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SPATIO-TEMPORAL VARIATIONS OF CLIMATIC CONDITIONS AND THE IMPLICATIONS ON TOURIST ATTRACTIONS IN KANO STATE

[1]M. Abba and [2]L. J. Magaji

[1]Department of Geography,Faculty of Earth and Environmental Sciences, Bayero University, Kano.
[2]Department of Environmental Management, Faculty of Earth and Environmental Sciences, Bayero University, Kano.
Corresponding author's e-mail: mahmudabba@yahoo.co.uk

Abstract

Tourism, like other economic activities, is sensitive to climate. Thus, a difference in climatic conditions may mean a change in tourism activities. This paper examines the spatio-temporal variability of some climatic elements and how they affect tourism resources in Kano State. Data were generated through field inventories, interviews, maps and satellite images. Documented materials were also consulted for climatic and tourism data. ArcGIS software was used to create shapefiles for tourist attractions and climatic attributes of the area. A single map for tourism attractions in relation to climatic characteristics was produced through an overlay procedure. It is found that the types and distribution of tourism attractions in the state follow spatio-temporal climatic patterns; hence there is a relationship between variations of climate and tourist attractions. The wetter climatic zone to the south favoured the presence of forests, game reserves, resorts and archaeological sites, while the drier zone to the north offered more opportunities for cultural and sporting activities. Cultural festivals and other recreational activities are usually staged during the warm and dry season *(kaka),* especially in the central and northern parts. It is recommended that public awareness campaigns on climate change and tourism be made, community participation in mitigation efforts be employed and further studies on peoples' knowledge for management of tourism resources be conducted.

Keywords: Variability, Recreation, Overlay, ArcGIS, Attractions

Introduction

Tourism and recreation like other human activities varied over space and time. Some locations, areas or regions are more endowed with tourism and recreational attractions than others (Abba & Yalwa, 2018). One important area for geographical studies is to examine the spatial distribution and the temporal variations of natural and human phenomena over a particular location. The focus of such studies may also include an enquiry into the various factors responsible for the observed spatial and temporal variations.

Weather and climate exert a profound influence on all the basic components of the environment; the atmosphere, the hydrosphere, the lithosphere and the biosphere. This implied that both physical and human phenomena are affected by the past and the prevailing climatic conditions of an area. For example, natural and anthropogenic processes and activities such as weathering, mass-wasting, erosion, biodiversity, desertification, transportation, leisure, recreation and tourism are all climate-sensitive; as each one of them is directly or indirectly affected by weather and climatic conditions. Given the above, therefore, it can be deduced that variations in climate may consequently cause variations in all the processes mentioned. Tourism, just like other economic sectors such as agriculture, insurance, energy and transport, is highly climate-sensitive. Hence, any variations in climate may imply a change in tourism and recreational activities.

The significance of weather and climate for leisure and recreation is well recognized. Climatic conditions of an area can be an important catalyst in

enhancing its scenic qualities. Even within a relatively uniform location, scenic and other recreational qualities may be due to climatic factors. The Climate system is dynamic; it shows significant variations over time and across different geographical locations. The climate of Kano state in particular is variable, especially concerning rainfall and temperature. It is a tropical wet and dry type, characterized by marked wet and dry seasons (Liman, Idris & Mohammed, 2014). Weather and climatic characteristics of the state play a significant role in shaping the economy and the socio-cultural practices of the people. Climatic data in the state are closely tied with the socio-economic activities of people, such as crop productions, livestock rearing and fishing (Liman, *et al.,* 2014.).

On another hand, Kano State is home to many exquisite natural and cultural attractions such as historic and archaeological sites, forest and game reserves, beautiful sceneries, gardens, amusement parks, holiday resorts and many festivals (KSTMB, 2004; Abba, 2007). A close look at these attractions will show that they are not evenly distributed in terms of their types and numbers across the state. This is to say, some locations within the state are more endowed with some categories of tourism resources than others. The variability of climate in the state can be responsible for the uneven distribution of the tourism resources as well as the seasonality of some tourist activities. For example, the present distribution of forest and wildlife reserves, holiday resorts and water bodies in the area closely follow climatic conditions. It is therefore very essential to study the variability of some critical climatic elements, such as temperature and rainfall, over space and across time, to determine their possible influence on the distribution and periodicity of some tourist attractions within the state. This is important because such information is very useful in planning for tourism development.

Therefore this paper is aimed at examining the variations of some climatic elements over space and time and to determine their possible impacts on some tourist and recreational attractions in Kano State.

Conceptual Frame

The concepts of leisure, recreation and tourism

The meaning of the term "recreation" cannot be fully appreciated without the understanding of the term leisure. The concept of leisure means the free time available to the individual when the disciplines of work, sleep and other basic needs have been met. It is also an unobligated time and a period not used for meeting the exigencies of life. It is time spent away from all kinds of work (Suleiman, 2016). "Basic needs" in this definition include essential cooking, shopping, housework, childcare and hygiene, while "work" includes travel time to and from work (Boud-Bovy & Lawson, 1998). For simplicity, leisure can be thought of as a time in which a person is relatively free to choose his activities (Knudson, 1980).

