

Mainstreaming Climate Change into EIA Process in Nigeria: Perspectives from Projects in Northern Nigeria

Lawal Adegboyega M.

Institute for Natural Resources Environment and Sustainable Development, University of Port Harcourt,
Rivers State & Department of Environmental Assessment, Federal Ministry of Environment Nigeria
lawal.adebo@gmail.com; alawal@ead.gov.ng

Prof. Ijeoma Vincent-Akpu

President, Association for Environmental Impact Assessment Nigeria &
University of Port Harcourt, Rivers State.
ijeoma.vincent-akpu@uniport.edu.ng

Dr. Abbas O. Suleiman

Director, Environmental Assessment Department,
Federal Ministry of Environment Nigeria
abbasule@hotmail.com

ABSTRACT

The persistent issue of drought in Northern Nigeria is exacerbated by the reduction in precipitation and rise in temperature. Nigeria is being impacted by climate change in diverse ways, necessitating the immediate implementation of proactive measures to tackle its challenges. It is crucial to integrate adaptation and mitigation into the country's development plans. The objective of the study is to identify current practices, gaps, and opportunities for incorporating climate change into the EIA framework; and the integration of climate change considerations into the Environmental Impact Assessment (EIA) process from projects in Northern Nigeria. The study assesses various criteria in EIA reports, such as vulnerability assessments, climate projections, adaptation measures, stakeholder engagement, and policy compliance. A self-created questionnaire titled "Mainstreaming Climate Change within EIA" was utilized to collect data. The questionnaire was designed with an interactive format, divided into three main categories (Category A, B, C). It was conducted between February and April 2022, with 400 potential volunteers receiving electronic and hard copies of questionnaires, resulting in 127 valid responses. The findings from five EIA reports of projects in Northern Nigeria revealed significant gaps in addressing climate change, including limited attention to vulnerability and risk assessments, inadequate reporting of adaptation measures, and insufficient stakeholder engagement. Key stakeholder interviews conducted support the relevance and significance of incorporating climate change adaptation skills into the EIA process. However, the study contends that in order for stakeholders to accept mainstreaming climate change mitigation and adaptation, institutional and policy changes are needed.

KEYWORDS: Climate Change, EIA, Climate Change Adaptation, Climate Change Mitigation, Northern Nigeria

INTRODUCTION

Climate Change (CC) is the most critical environmental, political, social, and economic problem facing the planet today. It refers to long-term changes in the average temperature and weather patterns of a region or the Earth, primarily caused by human activities such as burning fossil fuels and deforestation. These activities release greenhouse gases into the atmosphere, trapping heat from the sun and leading to a wide range of impacts, including sea-level rise, more intense heat waves, increased frequency of extreme weather events, changes in precipitation patterns, and disruptions to ecosystems and biodiversity (Warner *et al.*, 2010). The impacts of climate change are far-reaching and can have profound consequences for both natural and human systems. Although climate change is a global phenomenon, its effects are not the same everywhere (Vu *et al.*, 2019).

Nigeria stands as one of the nation's most vulnerable to the impacts of climate change, with approximately 6% of its land area at risk from the repercussions of extreme weather events (World Bank, 2019). Climate change has different effects across Nigeria, as the country has a tropical climate with varying levels of temperature and precipitation. It has a significant rise in temperature dating since the 1980s. According to studies, the temperature has risen considerably in recent decades and is projected to continue to increase in the future (Enete, 2014; Federal Ministry of Environment, 2014; Abatan *et al.*, 2016). In Northern Nigeria, the decrease in precipitation and increase in temperatures has made drought and water scarcity a very persistent challenge. Also, the drying up of lakes such as Lake Chad is a major concern, as it has been reported to have severe consequences on the millions of people in rural communities who rely on it for their livelihood and for the biodiversity that depends on it (Nwilo *et al.*, 2020). According to vulnerability assessments, states in the north are more affected by climate change than those in the south (Madu, 2012; Federal Ministry of Environment, 2014b). Scientific predictions explain that two-thirds of the northern Nigerian states: Bauchi, Borno, Gombe, Jigawa, Kano, Kaduna, Katsina, Kebbi, Sokoto, Yobe, and Zamfara may be deserts or semi-deserts by the end of the twenty-first century if the current trend of desertification continues (Idris *et al.*, 2011). These states are situated in Nigeria's Sahel region, which is particularly susceptible to desertification due to its mix of high temperatures and little precipitation. The local people, businesses, and ecosystems may all be significantly impacted by these environmental problems (Akande *et al.*, 2017).

Figure 1 shows Nigeria's geographic variety in terms of risk levels, according to states and the six geopolitical zones.

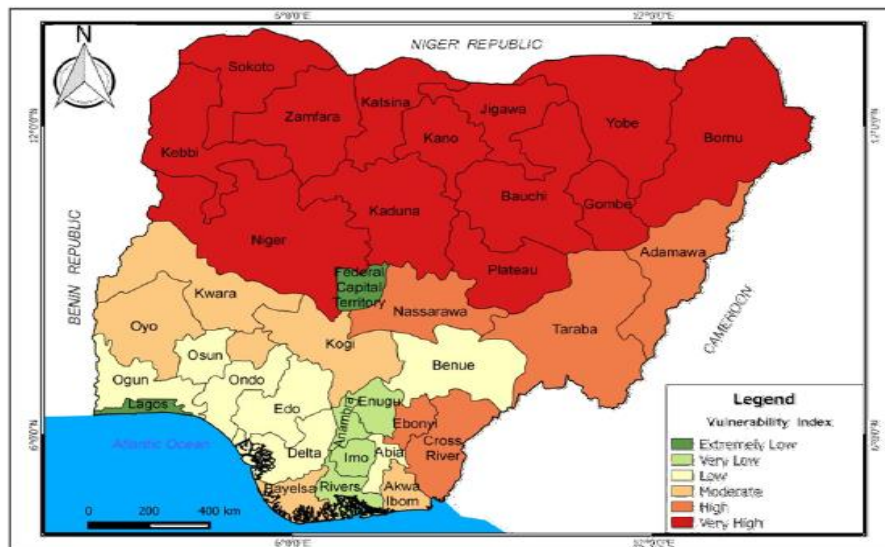


Figure 1: Pattern of Vulnerability in Nigeria (Source: Madu, 2012)

