



Research Paper

Impacts of Climate Change On Geotourism in Some Part of Northern Nigeria

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Abstract

This study investigated the impacts of climate change on geotourism in some parts of Northern Nigeria. The study adopts survey research design using questionnaire, observation and interview method. Random sampling was used to select 150 participants that responded to questionnaire. Purposive sampling was used to select 25 interview participants. Percentage and pie-charts were used in the analysis of data collected and in the presentation of results. The study findings revealed that climatic events like; heavy rainfall, flood, storm etc., have greatly affect geo-tourism resources such as; mountains, beaches and river banks as well as other geo-heritage features. This is through; destruction, disturbance and total disappearance which indirectly affects socio-economic geo-tourism activities affecting income, earnings and livelihood. The study concludes that climate change has greatly affected geo-tourism resources which subsequently impacts socio-economic wellbeing of communities. The study recommends that government and communities should inculcate the habit of environmental protection and recognition of geo-tourism potentialities to community members as well as strength and enforce laws and policies that will enhance environmental sustainability.

Keywords: Climate Change, Geotourism, Resources, Activities,

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I. Introduction

Studies indicated that climate change is rapidly being recognized as a serious threat to the sustainability of the geo-tourism and ecotourism system such as ecosystem, local communities, and the economy, specifically tourism demand and activities. Climate change is responsible for destroying and blocking hiking trails, affecting visitation patterns, as well as the tourist experience. It was highlighted that climate change is a major threat to many geo-tourism destinations worldwide (Yu, Schwarz and Walsh, 2009). The spring is the most problematic and vulnerable since most climate threats and negative impacts occurred. Therefore, these impacts create more challenges and place more pressure on geo-tourism businesses. Climate change impacts geo-tourism activities and seasonality which often negatively affects profitability and ultimately the viability of geo-tourism businesses (United Nations Environmental Programme, 2008).

It is however, important to note that, due to climate change skiing seasons are already shorter, and snow quality poorer, in many heavily frequented ski resort destinations in a number of countries. Beach geo-tourism destinations may be affected by increasing storminess in some coastal areas, and dive tourism destinations are being affected by damage to coral reefs associated with increasing ocean temperatures and acidity. Also, National parks and wilderness zones in forest and woodland areas may suffer higher risks of fire and consequent closure, preventing recreational access. Native ecosystems that currently act as tourist attractions may be invaded by weeds, feral animals, or plant and animal pathogens and may become less attractive as a consequence (Ralf, 2011).

Plamen and Milana, (2008) revealed that aggregate international tourism falls because of climate change, reaching a maximum decrease of 10% below the scenario without climate change around 2025, and edging towards zero after that. Aggregate international tourism falls because more tourists stay in their home country, particularly tourists from Germany and the UK, who make up a large part of international tourism. By 2100, for individual countries, international arrivals may fall by up to 60% of the base value or increase by up to 220% of the base value. Climate change increases the attractiveness of cooler countries, and reduces that of warmer ones. The relationship between current climate and impacts of climate change, however, is a lot noisier for expenditures than for international arrivals and domestic tourists.

United Nations World Tourism Organization (2015); Plamen and Milana (2008); Malek and Robert (2017) and Shehadeh and Ananbeh (2013) had been predicted that most of the 21st century tourism will be predominantly Asian. After 2030 Asia will capture a larger share of the tourism market. While the world aggregate number of domestic tourists hardly changes due to climate change, individual countries may face dramatic impacts that grow rapidly over time. Also colder countries will see an increase in domestic tourism while warmer countries will see a reduction. Apart from transport emissions, tourism is a relatively clean activity one that governments around the world encourage as an alternative to heavy industry. Clean environment and favourable weather conditions are crucial to visitor satisfaction and fundamental factor for the development of the tourism sector. Therefore, tourism is more a victim, than a vector of climate change. Studies indicate that Jordan will experience warmer and drier conditions by 2100. Jordan's Third National Communication on Climate Change suggested that precipitation is expected to decrease between 15% and 25% and temperatures will increase between 3°C and 4.5°C by 2100.

Precipitation trends are being variable and the number of extreme weather events has been increasing. Wide ranging impacts of changing in current climate in Europe have been documented: retreating glaciers, longer growing seasons, shifts of species ranges and health impacts due to a heat wave of unprecedented magnitude. Nearly all European regions are anticipated to be negatively affected by some future impacts of climate change and these will pose challenges to many Economic sectors including geo-tourism (Plamen and Milana, 2008).

In Nigeria evident clearly shows that there is sea level rise, drought, floods, and shift in growing seasons and so on. It has been observed that climate change in weather conditions has resulted in change of rainfall patterns which contributed to more damaged roads all across the nation. Heavy rain downpour has brought large pot holes in many Nigerian Roads. These factors can cause a shift in tourist destination and participation (Oladokun, Adedara and Adedamola, 2015). Directly or indirectly, climate change can have a significant impact on tourism participation by altering tourism's key attraction which is the environment. Studies conducted by Ijeoma and Aiyeloja, (2009) on the impact of climate change in Jos, Plateau state, Nigeria revealed that climate change can destabilize ecosystems, reduce tourism patronage, cause shift in tourism destinations, death and migration of wild life species, flooding of eco-destinations can make tourism time table ineffective by adversely affecting time for sighting games and fixed dates for culture events (Ijeoma and Aiyeloja, 2009).