In other words, leisure can be considered as spare time, it is a time concept. The word recreation, on the other hand, comes from the concept of creating again, reforming the mind. It is also viewed as the positive use of leisure time in a wide variety of pursuits (Patmore, 1975). It covered broadly any pursuit taken during the time of leisure other than those to which people have high commitments; for example, overtime, second job, home study and various maintenance jobs about the house (Suleiman, 2016). It involves activities, which are participated in anytime and anywhere merely for the enjoyment it affords. Therefore, recreation is an activity concept (Knudson, 1980).

Shittu (1991) proposed that recreation is the utilization of natural and cultural resources for leisure, that is, it is a land-use activity engaged in during leisure. This paper also considers recreation as a land-use activity, which unlike other land uses such as farming, mining, fishing, forestry, all of which can provide tangible products, its output is in many cases only experienced. Therefore its benefits are not easily conveyed to potential buyers.

Tourism on the other hand is defined as the relationships and phenomena arising out of journeys and temporary stays of people travelling primarily for leisure or recreation purposes (Pearce, 1981). It is also considered as the sum of phenomena and relations arising from the travel and stay of non-residents, in so far as these do not lead to permanent residency and are not connected with any earning activity (Adejuwon, 1993).

It may thus be analyzed in terms of its three main components, namely, the facilitation of travel of tourists, the activities they undertake at their destinations and the facilities and services provided to cater for their requirements (Boud-Bovy & Lawson, 1998). These views were summarized by NIHOTOURS (1999) which sees tourism as concerned with being away from home on a temporary short-term visit to and staying at places of interest outside one domicile and work, the industry which promotes such travel and caters for those on

the move as well as the impacts which the activities of the industry, the visitors and the hosts have on each other.

Tourism and recreation can be seen as separate but overlapping subjects (Boud-Bovy & Lawson, 1998). While recreation involves activities that are performed during leisure time, tourism covers broader scope. It involves recreation or leisure time activities as well as journeys, temporary stays and relationships, impacts, services provided and the industry that provides them. A basic distinction between the terms can be made based on the distance and the time involved in the activities. While tourism involves long-distance travel and a stay of at least one night, recreation deals with short distance travel and a relatively short duration of stay.

Environment and tourism: The 3-S relationships

The environment, whether natural or man-made, is one of the basic resources for tourism and also an important element of tourism products (Wall & Mathieson, 2006). In other words, the environment is one of the primary tourist attractions (David & Maureen, 1999). Traditionally, geographers consider the concept of 3-S to illustrate the relationship between tourism and the natural environment. The concept is based upon three important elements of the natural environment; the sun, the sand and the sea, which are considered as the core natural objects upon which tourism and recreation depend. Although very simple and uni-directional, the concept is however very important in depicting the environment-tourism relationship. The sun component of the concept is representing the significance of weather and climate to tourism and recreation. The sand represents the importance of not only beaches but all other geomorphological features or landforms. While the sea stands for the importance of water bodies (oceans, seas, lakes, rivers, ponds etc) to tourism activities.

Another 'S' can however be considered to make the concept complete and add more charisma to it. This represents scenery; that is the general appearance of a landscape which encompasses vegetation and wildlife. From the above, therefore, we can recognize the fact that the attractiveness of a location as a tourist destination is determined, to a large extent, by the natural environment of which weather and climate are important attributes (David & Maureen, 1999).

Climate-tourism relationships: Coexistence, symbiosis and conflicts

The relationships that exist between climate and tourism are not only fundamental, they are also very complex. To fully comprehend these complex relationships, we have to employ the three-fold relationship established by Williams (2009), to explain the nature of the relationship between tourism and the environment in general. The characterization of the climate-tourism relationship can be seen in terms of coexistence, symbiosis, and conflict (Williams, 2009).

Climate and tourism are said to coexist while, even though they are not fully compatible, however, they do not constitute any damaging impacts on the climate. In such relationships, some benefits could even be realized. Climate and changes of climatic conditions are on their own, chief attractions for tourists, at the same time they may directly influence other attractions such as beautiful sceneries, wildlife, vegetation, and surface water resource. This type of relationship is harmonious and non-conflicting. In this respect, changes in climatic conditions are likely to be associated with changes in the volumes of tourist flow and this can affect transportation services. These may likely also be associated with changes in catering needs and accommodation requirements of the tourist (David & Maureen, 1999).