The term "mainstreaming" is not new; it has been used in relation to the environment, gender issues, disaster risk reduction, poverty, and, most recently, climate change adaptation (Olhoff & Schaer, 2010; Uittenbroek *et al.*, 2013). Mainstreaming climate change adaptation (CCA) involves integrating climate change considerations into existing planning and decision-making processes across various sectors and industries, such as urban planning, transportation, energy, and agriculture. Researchers have highlighted the various ways in which climate change is affecting Nigeria and the urgent need for the nation to take proactive measures to address the challenges of climate change and mainstream adaptation and mitigation into its development plans (Elisha *et al.*, 2017; Ebele & Emodi, 2016; and Olaniyi *et al.*, 2013). Environmental Impact Assessment (EIA) is a systematic process used to predict and evaluate the potential environmental impacts of proposed projects or developments. By including climate change assessment in the EIA process, decision-makers can have a better understanding of a project's contribution to greenhouse gas emissions, vulnerability to climate-related hazards, and the need for adaptation measures. The integration of climate change adaptation into the development planning and decision-making process can take place in a variety of areas, such as infrastructure, water management, agriculture, poverty alleviation, and education (Ayers *et al.*, 2014). This approach ensures that climate change adaptation is integrated into all aspects of development and that the potential impacts of climate change are taken into account in the planning and implementation of development projects. There are presently only a few specific studies and articles accessible in Nigeria that give relevant evidence and discussion on climate change and its implications. The research aims to shed light on the potential opportunities and constraints in effectively addressing climate change concerns within the EIA process in Nigeria. The paper seeks to contribute to the ongoing efforts towards mainstreaming climate change into the EIA process, with the case study of Northern Nigeria as a valuable reference point for other regions facing similar challenges and seeking to improve their environmental decision-making processes.

Research Questions:

1. How is climate change currently influencing Northern Nigeria, particularly in terms of precipitation, temperature, and the persistence of drought?
2. What are the challenges and issues related to the Environmental Impact Assessment (EIA) process in Northern Nigeria, specifically concerning climate change?
3. To what extent are current EIA reports incorporating climate change indicators and addressing issues such as vulnerability, climate change risk, adaptation measures, carbon footprint, and mitigation strategies?

MATERIALS & METHOD

Study Design

The research employed a mixed-methods approach, combining a thorough review of EIA reports with survey administration, interviews with key stakeholders, and an extensive search of secondary materials through email communication. The survey responses offered valuable insights into the practical challenges and issues related to the EIA process, serving as additional sources of information. Additionally, an extensive internet search was conducted to gather secondary materials, including scholarly publications, media sources, and presentations. The search terms employed were "Northern Nigeria," "Climate Change," "Climate Change Adaptation," "EIA," and "Environmental Sustainability."

Data Collection

EIA Reports: Five EIA reports from projects in Northern Nigeria were reviewed, analyzing vulnerability, project sector, climate projections, climate vulnerability assessment, climate change risk, adaptation measures, carbon footprint, mitigation strategies, stakeholders' engagement, and policy and regulatory compliance. The Five EIA reports of projects situated in the Northern Region of Nigeria were reviewed, such as:

- a. "Environmental and Social Impact Assessment of WACOT Rice Milling Factory, Argungu Local Government Area, Kebbi State, North West Nigeria" by Wacot Rice Argungu Limited.
- b. "Environmental Impact Assessment for Proposed LCCN University, Demsa Local Government Area of Adamawa State, North East Nigeria" by Lutheran Church of Christ in Nigeria (LCCN).
- c. "Environmental Impact Assessment of the Proposed Small and Medium Hydropower Plant at Bakolori Dam, Zamfara State, North West Nigeria" by the Federal Ministry of Power.
- d. "Environmental and Social Impact Assessment of the Proposed 240km 132 Kv Dc Damaturu-Gashua-Nguru Power Transmission Line and Substations Project in Yobe State, North East Nigeria" by the Transmission Company of Nigeria.
- e. "Environmental and Social Impact Assessment of the Proposed Mubi International Cattle Market, Along Mubi – Maiha Trunk 'A' Federal Highway, Mubi, Mubi South Local Government, Adamawa State North-East, Nigeria

Interviews: A Personal Interview with the Director of the Environmental Assessment Department, Nigeria, Dr. Abbas O. Sulieman, and a professional Environmental Consultant, Dr. F. S. Ikuponisi was conducted.

Survey: A self-created questionnaire titled "Mainstreaming Climate Change within EIA" was administered to 400 potential volunteers, collecting demographic data and opinions on climate change integration in the EIA process. Data was collected using digitized Microsoft forms as well as hard copies of the forms. They were shared among specified professional environmental bodies and organizations (stakeholders) through various communication (email) and social media (Twitter, WhatsApp, etc.) platforms. The questionnaire was designed with an interactive format, divided into three main categories. Category A (Questions 1-7) focused on collecting demographic data from respondents, including gender, age, occupation, level of experience, and educational background. Category B (Q 8–15) focused on collecting the level of agreement of respondents to ways of mainstreaming climate change adaptation into the practice of EIA in Northern Nigeria. These closed questions (Q 8–15) used Likert scale ranging from 1–5 (1 = strongly agree, 5 = strongly disagree). Category C focused on the response of participants as to what an EIA that incorporates climate change should contain. The survey was conducted between February and April 2022, with 400 potential volunteers receiving electronic and hard copies of questionnaires, resulting in 127 responses returned.

Data Analysis

The survey data was coded and examined using statistical tools such as Statistical Package for Social Sciences (SPSS) and Microsoft Excel was used to tabulate the Likert scale questions. When presenting the findings, a list of the total number of replies received for each question as well as how many of those responses (n = 127, 100%) were for that particular question was noted. Mean and standard deviation were employed as statistical tools for data analysis, and the t-test was used to test null hypotheses at a significance level of 0.05, considering the degrees of freedom. Charts, graphs, and tables were employed to visually present the results.

RESULTS

Reviewed EIA Reports

From the review of the five EIA reports presented in table 1, deductions were made based on vulnerability, project sector, climate projection, climate vulnerability assessment, climate change risk, adaptation measures, carbon footprint, mitigation strategies, stakeholders' engagement, policy and regulatory compliance.

Vulnerability - The majority of the projects reviewed were located in areas of very high climate vulnerability, except for a project in Adamawa State, which was within the high climate vulnerability region. These findings align with similar studies by the Federal Ministry of Environment (2014b)

Project Sector - The reports covered projects in various sectors of the Nigerian economy, including power, infrastructure, manufacturing, and agriculture.

Climate Projection - Most of the reviewed EIA reports contained chapters discussing climate projections under the Climate and Meteorology section. Historical climatic data spanning 10 to 31 years were included in these reports. However, one report (Report D) did not review any climatic data in the project area. This indicates that a large percentage of EIA reports in the Northern Region assessed future climate projections for the project area, including changes in temperature, precipitation patterns, extreme weather events, sea-level rise, and other relevant climate variables.