Geotourism is a very vital and popular global human activity that stimulates the exchange of educational, recreational and cultural values (Okpolo, Emeka and Dimlayi, 2008). Tourism is a primary source of foreign exchange earnings in 46 out of 50 of the world's Least Developed Countries (LDCs) (Smart, 2011). Tourism now is the world's largest industry, the environment is taking center stage in tourism development. It is a powerful economic force and factor in the physical environment as well (Emaad, 2006). The major benefit of tourism is its capacity to stimulate infrastructural development. Perhaps, the benefits from infrastructural development justified the primary reasons for implementing tourism programmes and activities. Visitors spending can generate further income for both private and public sectors through the income multipliers-effect (Adora, 2010). Also, tourism sector and its sub sector employ a large number of people and provide a wide range of jobs ranging from the unskilled to the highly specialized. As the construction of roads, airports or airport maintenance, water supply, electricity, construction and renovation of hotels and other accommodations units create jobs for thousands of workers, both skilled and unskilled (Adora, 2010).

The purpose of this paper is to investigate the impact issues of climate change on geotourism resources and activities in selected States in Northern Nigeria. It does this with specific reference to Five (5) States: Adamawa, Bauchi, Borno, Jigawa and Taraba which are importance in terms of geotourism resources and activities.

II. Materials and Methods

This study adopts survey research design. Where random sampling was used in the selection of required number of sample areas. Five (5) States were randomly selected to administer questionnaire, these states are; Jigawa, Bauchi, Taraba, Adamawa and Borno. Random sampling was also used to select participants that will respond to questionnaires. 150 participants were sample and questionnaire was administered across the sample areas in which 30 questionnaires were administered in each state. Purposive sampling was used in the selection of interview participant that will give the desired responses, were a total number of 25 participants were interviewed to get data on the impacts of climate change on geo-tourism in Northern Nigeria.

The study used statistical technique in the analysis of data collected from the research respondents. Descriptive statistic was used in the analysis of questionnaire responses. The data were represented statistically using percentage and figures. The statistical analysis were carried out using Microsoft excel. The data was presented using pie-chart. Qualitative data collected using interview was also reported.

III. Results and Discussion

Age Groups and Gender of Respondents

The largest numbers of the age of respondents that filled the questionnaire responses are between the ages of 21-30 years (66.7%) as shown in Figure 1. This is because they are the most available age group that volunteers to give responses. Age group 31-40 has 15.68% as the second largest followed by 41-50 in 9.8% and age 15-20 in 7.8% as the lowest number of group of respondents.

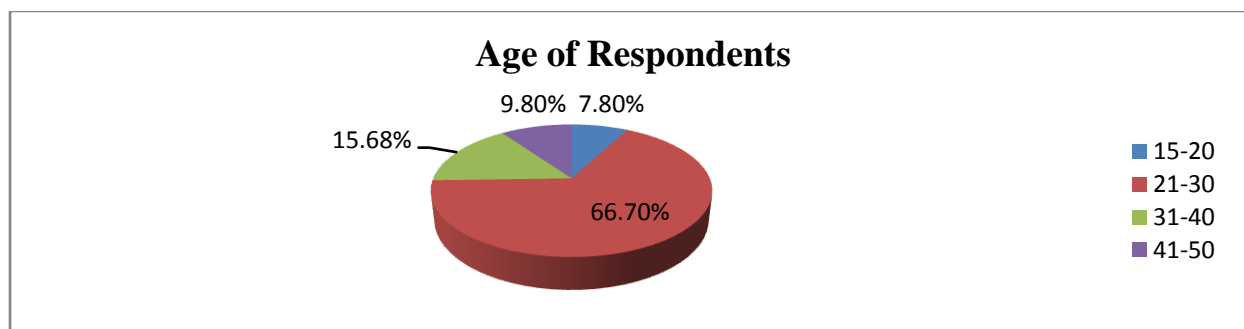


Figure 1: Age groups of Respondents

Male gender has 74.5% of participation in giving responses to the questionnaire items, making them the largest as shown in Figure 2. This is as a result of the nature of society in Northern Nigeria, that male genders are more available and are relatively more aware of the environmental affairs. Female gender has 25.5% of respondents which is low compared to male gender.

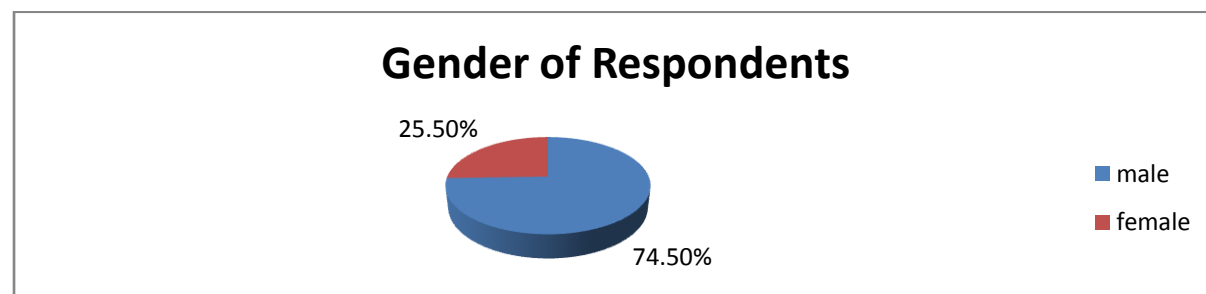


Figure 2: Gender of Respondents

Impacts of Climate Change on Geo-Tourism

This study revealed as shown in Figure 3 that 90.2% of respondents believed climate change impacts geo-tourism resources and activities, only 9.8% of respondents did not. This is an indication that climate change has seriously affected geo-tourism resources and activities and is very much felt by people who are directly and indirectly affected.