Climatic conditions may likely affect hydrological conditions such as the seasonality of streams, water levels in the rivers and reservoirs, all of which may, in turn, affect birds and fish species which are important tourist attractions. In the Rurum leisure centre section of Tiga reservoir in Kano, some bird species can only be found during a particular climatic season (Abba, 2007). Climatic variations can also determine the distribution of vegetation and wildlife. The present distribution of forest reserves in Kano, for instance, follows climatic conditions (Badamasi, 2014).

Symbiosis is the type of relationship, in which mutual benefits for both tourism and climate are both derived. For instance, the designation of an area as a forest reserve, park or green area can serve tourism and recreational purposes, at the same time can positively affect the local weather conditions through the improvement of air quality, can enhance cool breeze and may also increase atmospheric moisture.

Conflict may arise in the relation when tourism activities cause the degradations of the climatic resources upon which they depend. Large volumes

of literature exist on the type of relationship between climate and tourism that can be described as 'conflict'. Climate may have significant implications on the management of tourist facilities and infrastructure and the preservation of natural resources for tourism, for example, coastal areas and water resources. It may equally have some effects on the conservation of vulnerable fauna and flora as well as historic and archaeological sites.

In the Maldives, it was demonstrated how a temperature increase of only 1 or 2^0 C could cause devastating environmental effects such as the bleaching of coral reefs and the negative consequences of other invertebrates as well as increased threats of coastal flooding, all of which may adversely affect tourism activities (WTO, 1999). It was shown how warmer temperatures can lead to a reduction in snow cover duration which are negative consequences on traditional ski resorts in the European Alps, especially Germany and Austria. In the eastern Mediterranean, especially Greece and Turkey, studies have indicated how an increase in the summer temperatures to above 40^0C will reduce personal comfort and can lead to an increased incidence of heat stress.

Climatic extremities such as frequent droughts may increase grazing pressure in forest reserves and consequently lead to the degradation of tourist attractions. Tourism and recreational facilities and infrastructure can also be negatively influenced by climate. Heavy rainstorms, for example, can make important attractions inaccessible. It can even lead to the temporary closure of roads and trackways especially those leading to the waterside. Flooding can lead to deterioration of roads, collapse bridges and other important tourist structures.

Types of Tourism

a. Eco-tourism: This means "responsible travel to natural areas that conserves the environment and sustains the well-being of local people" (Wood, 2017). Tourism to areas of ecological interest (typically exotic and often threatened natural environments), especially to support conservation efforts and observe wildlife; spec. access to an endangered environment controlled to have the least possible adverse effect.

b. Archaeotourism or Archaeological tourism is a form of cultural tourism which aims to promote public interest in archaeology and the conservation of historical sites (*Comer, 2012).*

c. Historic site or heritage site is an official location where pieces of political, military, cultural, or social history have been preserved due to their cultural heritage value. Historic sites are usually protected by law, and many have been recognized with the official national historic site status. A historic site may be any building, landscape, site or structure that is of local, regional, or national significance (*Anderson & Low, 1996*).

d. Cultural tourism: This is a broad term encompassing anthropological tourism, food and drink, historical tourism, arts-festival tourism, museums and heritage sites, through indirect participation and enjoyment of tourists (Müller & Pettersson, 2005).

Research Methodology

The study area

Kano State is located in the semi-arid region of northern Nigeria; between latitudes $10^0$30'N and $12^0$37'N and between longitudes $7^0$30'E and $9^0$30'E. It covered a total area of 20,760km^2. It has a population of 9,401,288 people (NPC, 2006). Kano city, the capital of Kano State is amongst the largest urban centres in sub-Saharan Africa. Right from the pre-colonial period, the area had been a centre of trade and commerce in sub-Saharan Africa. It continues to play this role even during the colonial period as it became an important industrial centre. This economic status was improved during the colonial era when the area was connected to the trans-Atlantic trade partaking in global trade and manufacturing (Tanko & Idris, 2014).

The physical setting of Kano State is the result of geologic, geomorphic, hydrologic and climatic interactive processes through time (Olofin & Tanko, 2002). These formed the environment on which tourism and recreational activities evolved and developed. The area, as described by Olofin (1987), is characterized by two major geologic structures, with minor intrusions of the third. The southern and north-western parts of the state are underlain by rocks of a Basement Complex of Pre-Cambrian origin. There are also the intrusions of Younger granites in the extreme southern parts. The remaining north-western part is of the unconsolidated sediments of the Chad Formation. These two major structures are divided by a well-defined hydro-geological divide (HGD). The general elevation of the state ranges from 400m at the north-eastern margin to over 1,200m above mean sea level at the southernmost tip. Thus, relief and landforms

are closely linked to geology (Olofin & Tanko, 2002).

The natural vegetation of Kano State is generally Sudan Savannah except for the southernmost area which is characterized by the Northern Guinea Savannah (Olofin, 1987). However, natural vegetation is greatly affected by human activities. This is because orchard parklands and in some cases afforestation replaced the natural vegetation in places where the land is under fallow and cultural vegetation (crop cultivation) (Olofin & Tanko, 2002).