Climate Vulnerability Assessment - None of the five reports reviewed had a section discussing the assessment of climate vulnerability in Northern Nigeria. Although Report E mentioned that climate vulnerability would be discussed, it was not included in the report. This may be due to the absence of climate vulnerability assessment in the EIA study's Terms of Reference and guidelines, as well as insufficient technical expertise in the field as confirmed in an interview with the Director of Environmental Assessment Department, Nigeria, Dr. Abbas O. Sulieman.

Climate Change Risk - The reviewed EIA reports revealed that many of the EIA preparers interchange climate change risk with climate change impact. Some reports classified risks and hazards posed by climate change as climate change impacts, such as increased flooding, drought, coastal erosion, or food shortages. The reports also identified the removal of vegetation and the emission of greenhouse gases from generators as impacts on climate. This indicates knowledge gaps in reporting climate change risks that can be addressed through training, engaging a climate change expert as part of the EIA report writing team, and developing guidelines for mainstreaming climate change into EIA reports. This suggestion was confirmed during the interview with the Director Environmental Assessment Department, Dr. Abbas O. Sulieman.

Adaptation Measures - None of the five reports reviewed had a section discussing the assessment of adaptation measures within the study area. However, Report C incorporated some adaptive measures into the project design, such as incorporating resilient design features like dam embankments to prevent flooding. However, these measures were not discussed as climate adaptation measures which would have enhanced its implementation. The review outcome reveals knowledge gaps in reporting climate adaptation measures that can be addressed through training, engaging a climate change expert as part of the EIA report writing team, and developing guidelines for mainstreaming climate change into EIA reports. This suggestion was confirmed during the interview with an Environmental Consultant Dr. F. S. Ikuponisi.

Carbon Footprint - None of the five reports reviewed had a section discussing the estimation of the carbon footprint for the projects. Some reports (Report A and B) identified greenhouse gases as sources of carbon footprint from energy utilization, but none reported estimated values of GHGs from the projects' energy consumption, transportation, waste management, and other relevant activities. The review outcome reveals knowledge gaps in reporting carbon footprint, which may be due to the absence of estimating carbon footprint in the approved Terms of Reference of the EIA study. This suggestion was confirmed during the interview with an Environmental Consultant, Dr. F. S. Ikuponisi.

Mitigation Strategies - The five EIA reports reviewed revealed that most of the listed mitigation strategies were not adequate. Tree planting and the use of renewable energy were identified as mitigation strategies in some reports (Report A, B, and D), except for Report E, which did not identify any mitigation strategies. The inadequate reporting of mitigation strategies may be connected to the ineffective identification of climate risks that require mitigation measures. The review outcome reveals knowledge gaps in the identification of mitigation strategies, which can be addressed through training, engaging a climate change expert as part of the EIA report writing team, and developing guidelines for mainstreaming climate change

into EIA reports. This suggestion was confirmed during the interview with the Director Environmental Assessment Department, Dr. Abbas O. Sulieman.

Stakeholders Engagement - The five EIA reports reviewed revealed that most of the stakeholders' engagement measures listed were not adequate. Although questionnaires and scoping workshops were employed, the minutes of meetings and agendas did not include discussions on the climate change implications of the proposed projects. This indicates the need to update stakeholder engagement plans to address climate change issues, as well as the development of guidelines that describe how climate change issues can be mainstreamed into stakeholder engagement plans.

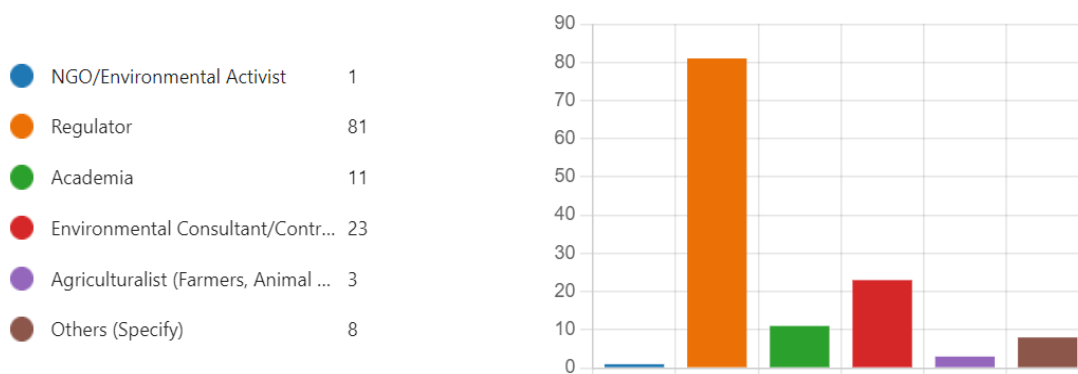
Policy and Regulatory Compliance - Most of the reviewed EIA reports considered national and regional climate change frameworks, emission reduction targets, adaptation strategies, and other relevant guidelines. However, Report C and E did not adequately review relevant national and international climate change frameworks.

Table 1. Review of EIA Reports of Project Located in Northern Nigeria

| | REPORT A | REPORT B | REPORT C | REPORT D | REPORT E |
|---|---|--|--|---|-------------------------------------|
| Sector | Manufacturing | Infrastructure | Power | Power | Agriculture |
| Climate Projections | 20 years Climatic Data (2001-2021) | 10 years Climatic Data (2010 – 2019) | 31 years Climatic data (1978 – 2008) | Not Available | 15 Years Climatic Data (2004 -2018) |
| Climate Vulnerability Assessment | Not Available | Not Available | Not Available | Not Available | Not Available |
| Climate Change Risk | Not Adequate (only removal of trees identified) | Not Adequate (only Generator Emissions was identified) | Not Adequate (No Dedicated Section) | Not Adequate (Loss of Vegetation & Emissions from Diesel Engines) | Not Adequate |
| Adaptation Measures | Not Identified | Not Identified | Not Identified | Not Identified | Not Identified |
| Carbon Foot Print | Not Calculated | Not Calculated | Not Calculated | Not Calculated | Not Calculated |
| Mitigation Strategies | Not Adequate (only tree planting proffered) | Not Adequate (Tree Planting Use of Renewable Energy) | Not Adequate (Embankment & Spill Way Design) | Not Adequate (Tree Planting) | Not Adequate |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|------------|---|
| Stakeholders Engagement | Not Adequate (Questionnaire & Scoping Workshop) | & | Not Adequate (Questionnaire & Forum) | & | Not Adequate (Questionnaire & Consultation) | & | Adequate chapter dedicated for this) | (A was for | Not Adequate |
| Policy and Regulatory Compliance | Adequate Relevant (National and International Laws) | & | Adequate Relevant (National and International Laws) | & | Not Adequate (Relevant National and International Laws Omitted) | & | Adequate Relevant (National and International Laws) | & | Not Adequate (Relevant National and International Laws Omitted) |