The nature of climatic impacts to geo-tourism resources are through destruction and disturbances of natural resources of the affected areas like; landscape, rocks, sand dunes, beaches and other geo-heritage features due to; heavy rainfall, high temperature, greenhouse gases emission, poor soil confection, desertification and erosion making geo-tourism resources highly vulnerable to be affected and destroyed. Also, due to environmental vulnerability heavy rainfall causes flood and erosion resulting to spillage of drainage channel.

It was found out that a water channel was destroyed in Jalingo Taraba State due to the impacts of climate change. Also a lot of bridges linking one geo-tourism areas to another were destroyed due to heavy rainfall and flood in the state. Mambila plateau was also reported to be affected by storm and heavy rainfall. It has been reported that in Marke, Yalo and Hadin towns of Kaugama Local government and in other part of Jigawa State flood has caused serious losses of farm products and destroyed Kano-Hadejia road that link the above towns. Bridge in Auyo and Babura as well as other part of the state were reported to be destroyed which directly and indirectly affected geo-tourism resources and activities. Also, sandiness along Jahun-Kiyawa roads of Jigawa State were affected by heavy rainfall and flood resulted to eroding of some vital ecosystem services which might affect geo-tourism resources and activities. A lot of geo-tourism features like; landscape, rocks and valleys were also destroyed in Bauchi State. It was also observed that Ningi Bridge linking Jigawa to Bauchi from Birnin Kudu axis was destroyed due to heavy rainfall and flood, though, the bridge was immediately re-constructed by Bauchi State Government.

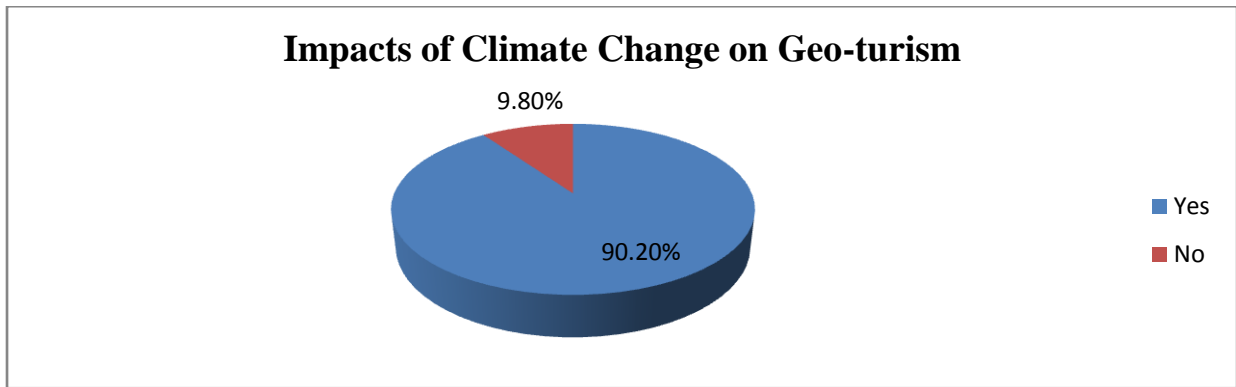


Figure 3: Impacts of climate change on geo-tourism

The Affected Aspects

Findings of the study as in Figure 4 shows that responses of participants to the impacts of climate change on geo-tourism resources is 56.33% whereas impacts to geo-tourism activities is 43.67%. This simply revealed that impacts of climate change on geo-tourism resources are more severe and disastrous hence it catches more attention of people in the study area. The impacts of climate changes on geo-tourism activities are also serious but are not as disastrous as that on resources. In an interview participants revealed that “climate change has more impacts on resources that geo-tourism activities rely on, so it is indirectly affected”.

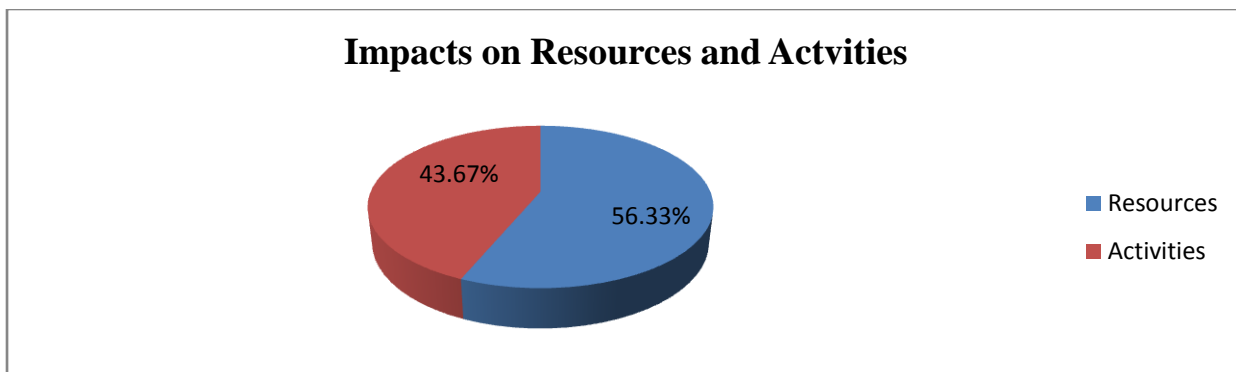


Figure 4: Impacts on resources and activities

Geo-Tourism Resources Affected by Climate Change

The findings as in Figure 5 revealed that beaches and river bank (24.39%) are the most affected geo-tourism features followed by other geo-heritage (18.69%) and mountain in 17.07%. The features that experience less effect are sandune (4.06%) and rocks (3.25%). “Mountains and rocks as well as river banks and other geo-heritage areas are the most affected geo-tourism features due to their availability and vulnerability in Northern Nigeria” expressed by interview participants. Another participant revealed that “climatic event especially; flood, heavy rainfall and drought has destructed a lot of ecological and social values of geo-heritage features in Northern Nigeria”.