The climate of Kano State is the tropical wet and dry type, classified by Koppen as Aw. Temperature and rainfall are very critical weather elements whose interplay is caused by the movement of two air masses which consequently determine the climatic seasons. These air masses are a moist, cool southerly mass known as South-Westerlies and a hot, dry northerly mass called the North-Easterlies. The moist southern heavier air forms a wedge under the dry northern lighter air. The region where these air masses meet is primarily an area of pronounced moisture gradient. The humidity gradient is known as intertropical discontinuity (Liman, *et al.,* 2014).

Data collection and analysis

The paper utilized quantitative data. These include climatic data on rainfall and temperature, as well as the number and types of tourist attractions and recreational activity calendar. The paper employed the use of researcher constructed data, popularly known as a primary source and documented record or secondary source of data. The primary source of data involved inventory and enumeration of natural, historical, archaeological and socio-cultural tourist attractions through observation in the field and interviews. The documented sources include climatic data recorded by MARDITECH (2011), records kept by Kano State Tourism Management Board, Kano State History and Culture Bureau and National Commission for Monuments and Museums.

Field observation and inventory, structured interviews and in-depth interviews were used to collect data. The field observation technique involves visiting different locations or sites that have tourism and recreational attractions, attending various cultural festivals and events to take a record of the nature, locations and the periods of the activities. Face to face structured interviews was designed and conducted covering various tourism stakeholders in the state. These were divided into three categories; government agencies, which consist of Kano State Tourism Management Board, Kano State History and Culture Bureau and National Tourism Development Commission. The third category was the local communities such as village heads, ward heads, youth groups and leaders of various local trades, these were purposively sampled. The interviews were based on a checklist of points that guide and direct the flow of the discussions led by a team leader assisted by two note-takers.

The analyses of spatial and temporal variations of climatic data as well as the mappings of tourist attractions across Kano State were done using ArcGIS. The ArcGIS software was used to create a shapefile for tourist attractions and climatic attributes. A single map for tourism attractions concerning climatic characteristics of the study area was produced through an overlay procedure. The data on the location, nature and periodicity of the tourism attractions were summarized, aggregated and presented in the table.

Results and Discussion

Temperature and rainfall are the critical climatic elements in the area; because they are, more than all other elements, closely connected with the economic and socio-cultural activities of people, such as agriculture and tourism. Therefore, this paper analyzes the spatial and temporal differences of these two important climatic variables and examine how they affect some tourist and recreational attractions in the state.

Spatial variability of some climatic elements in Kano State

The mean annual rainfall of the state is about 884 mm and this varies significantly from the southern to northern parts of the area (Liman *et al*, 2014). The spatial variability of rainfall across the state is more significant than that of temperature. This is to say, variation of the total amount of rainfall received within the entire state is spatially more pronounced than that of temperature. Mean annual rainfall data of Kano state which was analyzed using ArcGIS software, give three climatic zones based on mean annual rainfall for the state (Figure 1). The three zones identified, are:

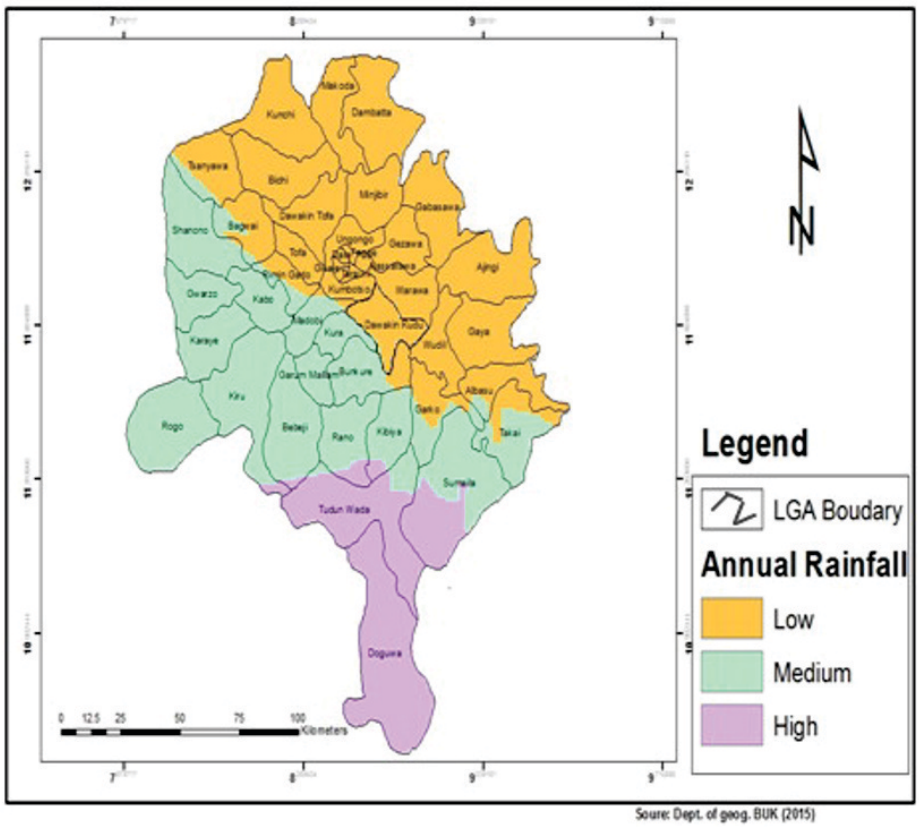

Figure1: Rainfall Zones of Kano State

a. Zone I: Low Rainfall Zone: The mean annual amount of rainfall in this part of the state is 445 mm – 599 mm per annum. This zone covered the entire northern, north-eastern and some parts of eastern Kano State. It includes the entire Kano metropolis and other local government areas such as Danbatta, Tsanyawa, Gabasawa and Albasu.

b. Zone II: Medium Rainfall Zone: The mean annual amount of rainfall in the zone ranges between 600 mm-745 mm per annum. This class covered north-western, western and some parts of eastern Kano. Local government areas in the zone include, Shanono, Karaye, Rogo, Bebeji and Sumaila.

c. Zone III: High Rainfall Zone: the mean annual rainfall for the zone is 745 mm-870 mm. This is the southernmost climatic region in the state. It consists of Tudun Wada and Doguwa local government areas. However, some parts of Rano, Kibiya and Sumaila local government areas also fall within this zone.

Temporal variations of climatic conditions in Kano

For the temporal variation of climate in the state, both rainfall and temperature are very significant. Just like rainfall, the temperature is temporally a very critical climatic element in the area. It ranges from 21° C in the coldest months (i.e. December and January) to 31° C in the hottest months (April and March) (Liman *et al*, 2014). Based on these two variables, four distinct climatic seasons, of approximately a quarter of a year each, are experienced in the area. (Olofin, 1987; Olofin & Tanko 2002; Buba, 2014; Liman *et al*, 2014). These climatic seasons are:

a. Hot and Dry Season (*Rani*): This season covered the months of March, April and May. It marks the beginning of the wet season (Buba, 2013). Few instances of rain showers are received in May. It is also a transitional period between the harmattan and wet seasons. The weather is hot and dry with few instances of rainfall; less than 1%. It is the hottest season of the year; the mean temperature is 28°C to 30°C as the onset of rains is preceded by the hottest temperatures.

b. Warm and Wet Season (*Damina*): The season occurred between June, July and August. This is the main wet season. A period of convectional rainfall and high humidity. The rains are normally heavier, in July and August, often torrential and characterized by thunderstorms and lightning. Over 90% of the annual rainfall is recorded in this season. The temperature drops to

an average of 24^0 to 29^0C while evaporation is lower because of the higher relative humidity. It is the crop growing season when cereals and legumes are grown.

c. Warm and Dry Season (*Kaka*): Between September, October and November is the major harvest season. A transitory period from wet to dry season, marking the end of rains and accounting for less than 8% of the annual rainfall. The average temperature is 28^0-29^0C. Evaporation exceeds rainfall, soil moisture depletes and streamflow recedes. Hence, it is a dry season. It is also the major harvest season of all cereals and legumes availing farmers with an abundant supply of foodstuff which implies food security. No wonder its local name is *Kaka* (abundance).

d. Cool and Dry Season (*Hunturu*): The months of December, January and February fall within this season; the major dry and cool season when no rainfall is recorded. A period of dry, cool and dusty harmattan wind (*haze*). It is dusty in the day, cold at night. The temperature is between 25^0 and 27^0C.

The implications of the climatic variations on tourism attractions in Kano State

Tourist attractions are the primary motives for all tourism and recreational activities. The driving force for the tourism industry is represented by the attractions at the destinations. Tourists have no reason to travel or visit destinations that have nothing to offer (Formica, 2002). Attractions could be anything from physical features to socio-cultural