Demographic Characteristics from Survey



A total of 127 valid responses were recorded after the survey, of the 127 respondents, 56% were men (Fig. 2a). Due to a lack of accurate personnel data in the study area, it was not possible to determine if gender played any role in the opinions expressed by the participants. The respondents' average age ranged between 36 and 46 years old (Fig. 2b). The lowest response rate for respondents aged 58 and over is related to the Nigerian Civil Service's mandatory retirement age, which is 60 years of age or 35 years of pensionable service, whichever comes first. Fig. 2c showed that the majority of the respondents were married (80%). Based on education level, more than 98% (n=124) of the respondents hold a bachelor's degree, with the remaining 2% holding a higher diploma. The majority of the group (65%) had postgraduate degrees, which shows some level of specialization in the topic. Since all of the participants had education levels beyond the bare minimum (Fig. 2d), it may be assumed that having some education is necessary for working in the EIA field. Fig. 2e demonstrates that 9% (n=127) of the participants had been employed for more than three years. Given that 51% of the participants said they had more than twelve years of experience, it was predicted that the responses would represent important realities and, as a result, cut down on unwarranted optimism. In their survey of IAIA members, Morrison-Saunders and Sadler (2010) discovered a comparable demographic profile. Although this was not intended, more respondents (64 percent, n=81) held positions as regulators in the public sector, while 18 percent worked as environmental consultants or contractors who conducted environmental

impact assessments for projects and 9% were academics from higher education institutions in the same regions. The civil service's responses were made up of workers from the federal government (Fig. 2f).

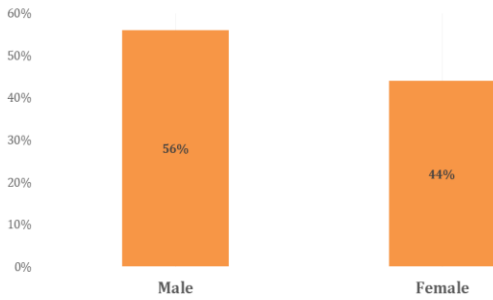


Figure 2a. Gender Distribution of respondents

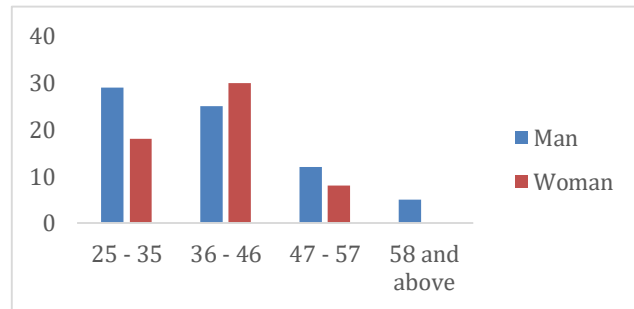


Figure 2b. Age group and gender distribution of respondents

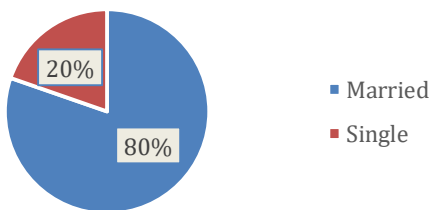


Figure 2c. Marital Status Distribution of Respondents

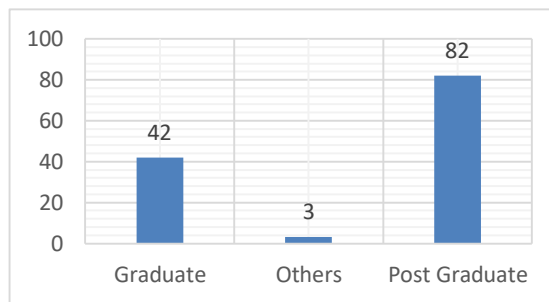


Fig. 2d. Educational Qualification of Respondents

Figure 2e. Length of Work Experience of Respondents

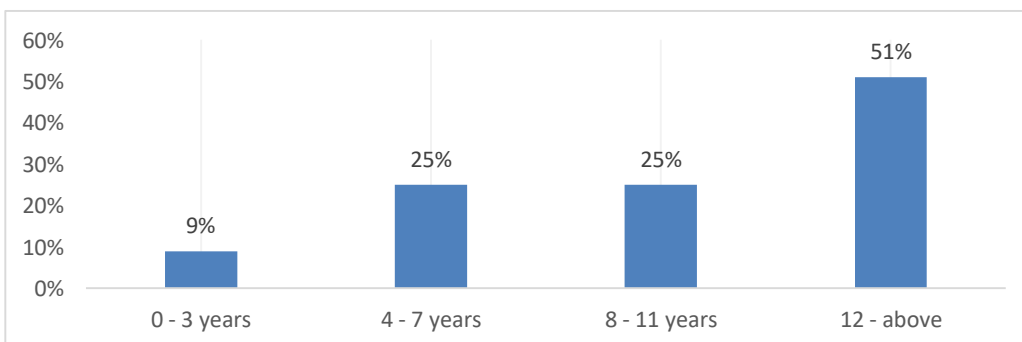


Figure 2f. Stakeholder Representation of Respondents

Level of Agreement to Mainstreaming Climate Change

Sixty-seven (67, 53%) respondents strongly agreed with the statement “Q8: Climate change impacts are currently being experienced in Nigeria especially in the North”. Some respondents (49, 39%) agreed while a small percentage of respondents (4, 3%) were indifferent. However, 6 respondents (5%) disagreed and only 1 participant (1%) strongly disagreed. Noticeably, most participants (116, 92%) expressed agreement that Climate change impacts were currently happening in northern Nigeria (Fig. 3).