The resources are affected by extreme climatic events caused by nature such as; earthquake and storm as well as other issues like; environmental degradation that eroded earth surfaces damaging the aesthetic beauty of geo-tourism features like; hills, sandune, landscape, geo-heritage etc. Interview respondent said that “in Jalingo Taraba state the features are mostly affected by high temperature and heavy rainfall that over flow and dried-off the geo-tourism areas”. Another respondent expressed that “geo-tourism features including river banks, hills, mountains, geo-heritage etc., are affected by flood and drought due to their vulnerability to the said climatic events”. Landscape and other geo-heritage features are affected by deterioration of topographical surface of the earth due to geomorphological action and other climate change impacts.

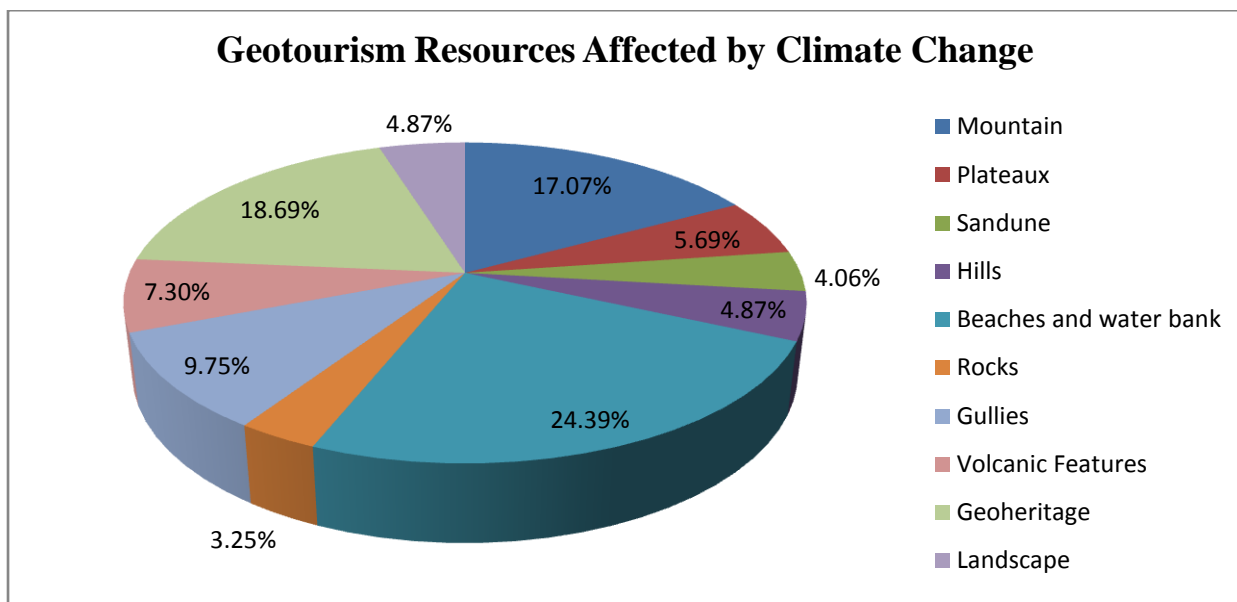


Figure 5: Geo-tourism Resources Affected by Climate Change

Climatic Events that Impacts Geo-tourism Resources

The findings as shown in Figure 6 revealed that flood is the most serious climatic event that affected geo-tourism resources in 28.84%, followed by drought (19.87%) and then erosion in 16.66%. The climatic events of fewer impacts are storm (6.89%) and the least is sea level rise in only 3.84%. This means that flood, erosion and heavy rainfall are the most well-known climatic events that destruct, disturb and resulted to the total disappearance of geo-tourism resources in some part of Northern Nigeria. Interview participant expressed that “heavy rainfall that causes flood and erosion has seriously resulted to the destruction of lot of geological, geomorphological and ecological features that are worth geo-tourism resources”. Extreme climatic event were reported to affected landscape, sandune, rocks, hills, plateau and other geo-heritage features.