Table 1: Tourist Attractions across Different Climatic Zones of Kano State

Climatic Zone	Local Government Area	Culture, Sports & Festivals	Ecotourism & resorts
Zone 1: Low Rainfall	Gaya	*Wasan Mahaukata* (Mad men's play)	Jirjir Hills and Dudduru Forest
	Tsanyawa		Tumuku north/South
	Kunchi		Gari Dam
	Gabasawa	Shadi Festival, Mini-Durbar Festival, Local Wrestling	Joda River
	Makoda	Sallah Mini Durbar	Tomas Dam, Dutsen – Nika Hills
	Ajingi	Shadi Festival, Local Boxing, Wrestling	Tsafau Forest Reserve
	Minjibir		Wasai Dam, Porto Golf Resort, Karoman Minjibir Forest
Zone II: Medium Rainfall	Shanono,	Kalankuwa Festival (Shakosi Village)	Koya Hills, Ruwan Madofa Forest
	Karaye		Challawa Gorge Dam, Kusalla Dam, Tsaurin Sanka Forest Reserve, Darbuji Forest Reserve, Turawa Forest Reserve, Garun-Amina Forest Reserve, Ruwan Baturiya Natural Spring Water,
Zone III: High Rainfall Zone	Rogo,		Nassarawa Earth Dam, Ijaguwa Dan-Nana Lake
	Tudun Wada		Kwafsaye Hills
	Doguwa		Falgore Game Reserve, Zainabi Waterfalls & Bautiful Rock Scenery
	Sumaila	Sallah Mini Durbar, Kalankuwa Festival	Gumo Forest Reserve, Baji Hills

Source: Compiled from various sources (2015).

activities as well as places or objects of archaeological or historic significance (Abba & Yalwa, 2018). Kano State has a considerably large number and a wide variety of tourist attractions. The attractions are broadly categorized into five categories, these are: (a) Ecotourism and Holiday Resorts (b) Archaeological attractions (c) Historical sites (d) Local crafts and Traditional Industries (e) Socio-cultural attractions and Festivals (Table 1).

The number and the types of tourist attractions varied from one local government area to the other. Rano and Karaye local government areas have the largest size of tourist attractions; in terms of the total number, irrespective of their category or types, with a total of 9 to 12 attractions. Both the local governments are located within the Medium rainfall zone. These are followed by 18 other local governments that are found across all the rainfall