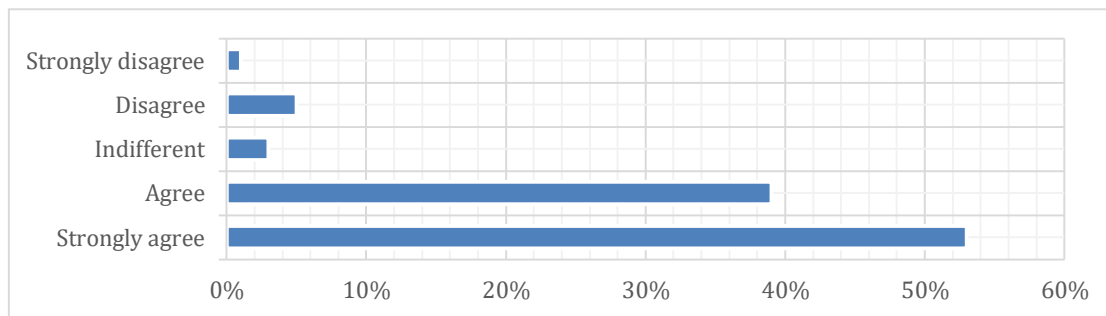


Figure 3. Stakeholder Perception on Climate Change Occurrence

There were 127 responses to the statement “Q9: Climate change is responsible for security issues currently experienced in Northern Nigeria such as farmer –Herder’s crisis, inter-ethnic clashes etc.” Only 18% (22 respondents) strongly agreed and (45 respondents, 36%) agreed with this assertion. 18 respondents (14%) remained indifferent, whereas, 25% (31 respondents) disagreed and 7% (9 respondents) strongly disagreed (Fig. 4).

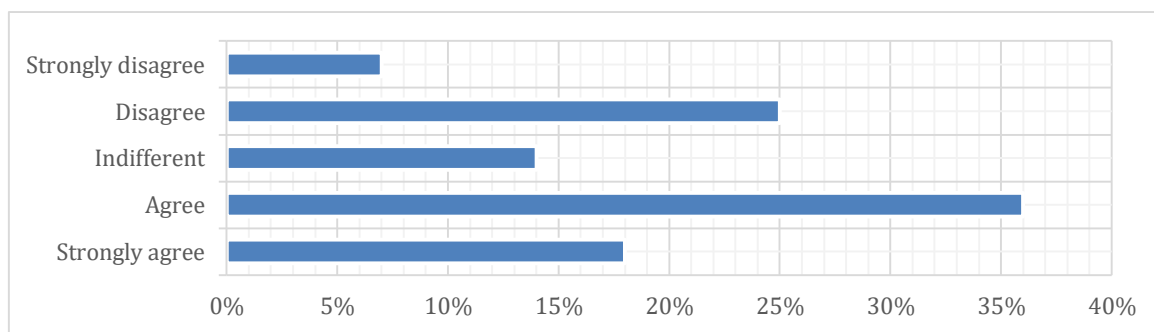


Figure 4. Stakeholder Perception of Climate Change and Insecurity

From the presentation Figure 5, fifty-nine respondents (46%) agreed with the statement “Q10: Projects and activities prevalent in the North such as Agricultural Production (Rice Production, Livestock farming etc.) Mining, food processing, etc. contributes to Climate Change.” Twenty-one respondents (17%) stated that they strongly agreed, 27 respondents (21%) actively disagreed and 3 respondents (2%) strongly disagreed. The remaining responses (28, 13%) claimed indifference. Further examination of the result showed that 65% who agreed were within the age range of 47-57.

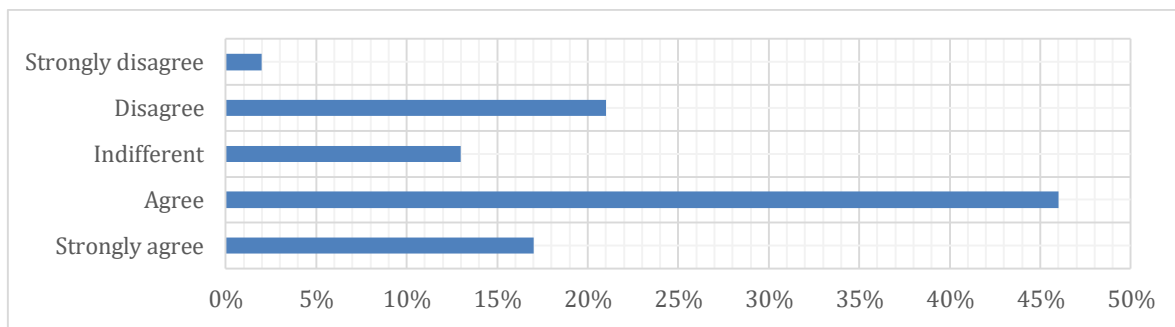


Figure 5. Stakeholder Perception on Climate Change and Agriculture

In answering the question “Q11: Climate change Impacts, Mitigation and Adaptation are currently being addressed in EIA reports in Nigeria”, the majority of the respondents (28%, 43%) supported the assertion (Fig. 6), most of which are regulators. However, 13% (16 respondents) disagreed, 7 respondents (6%) strongly disagreed and 14 respondents (11%) stayed indifferent. The result of this poll does not correspond to the findings from the review of the selected EIA reports.

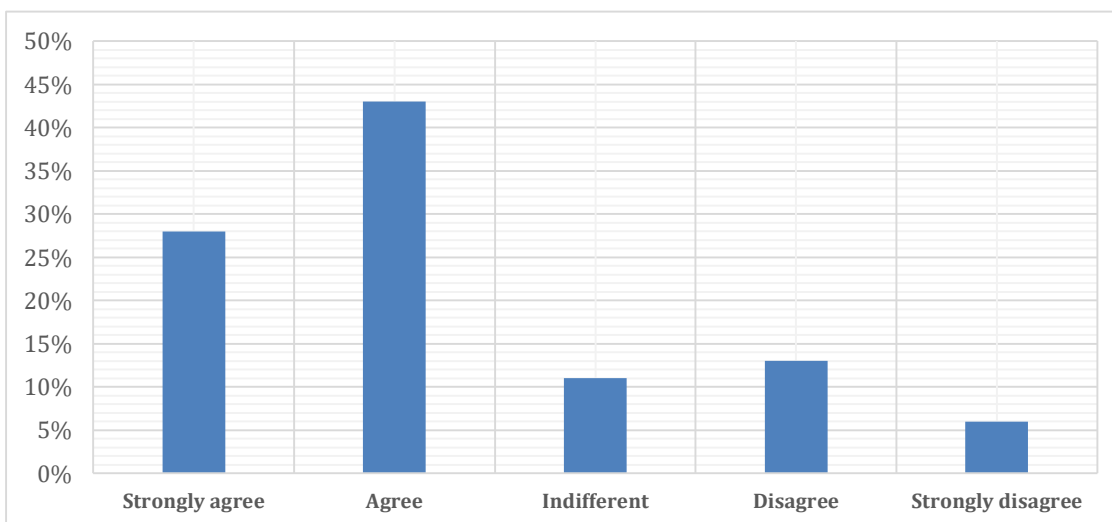


Figure 6. Stakeholder Perception on Climate Change Impacts, Mitigation, and Adaptation

There were 127 respondents to the statement “Q12: Mainstreaming Climate Change issues into EIA Process in Nigeria will help address Climate Change Impacts in Nigeria, especially for Projects in the North” (Fig. 7). Only (2%, 3 persons) were indifferent, 2% disagreed and 1%, 1 person strongly disagreed. The vast majority of survey respondents (95%, 121 persons) agreed to Q12.