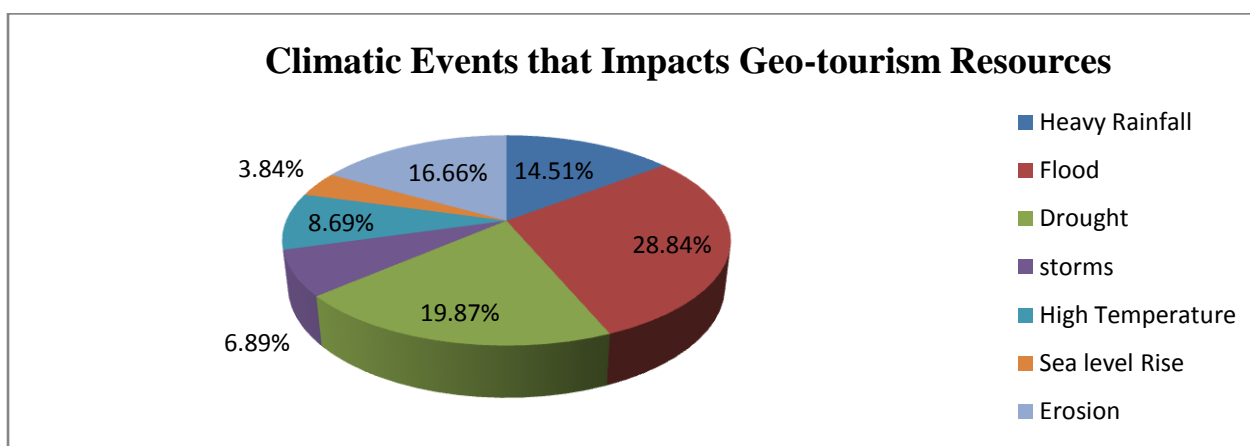


Figure 6: Climatic Event that Impacts Geo-tourism Resources

Impacts of Climate Change on Geo-Tourism Activities

In addition to the impacts on geo-tourism resources climate change is also affecting geo-tourism activities in various ways as revealed in Figure 7: Heavy rainfall event is the most serious climatic event, (31.42%) that hinders geo-tourism activities followed by flood, (22.14%) and high temperature, (17.85%). The events with less effect on geo-tourism activities are sea level rise (5.71%) and erosion (2.85%). Destruction of geo-tourism resources has indirectly resulted to the stoppage of geo-tourism activities while occurrences of heavy rainfall, flood, storm, drought and high temperature has hinder geo-tourism activities affecting; geo-tourist arrival, transport industries, accommodation industries, food industries etc. Participants expressed that “climate change has directly and indirectly affected geo-tourism activities in Northern Nigeria”.

Geo-tourism activities are affected due to reduction of economic activities caused by heavy rainfall, high temperature, flood and storms. Geo-tourists mostly changes their geo-tourism plan and preferences due to the consequences of climate change. Flood and high temperature were reported to be serious problems to geo-tourism activities making the areas in-habitable especially to in-bound geo-tourists. Participants revealed that “congestion of water ways, blockage of drainage channel and other problems like poor or non-environmental sanitation and heavy rainfall causes flood and consequently hinders geo-tourism activities.

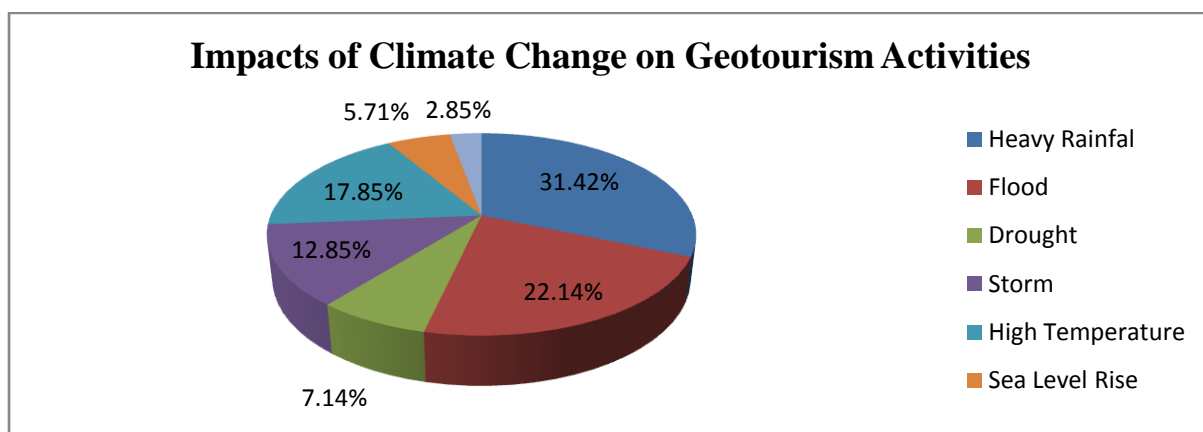


Figure 7: Impacts of Climate Change on Geo-tourism Activities

Impacts of Climate Change on Geo-Tourism Features and Socio-economic Activities

The finding of this study as in Figure 8 revealed that climate change greatly impacts environmental geo-tourism resource is 37.38% followed by economic geo-tourism activities is 33.38% and then social geo-tourism activities is 29.23%. Geological, geomorphological, fluvial and other geo-heritage features are affected by climatic events like; storms, drought, high temperature, heavy rainfall, flood etc. Socio-economic geo-tourism activities in tourism centers, accommodation, travel industries, foods and others are affected mainly by flood, storms and high temperature that resulted to low engagement of community in geo-tourism activities affecting their sources of income, livelihood and other social activities. Interview participants expressed that “geo-tourism resources are more seriously and directly affected; however, socio-economic activities are also directly and indirectly affected by climatic event.

