changes. This highlights the need for accurate public education, aligning with the 26.3% recognition of greenhouse gas emissions.

Respondents' awareness of climate change adaptation strategies in Ministries indicated higher awareness of Water management, agricultural adaptation, education and resilient building codes. Ebenehi et al. (2018) on a study of farmers' climate change awareness found varying degrees of understanding, with some strategies like agricultural adaptation being well-known, while others, such as green finance, were less familiar. Findings on effectiveness of existing strategies in Benue State Ministries on climate change shows that identified agricultural adaptation and water management as most prominent. Integrated approaches, combining familiar and lesser-known strategies, are essential for robust climate resilience.

The research findings on the effectiveness of climate change strategies and policies in Benue State Ministries identified environmental impact assessment and policies, addressing climate change challenges, climate change awareness and adaptation, and specific strategies and their impacts were some reasons. These findings align with report of Kalogiannidis et al. (2024) that policy integration and the importance of addressing climate change challenges through various strategies and policies were significant. The study of Zheng et al. (2023) recommended policymakers to formulate energy policies aligned with global and domestic requirements.

The reasons behind the inefficiency of existing strategies and the incomplete implementation of policies in Benue State Ministries include poor policy implementation and effectiveness, inadequate observations and acknowledgment of positive impacts, challenges in education and public awareness, poor general compliance and government attitude, and policies lacking clear or directional purpose. These issues are consistent with the findings of Kalogiannidis et al. (2024) highlighted on financial constraints, lack of political will, and inadequate infrastructure as the barriers to integrating climate change strategies into broader policy and planning frameworks.
The stakeholder engagement involved in the development and implementation of climate change adaptation strategies and policies in Benue State Ministries includes local communities, businesses, local NGOs, foreign NGOs, and governmental stakeholders. This diverse engagement is consistent with Kalogiannidis et al. (2024) report which stated that knowledge and capacity challenges were significant barrier to integration of climate change strategies into regional development policies in Europe, especially in Greece. This finding was also corroborated by IPCC. Regional Context (2014) and Cittadino et al. (2022)

The research findings on climate change mitigation, adaptation, and resilience adopted by Benue Ministries revealed that most important climate change mitigation measure chosen by respondents

is behavioral change, afforestation/reforestation and government policies. On adaptation measures, water resource management was the most commonly adopted, with community education/awareness and urban planning/design equally emphasized at each. The resilience methods were adaptation strategies identified as the most crucial, these findings highlight a multi-faceted approach to addressing climate change in Benue State, incorporating mitigation, adaptation, and resilience strategies (Onoja *et al.,* 2011; Abbass *et al.,* 2022).

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