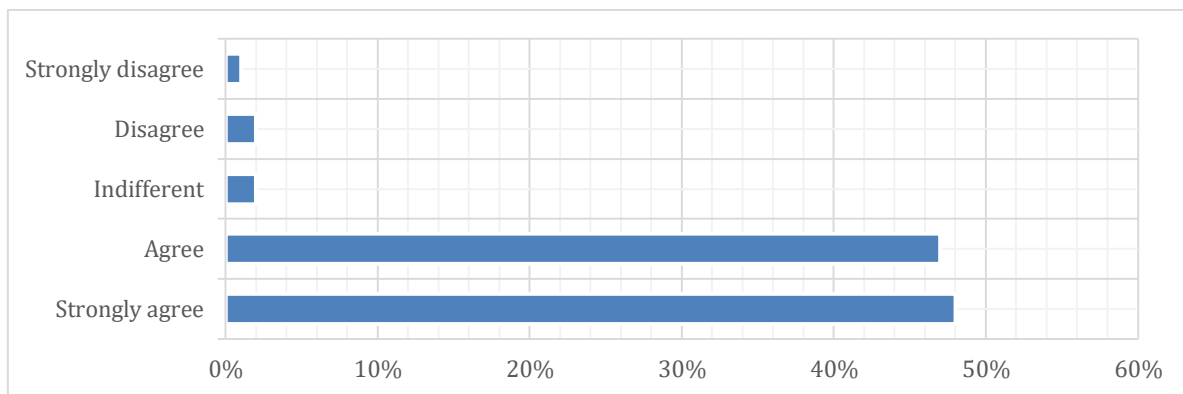


Figure 7. Stakeholder Perception on Climate Change and Mainstreaming

In answering the question “Q13: Potential Climate Change Impacts should be assessed along with Potential Impact Assessment of Proposed Projects” (PIA), most of the respondents (124 persons, 97%) agreed, 2 persons were indifferent and 1 person disagreed as presented in Figure 8.

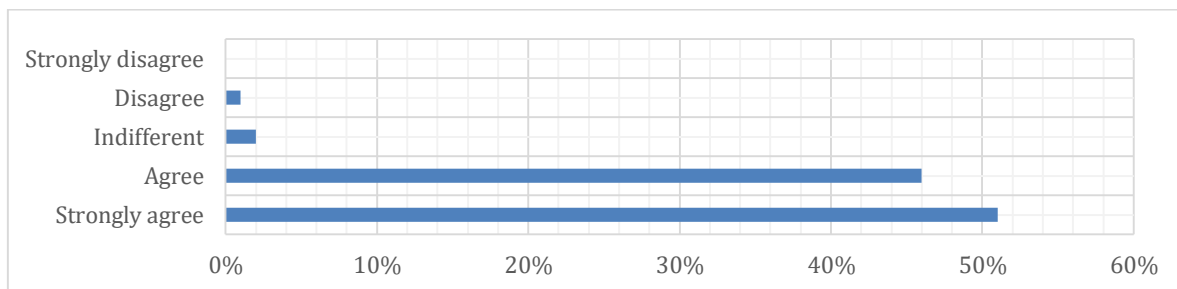


Figure 8. Stakeholder Perception on Climate Change within PIA

Most of the respondents (99%, 124 persons) fully supported the statement “Q14: Climate Change Mitigation measures should be proffered in the EIA report Chapter discussing Mitigation Measures” as shown in Figure 9. 74 respondents (59%) strongly agreed, 50 persons (40%) agreed, 1 person was indifferent and 1 respondent strongly disagreed (Fig. 9). Further analysis revealed that 69% of people who strongly agree were within the age range of 25 – 35 years.

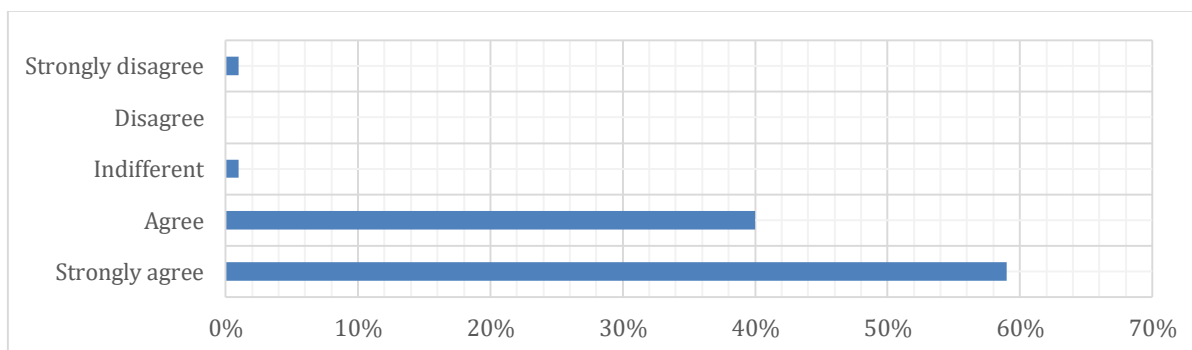


Figure 9. Stakeholder Perception on Climate Change Mitigation Chapter within EIA Reports

From the statement “Q15: Applicable Climate Change Adaptation Plans should be proffered within the Chapter on Environmental Management Plan (EMP)” as presented in Fig. 10, 50% (63 respondents) strongly agreed while 49% (62 respondents) agreed. A small percentage of respondents (1, 1%) were indifferent.