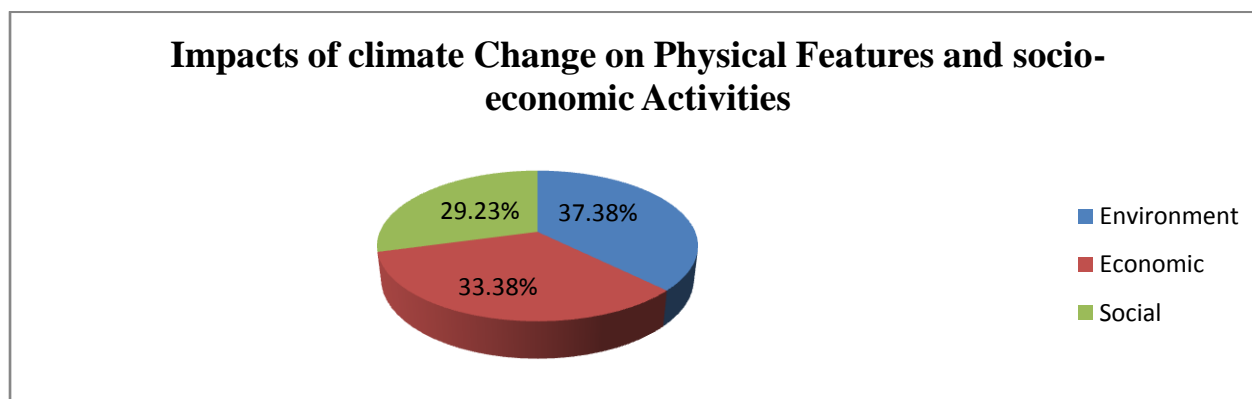


Figure 8: Impacts of climate Change on socio-economic activities

Nature of Climate Change Impacts on Geo-Tourism Resources

Climate change has seriously affected geo-tourism resources, through destruction, disturbances, total disappearance and hindrance. Figure 9 revealed that climate change has destructed resources is 59.21%, followed by disturbance of their functionality for sustainability is 28.94%. Lack of access to them is hinder by flood, erosion, heavy rainfall and high temperature is 6.5%. However their total disappearance as a result of climate changes impacts occurs less in only 5.2%. Destruction and disturbances of geo-tourism resources are due to frequent storms, flood and erosion mainly in the raining season which has resulted to washing away, falling and reshaping of geo-tourism features like; sandunes, landscape, hills, rocks and other geo-heritage features. Interview participant expressed that “climate change not only disturbgeo-tourism resources but also seriously destruct themthreatening their functionality and sustainability”.

The impacts of climate change on geo-tourism resources are as a result of occurrences of frequent extreme climatic events like; storms, flood, high temperature and heavy rainfall. This is in addition to poor management, lack of public prioritization couple with improper environmental sanitation as well as nature responses to disaster, destruction and disturbances. The impacts of these include destructions of natural resources, farmland, houses, disappearance of natural vegetation and damage to cultural environment altering the morphological features of resources. This causes losses of properties, death, environmental pollution, desertification, poverty, hunger and starvation, poverty etc. These directly or indirectly affect geo-tourism resources and activities. The most occurrences event is flood which occurs frequently.

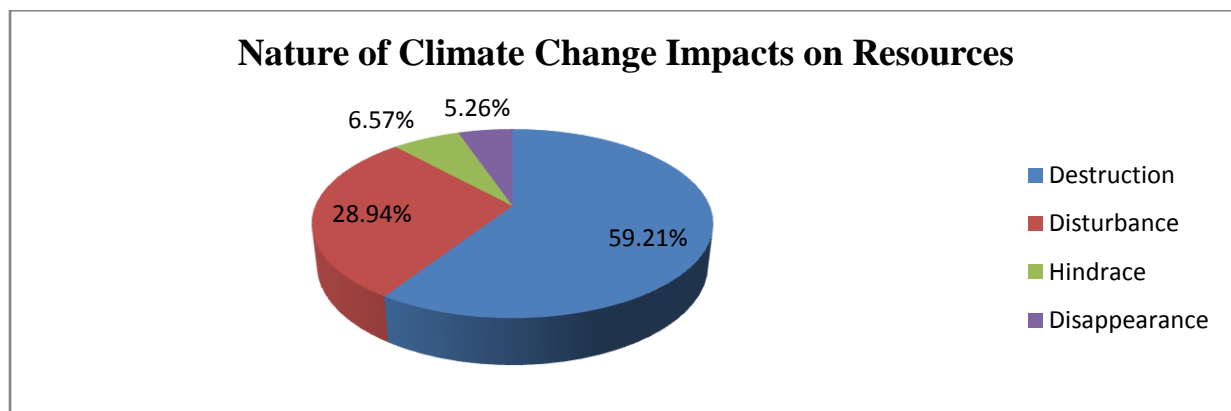


Figure 9: Nature of Climate Change Impacts on Resources

Nature of Economic Impacts of Climate Change on Geo-Tourism Activities

Climate change in a various ways has seriously impacts geo-tourism activities in Northern Nigeria. The issue of serious concern is the hindrance to geo-tourism economic activities which occurs is 45.09% as shown in Figure 10, this is followed by change of geo-tourism demand due to fear of extreme climatic events like; flood, high temperature etc. change of economic geo-tourism activities as a result of the effects of climate change occurs is only 6.86% due to the facts that if there is easy access to geo-tourism activities there will probably be good number of geo-tourist demanding visiting and exploration to geo-tourism areas, hence, there will be varieties of geo-tourism activities that might satisfy the need of geo-tourists and geo-tourism industries.