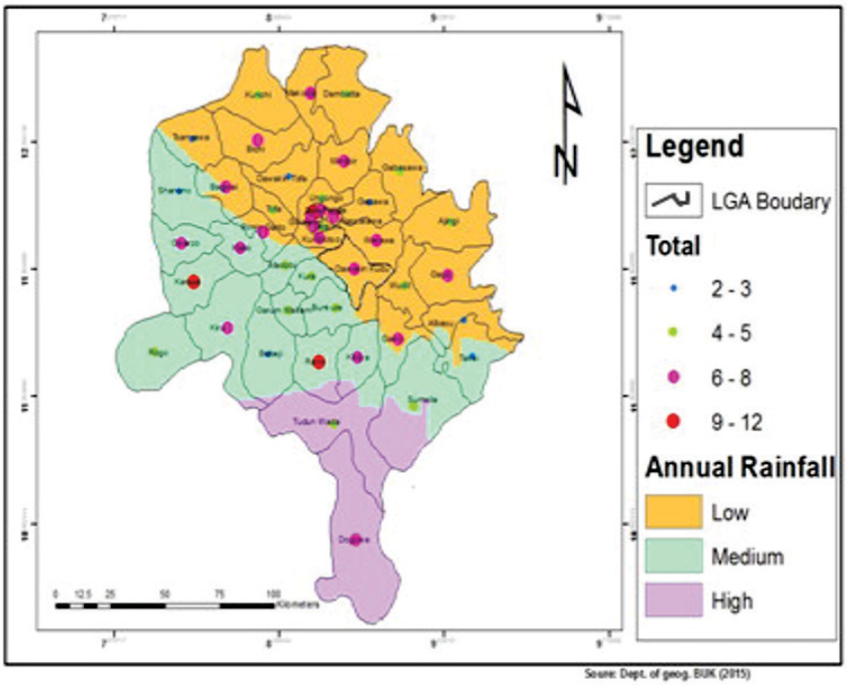

Figure 2: Number and Spatial Distribution of Tourist Attraction

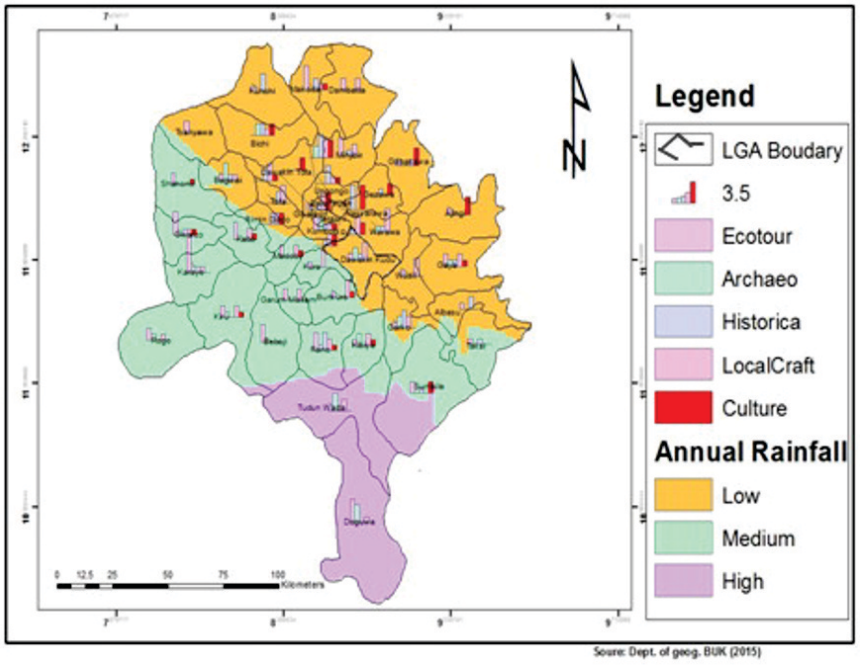

Figure 3: Distribution of the Categories of Tourist Attractions

zones; from Doguwa in the wettest zone to Kibiya, Kiru and Kabo, in the medium rainfall zone and the entire local government areas of Kano metropolis which fall under the low rainfall area. This group has a total of 6 to 8 attractions in each local government area (Figure 2).

It can therefore be understood that the rainfall characteristics of the study area do not affect the total number of tourist attractions found. As even Tudun-Wada area, which is located in the wettest zone, has fewer attractions than Dala, Nassarawa and Minjibir, which are all located within the drier zone (Figure 2). This almost corroborates the research findings of Becken & Wilson (2013) in New Zealand which states that weather do not have a significant impact on tourists' travel, activities and attractions either because it was generally favourable or because tourists made no change despite detrimental weather.

However, when we are considering the types or the categories of the tourist attractions, then we will discover that the attractions follow the three climatic zones identified. This is to say, the five categories of tourist attractions identified in Table 1 are significantly influenced by the rainfall characteristics of the state. Zone three and zone two, which are the highest and the medium rainfall areas respectively; are more endowed in terms of ecotourism resources, such as forest and game reserves, water bodies, beautiful sceneries and holiday resorts than the other climatic zone. They also have more archaeological sites than zone one (Figure 3).

This is simply because the wetter climatic conditions found especially in the southernmost zone, supported dense vegetation, wildlife, lakes, streams, rivers and dams. The same conditions have also supported early human activities in antiquity. For instance, Doguwa and Tudun Wada local government areas have a significantly higher ratio of ecotourism and archaeological resources than those areas in zone one such as Dambatta, Gabasawa, Ajingi and all the local government areas in the Kano metropolis. However, Karaye local government area located within the medium rainfall zone; has the highest ratio of ecotourism resources in the entire state.

But as Figure 3 indicates, the highest concentrations of festivals, sports and cultural attractions in the state are found in zone one; which is the low rainfall region. Even though the zone is not endowed with ecotourism attractions like the other two, it is, however, the 'cultural hot spot' of the state. The local governments within the Kano metropolis such as Dala, Municipal, Nasarawa and Fagge supported most of the local crafts and traditional industries; sporting activities and major festivals in the state. The zone also supported the highest number of historic attractions in the state. All these may not be unconnected with the fact that this climatic zone covered Kano city; the administrative capital of the state, one of the most urbanized and densely populated cities in the country, one of the economic hubs of West Africa and one of the oldest cities in sub-Saharan Africa.

Temporal variations of rainfall and temperature also have significant impacts on some tourist and recreational attractions in the study area. However, the impacts are on the activity attractions not on the physical or site attractions of the state. The state is home to a wide range of cultural attractions and festivals such as Sallah durbar, *Maulud* and *Maukib*festivals, local wrestling (*kokawa*), local boxing (*dambe)*, cane lashing (*sharo*), bull-fighting (*hawankaho*), thanksgiving (*kalankuwa*), fishing and hunting festivals etc (Table 1).

The influence of climatic conditions on these attractions is that most of them are organized around the four climatic seasons identified. While a number of the festivals are organized all year round, independent of any climatic season; like Sallah durbars, Maulud and Maukib festivals, several others are staged exclusively within a particular season of a year (Figures 4 & 5).

It can be observed that, amongst the four climatic seasons experienced, the Kaka season; which is the warm and dry season between September, October and November, has the highest number of recreational events organized in the state. This can be attributed to the fact that the season is the major harvest season of all cereals and legumes availing farmers with an abundance supply of foodstuff, hence the name *Kaka* which means abundance.