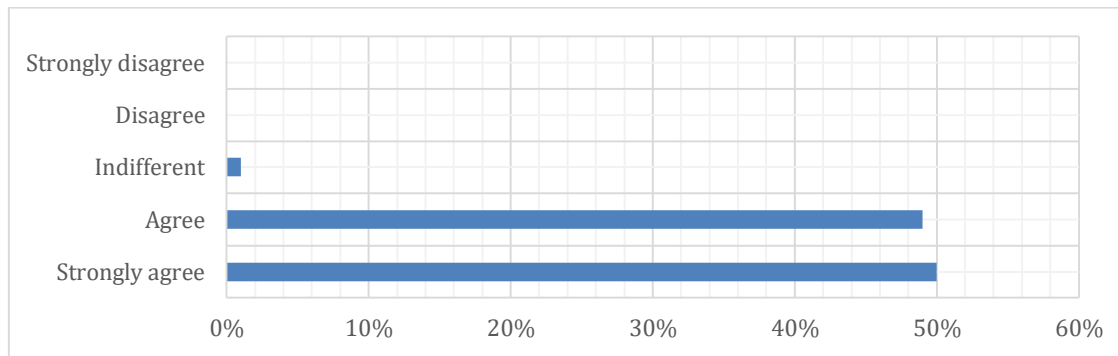


Figure 10. Stakeholder Perception on Climate Change Adaptation Plans within EMP

Content of EIA Incorporating Climate Change

The results presented a high level of agreement among the participants for all the questions, with at least 87% of the responses being in agreement as shown in Figure 11. The analysis of the responses revealed that only three questions, Q4 (87%), Q9 (88%), and Q5 (89%), had a lower level of agreement among the participants. The remaining seven questions had a high level of agreement, with over 92% of the respondents being in agreement.

For Q1, 96% agreed (53% SA and 43% A), 2% opposed, and another 2% selected "Neutral" that an EIA that effectively addresses climate change should be backed by regulations for addressing climate change issues. Q2 addressed that the EIA should have guidelines for addressing climate change issues - 95% agreed (49% SA and 46% A), 1% disagreed, 1% severely disagreed, and 3% were "Neutral" on the subject. 96% of the 127 respondents agreed (48% SA and 48% A) that the EIA should clearly state stakeholder roles and responsibilities for addressing climate change issues (Q3), 2% disagreed and another 2% were "Neutral." The majority of participants across all stakeholder groups believe that clearly distinguishing roles and responsibilities is required for EIA to address climate change successfully. Q4 addressed that the EIA should centralize project data for all to access to consider the cumulative effects of climate change - 87% agreed (42% SA and 45% A), 6% disagreed, 2% severely disagreed, and 5% were "neutral." The majority of participants with similar educational levels think that project data should be centralized and accessible to everybody for EIA to successfully address climate change. For Q5, 89% agreed (42% SA and 47% A), 3% disagreed, 3% severely disagreed, and 5% were "Neutral" that the EIA should incorporate regional and/or national model outputs of future climate change scenarios. The majority of respondents (94% agreed (43% SA and 51% A)) feel that the EIA should incorporate climate change issues in public discussion and/or negotiation of all proposals (Q6), 2% disagreed, 2% strongly disagreed, and another 2% selected "Neutral." For Q7: EIA that effectively addresses climate change should provide stakeholders with training on EIA-climate change integration methods and procedures, 96% agreed (52% SA and 44% A), 3% disagreed and 1% selected

"Neutral." For Q8: An EIA that effectively addresses climate change should have a coordinating mechanism for climate change issues in the EIA process, 92% agreed (45% SA and 47% A), 2% disagreed, 1% strongly disagreed, and 5% were "Neutral." Q9 addressed that the EIA should be backed by incentives to encourage a project to address climate change issues, e.g., a greening project or an adaptation project, etc., 88% agreed (39% SA and 49% A), 4% disagreed, 2% strongly disagreed, and 6% selected "neutral." In addressing the issue that the EIA should enforce the implementation of approved projects on mitigation and adaptation to climate change (Q10), 94% agreed (52% SA and 42% A), 2% disagreed, 1% strongly disagreed, and 3% were "Neutral."

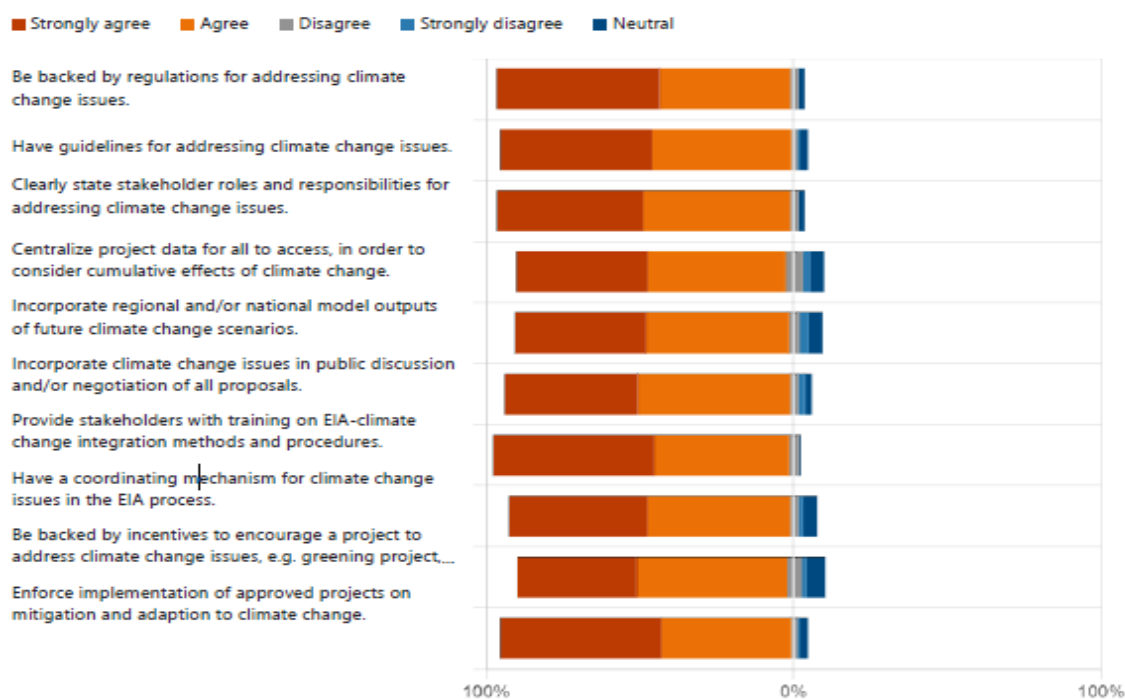


Figure 11. The level of agreement for each issue in Part II of the poll

DISCUSSION

In Northern Nigeria, climate change impacts are mostly felt in areas of insecurity and agriculture while drought, extreme heat waves, flooding, and seasonal variation are other impacts of climate change being experienced generally in the North. From the pool of approved EIA reports in the Northern region, the review revealed the need for the development of a guideline that describes how EIA preparers can mainstream Climate Change indicators such as Climate Projections, Vulnerability Assessment, Climate Change Risks, Adaptation Measures, Carbon Footprint, Mitigation Strategies, Stakeholders Engagement, Policy, and Regulatory Compliance issues into an EIA study. According to the survey polls; age, experience, and education are relevant to the EIA process in Nigeria. The findings from the review of five EIA reports of approved projects in Northern Nigeria as well as the interview with key stakeholders indicate that existing EIA systems in the country may not be sufficient in addressing climate change concerns, which is consistent with the findings of a similar study conducted by Akinola et al. (2020). Most of the participants emphasized the importance of