Occurrence of heavy rainfall, flood, storms and high temperature which affect marketing, accommodation industries and transportation industries hindering access to geo-tourism areas has affected people engaged in local business activities. Respondent said that “climate change affect economic activities of geo-tourism due to variations and changes of climatic condition and mismanagement of environmental resources in geo-tourism areas. These happen due to ignorance, selfishness and weakness of laws/policies. The problems cause cancellation, postponement and hindrance of activities that resulted to reductions in the number of tourist participation which directly and indirectly affect incomes and earning in geo-tourism activities. However, another participant revealed that “climate change in some instances has resulted to destruction of geo-tourism resource and/or structures that link geo-tourist to geo-tourism center and that renovation and re-establishment of these structures required huge amount of money which directly or indirectly will make impacts to economic activities”. The most severe issue in this part is the demolishing of structures and loss of economic activities.

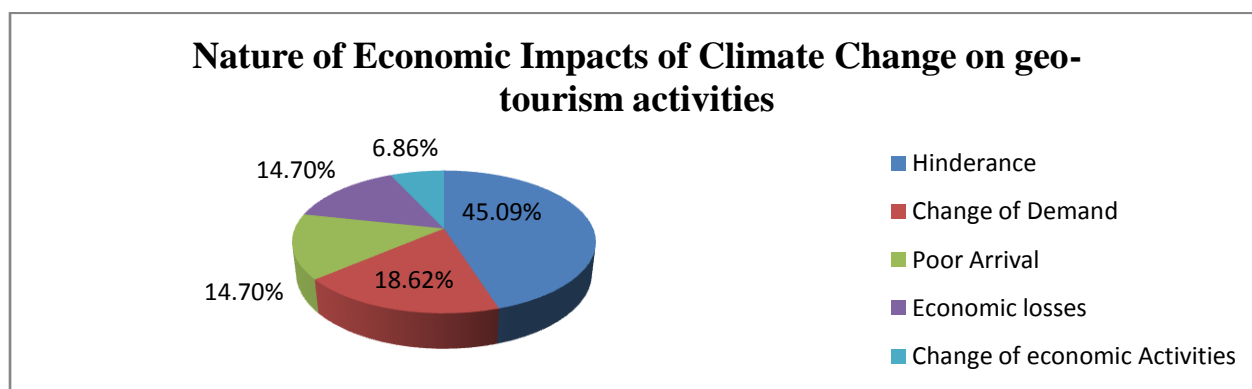


Figure 10: Nature of Economic Impacts of Climate Change on geo-tourism activities

Nature of Social Impacts of Climate Change on Geo-Tourism Activities

The social impacts of climate change to geo-tourism activities also exert serious setback to the social activities in Northern Nigeria. Though, the issues are indirectly related to climate change and geo-tourism activities. Figure 11 revealed that insecurity has the highest percentage 26.42%, followed by poor management of environmental resources and surrounding areas is 21.42%. Attitude and poverty are issues of medium impacts is 12% each. Cultural activities occurs less is 5% while religious activities happened to-be issue of least impacts is only 2.85%. Participant expressed that “these issues are only indirectly affecting geo-tourism activities; however their impacts should not be neglected because of their role in instigating climate change and affecting geo-tourism activities”.

The social impacts of climate change that affects geo-tourism resources are; negligence of geo-tourism resources, poor relation and lack of political will causing environmental problems affecting accommodation resources and activities, business location and other geo-tourism resources and activities. These are due to poor environmental sanitation, illiteracy and poor attitude. Finding also revealed that another social problems related to the above issues are kidnapping of visitors for ransom, assassination, insurgencies and other insecurity issues in places like; Borno, Yobe, Zamfara, Taraba, Kaduna, Jos, Katsina and Adamawa States, etc. However, weakness of policy/rule and government failure to identify and utilize geo-tourism resources, culminate to indirectly affect geo-tourism resources and utilization in Northern Nigeria. Additionally, it was revealed that lack of money to pay for geo-tourism services directly and indirectly impacted geo-tourism resources and activities. The most severe issues are poverty due to flood disaster and insecurity that affect food production, livelihood and income.

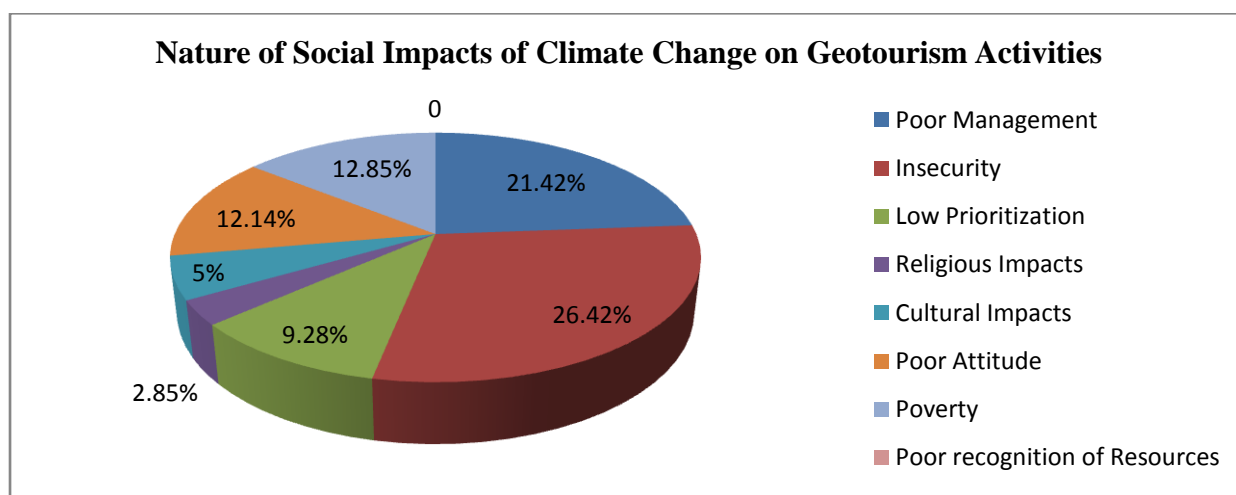


Figure 11: Nature of Social Impacts of Climate Change on Geo-tourism Activities

Authorities/Organizations and their Effectiveness in Regulating Impacts of Climate Change on Geo-tourism