Therefore, these festivals are organized to coincide with the period because people are less busy and they have abundant food and money from the harvest. The weather conditions of the period are also mild and favourable for outdoor recreation; as there is very little or no rain, no harmattan dust and the temperature is not extreme. Studies in New England by Beaudin and Huang (2014) had shown how weather conditions can have significant direct and

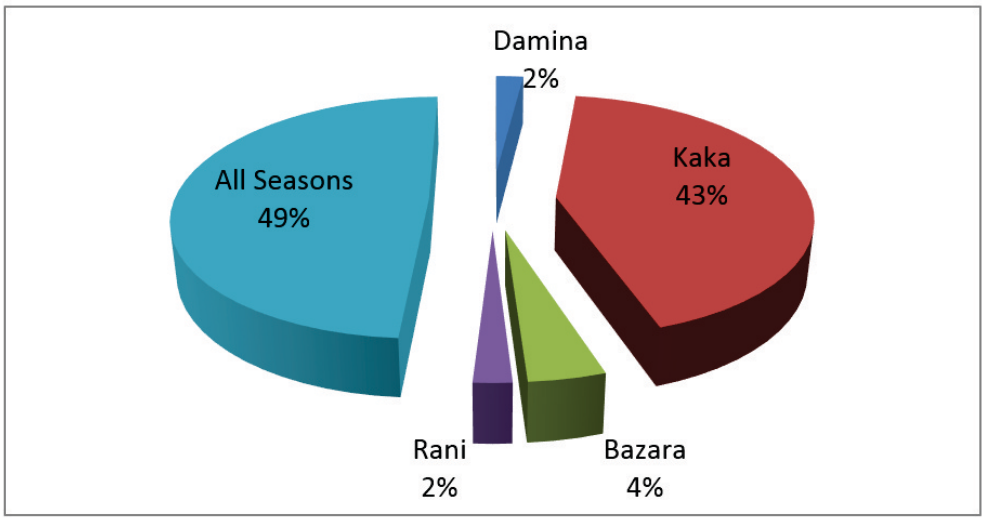

Figure 4: Seasonal Distribution of Some Activity Attractions
Source: Fieldwork (2015).

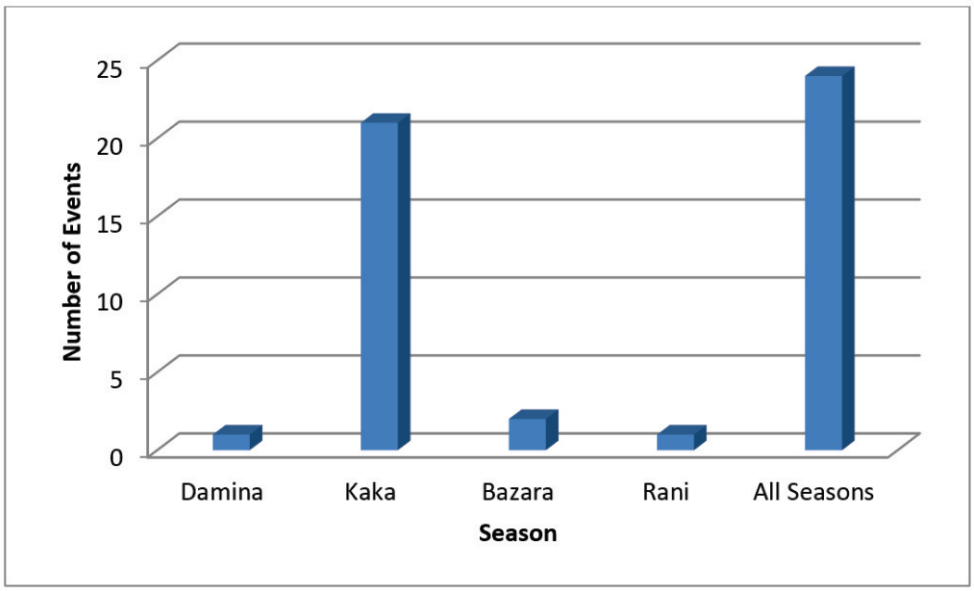

Figure 5: Number of Tourist Events Performed In Different Climatic Seasons
Source: Fieldwork (2015).

indirect effects on tourism and recreational activities such as ski.

Conclusion

The variation of weather and climatic elements created spatially different climatic zones and different climatic seasons in Kano State. The state is blessed with diverse tourism resources, in terms of both number and types. Most of these resources are sensitive to the weather and climatic conditions experienced in the state. The spatial variations of climate have no significant effects on the distribution of the total number of tourism resources found across the state. However, the variations have significant effects on the types or categories of attractions found at different locations within the state. The seasonal variations of climate considerably influenced the temporal distributions of many cultural attractions and festivals in the state, as most of them are staged during the warm and dry season.

Recommendations

a) There is a need for unrestricted access to tourism data for academic researches and planning for tourist

destinations and tourist flow in the state.

b) Up-to-date, broadly covered and better interpreted spatial and temporal meteorological data are required for a better understanding of the effects of microclimate on geographical features and socio-cultural activities in the state.

c) Further multidisciplinary researches to fully understand the extent of tourism sensitivity to climate with a view to adaptations and mitigations.

d) Rigorous awareness campaigns at grassroots levels of tourism destinations, stakeholders and communities to better appreciate the effects of climate and changing climatic conditions on tourism.

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