rules and regulations in mainstreaming climate change in the EIA process, and the EIA reports revealed the inadequacies of the review indicators. This answers the research question on the current practices and approaches employed in the EIA process in Northern Nigeria about addressing climate change considerations and also helps to assess the current state of climate change integration in the EIA process in Northern Nigeria.

The practice of EIA in Nigeria, like in other nations across the world, has not yet fully incorporated climate change adaptation, that even though it would be the greatest threat to human security and development goals like the Nigeria Vision 2050. The study suggests that most of the EIA assessments carried out in Nigeria primarily focus on the historical climatic trends of the regions where the projects are located, without taking into account the context of climate change or including any provisions for adaptation. This implies that the current EIA assessments may not be sufficient in addressing the impacts of climate change on the projects. The study suggests that there is a lack of capability for climate change adaptation, and pre-project EIA studies in Nigeria do not account for predicted regional or sectoral climate change patterns. This implies that there is little progress being made in integrating climate change adaptation into the current EIA approach in Nigeria. EIAs are an important foundation for incorporating climate change adaptation into development planning. To do this effectively, the regulations for EIA would need to be expanded to consider the impacts of climate change. EIA professionals in Nigeria see the inclusion of climate change adaptation in the EIA process as both relevant and important. They think that an EIA process that can evaluate the environmental effects of proposed development projects as well as the effects of climate change on those projects will be a more useful tool for decision-making. The survey's high level of participation and meaningful replies highlight how EIA might address climate change challenges and reduce additional environmental damage. Our findings indicated a need for more formalized norms and guidelines to help guide EIA in tackling climate change challenges generally and specifically in poor countries. As noted by Owen (2008), and Agrawala et al. (2010), and other researchers, mainstreaming climate change has been unsuccessful because of the absence of a broader systemic regulatory framework and rules in developing nations. The fact that so few nations have, to date, developed a strategy to adopt a legislative framework and/or guidelines to address climate change problems within their EIA procedures emphasizes the gap between intention and implementation even more. The perspectives and attitudes of stakeholders involved in the Nigerian EIA sector regarding the integration of climate change considerations into the EIA Process as assessed, reveals that the majority of stakeholders think that, when heavily affected by policies, mainstreaming climate change adaptation into EIA within Northern Nigeria would be achievable.

According to this study, EIA practitioners in Nigeria do not think that the EIA process contains tools for reducing climate change impacts and adjusting to them. They said that such integration within the EIA could only take place if governing laws, regulations, and implementation instructions of the EIA were updated to include such clauses. According to the polls, most participants across all stakeholder groups (Q6) think that laws are required for EIA to successfully address climate change, which corresponds to respondents' years of work experience (Q3) and educational level (Q5). This outcome suggests answering the question on "how EIA guidelines and regulations in Nigeria can be modified or improved to better incorporate climate change considerations and ensure the effective mainstreaming of climate change into the EIA process". The review of the EIA reports and key stakeholder interview during this study also suggest the need to develop or improve

the existing National EIA report writing format to address the gaps observed with respect to inadequate climate change indicators. There is a need to also update the EIA Process Chart to include Vulnerability study.

Results from the study correspond with that of Sok (2014), who carried out a comparable survey among IAIA members in various nations. It was fascinating to note that none of the Likert scale responses differed significantly among the various stakeholders who comprised the respondents. Furthermore, this study found that stakeholders are aware of consistent climate adaptation and mitigation strategies (Yedla & Park, 2009; Sumangala, 2013; Afon et al., 2016; Anake et al., 2018; Bortolini et al., 2018; Emetere, 2019). The outcome of the research also helps achieve one of the objectives of the study which is to identify areas within the EIA report and process where climate change considerations can be incorporated. This also addresses another research question “How Climate change Impact, Mitigation and Adaptation Plan can be mainstreamed into Impact Assessment, Mitigation and Environmental Management Plan.”

CONCLUSION

Despite efforts by NGOs and policymakers to raise awareness of climate change and its effects in Northern Nigeria, it appears that these campaigns have not been expressly designed to integrate EIAs. Mainstreaming climate change into the EIA process in Northern Nigeria is both necessary and feasible, and doing so would have a significant impact on addressing the real threats that climate change poses to the environment, as well as, the life and livelihood of the people. Stakeholders, including government agencies, the private sector, civil society organizations, and local communities, must collaborate more closely to develop novel approaches and adaptive measures that are tailored to address specific climate change challenges facing the region. By mainstreaming climate change into the EIA process, it becomes possible to proactively address these challenges and develop sustainable adaptation and mitigation measures.

RECOMMENDATIONS

1. Different stakeholders, including the government, NGOs, and cooperative societies, should be involved in promoting public awareness in Northern Nigeria – establishment of climate change clubs in academic institutions, periodic workshops and seminars.
2. Consideration of climate change should be made mandatory for high-profile projects and ensure the developers consider climate change in the project design and implementation. Developers should also be encouraged by providing incentives and subsidies (green tax cuts).
3. Necessary steps should be taken to integrate climate change considerations into the EIA process to ensure the sustainability and resilience of development projects in the northern regions.
4. Researchers should be encouraged to develop climate change prediction models for every region of the country and scale them down to local regions to provide EIA practitioners with a scientifically grounded reference when conducting EIAs. Local commitment to tackle climate change by developing a climate change strategy and action plan for the next decade should be done.
5. The government, private sector, and other stakeholders should invest in research and capacity building to build the necessary knowledge and skills to mainstream climate change adaptation in Northern

Nigeria. By implementing integrated strategies for both mitigation and adaptation through capacity building, Nigerians can become more mindful of climate change.

6. A comprehensive guideline that specifies an integrated approach that addresses both mitigation and adaptation to effectively and sustainably manage the impacts of climate change on the northern region and other parts of Nigeria should be developed.

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