Finding of this study as shown in Figure 12 revealed that there is a lots of Authorities/Organisation regulating the impacts of climate change (89.37%). They are engaged in regular awareness, giving support to community for enhancement of environmental sanitation, etc. However, there is need for awareness and education for better community participation in environmental sanitation and sustainability as it is the only way out.

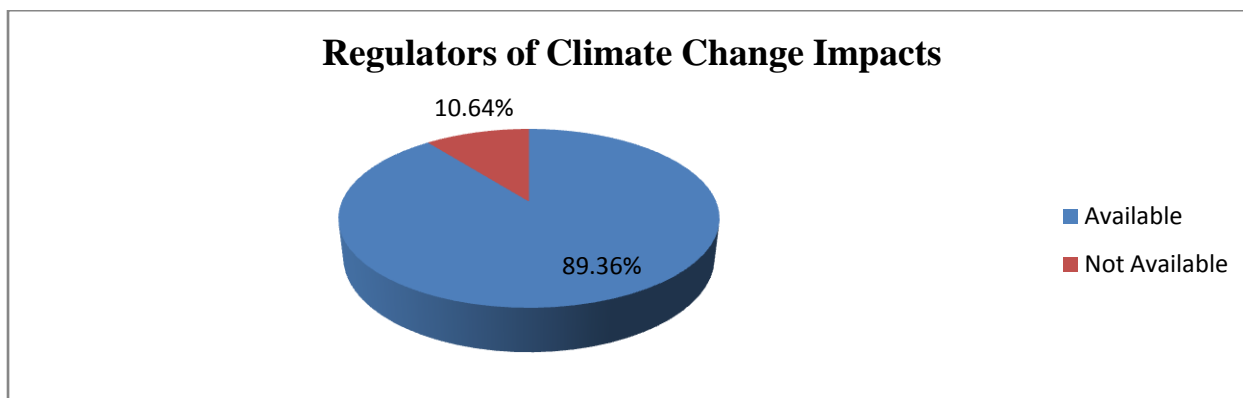


Figure 12: Regulators of Climate Change Impacts

Figure 13 shows that 76.744% of respondent revealed that rules/laws provided by Authorities/Organizations on climate change preventions are not effective. This is because of poor community participation, government failure to enforce laws on climate change issue and failure of Authorities/Organization to provide reward and punishment on climate change issue to communities. On the other part community are also not willing to support preventive measures due to lack of environmental education and positive attitude toward nature.

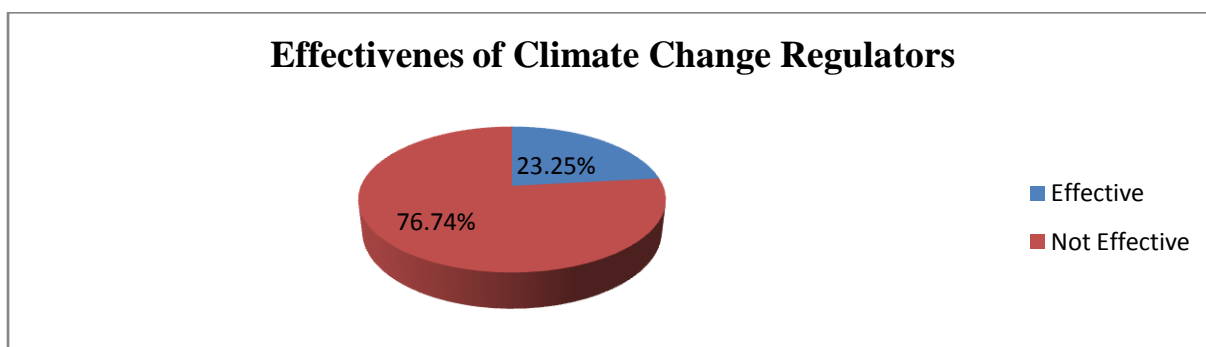


Figure 13: Effectiveness of Climate Change Regulators

IV. Conclusion

This study concludes that climatic events like; heavy rainfall, flood, storm etc. has greatly impacts geo-tourism resources through destruction, disturbance and total disappearance of features such as beaches and river bank, mountains, and other geo-heritage features. Effects of these features have directly and indirectly impacts geo-tourism through hindrance of socio-economic activities affecting sources of livelihood and income.

V. Recommendations

This study therefore make recommendations as follows:

- i. The stakeholders in environmental resources management should ensure the inculcation of environmental friendly habits to the general public including school children, regular community awareness on the importance of geo-tourism to host communities as well as encourage national and international geo-tourist arrivals.
- ii. Government should strength and enforce laws and policies to support afforestation, conservation and re-generation of resources through effective community involvement to restore nature, reduce carbon emission and other environmental problems to enhance environmental sustainability.

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