

**GEOGRAPHICAL ANALYSIS OF ECOTOURISM RESOURCES FOR
SUSTAINABLE TOURISM DEVELOPMENT IN THE KANO REGION-
NIGERIA**

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ABSTRACT

This paper aim at provision of the inventory of the ecotourism resources and their distribution pattern for Sustainable tourism development in the Kano Region-Nigeria. Documentary data on the inventory of the ecotourism resources were sourced from both published and unpublished materials. Garmin Global Positioning System was used for capturing coordinates of the ecotourism resources and GIS version 10.8 was used to analyze their spatial pattern using Nearest Neighborhood Analysis (NNA) tools. Based on the finding, it can be concluded that Kano region is home of ecotourism resources found in different locations across the region that have the potential to attract different types of tourists and promote environmental resource conservation. Rock formations and water bodies are the major ecotourism resources dominated the northwest, southwest and southeastern part of the region that can be used for achieving different socio-economic development, satisfying the interest of different Eco-tourist and improve infrastructural development of the region. The study recommended that Government at both National, state and local in collaboration with Non-governmental organizations and private individuals should put more emphasis in the development of ecotourism resources through provision of basic infrastructure at each sites in order to continue attracting different types of tourists and promote environmental resource conservation and to improve the socio-economic status of the local communities through incentives to provide local craft and souvenirs around each sites for the promotion of ecotourism in the region.

Keywords: Distribution, Ecotourism and Sustainable Development

1.0 INTRODUCTION

Globally ecotourism resources contributes to socio-economic and environmental sustainability to areas where the resources are available, conserve and promoted to meet the goal of tourism development. As define by Azmaiparashvili (2017), ecotourism, as an alternative tourism, involves visiting natural areas in order to learn, study, or to carry out activities that is environmentally friendly based on the nature experience, which enables the economic and social development of local communities. This makes ecotourism to be one of the fastest growing industry focuses on conservation, economic development and ecological sustainability (Yacob, Radam, Hashim & Adam 2015; Obateru & Lasisi 2020) that bring socio-economic development to many developed and developing countries. Muhammad, Lambu, Ibrahim &

Shehu (2024) posited that tourism as an asset have enormous potential for the development of socio-economic activities and sustaining the character of the environment and the host community.

To continue enjoying the advantages of tourism many countries today dive into tourism business as a best preference for achieving sustainable development goals of their nations. The United Nation Environment Program (UNEP) (2005) and United Nation World Tourism Organization (UNWTO) (2015), stated that sustainable tourism refers to the economic, environmental and socio-cultural part of tourism development. Nigeria as a country is rich in natural landscapes and biodiversity which makes her an ideal destination for ecotourism (Mohammed, 2022) which if properly develop and harness will promote environmental sustainability. In support of this, Muhammad, Ahmed, Lambu & Bello (2021) emphasize that if tourism resources are properly manage could contribute to the achievement of all the Sustainable Development Goals (SDGs) especially those concerned with poverty alleviation and environmental conservation among others. This prompt many countries today to considered tourism as the main force to promote economic development of their country and increased environmental resource conservation (Monsef, Gilaninia & Vajargah, 2013). Therefore, for ecotourism businesses to continue achieving its desired goals of sustainability, there is need for the inventory of the good and qualitative tourism resources in order to harness the potential of the industry in the stability of economy and environment. As a result of this, Nigeria as a country has taken bold strides towards the total harnessing of the potentials of tourism (Okonkwo & Odey 2017).

Although, Kano region is blessed with abundant natural resources available in all part of the country worthy for the promotion of ecotourism and development such as reserved forests, water bodies, mountains, rivers, waterfalls and hills, located in vast areas of Kano region that have tremendous potentials for eco-tourism development. But yet not all areas of the region were identified and integrated using Geographical Information System. Though, there are many studies on ecotourism development in the Kano Region (Muhammad, Lambu, Ibrahim & Shehu 2024; Muhammad, Muhammadu & Ahmed, 2024; Muhammad, Lawan & Ibrahim 2022; Muhammad, Ahmed, Lambu & Bello 2021; Agbabiaka, Barau, Olugbamila & Ibrahim 2021; Muhammad, Bichi, Bichi, & Butu 2020; Adamu, 2020; Ujih & Ibrahim, 2020; Falola, 2019; Gontul, Iirmdu, Garba, Timchang, Kassam, & Aliba, 2018; Muhammad, 2018; Muhammad & Lambu 2018; Barau, 2007; Rabo, 2014; Mangut & Mangut, 2012) among others. But looking at all these studies, they were limited in spatial scope as they study some specific resources in some places without covering the entire Kano region that comprises of Kano and Jigawa states. Therefore, there is a need for a study that will identify the entire ecotourism resources in the Kano region and analyze their geo-spatial pattern for easy visualization and sustainability.

On the basis of this, that the aim at analysis ecotourism resources for Sustainable tourism development in the Kano Region-Nigeria with the view to provide the inventory of the resources, distribution pattern of the resources and their classification for sustainability.

2.0 DESCRIPTION OF THE STUDY AREA

Kano region is part of the Sudano-Sahelian zone of Nigeria constitutes both Kano and Jigawa states of Northwestern Nigeria, lies between Latitudes 10° 29' 4'' N and 13° 02' 43'' N of the

Equator and Longitudes 70 41' 21'' E and 100 40' 31'' E of the Greenwich Meridian. It shares boundaries with Niger Republic to the North, Katsina State to the west, and Kaduna states to the southwest, Bauchi state south east and Yobe state to the east. The Region is made up of 71 Local Government Areas (LGAs) (Figure 1).

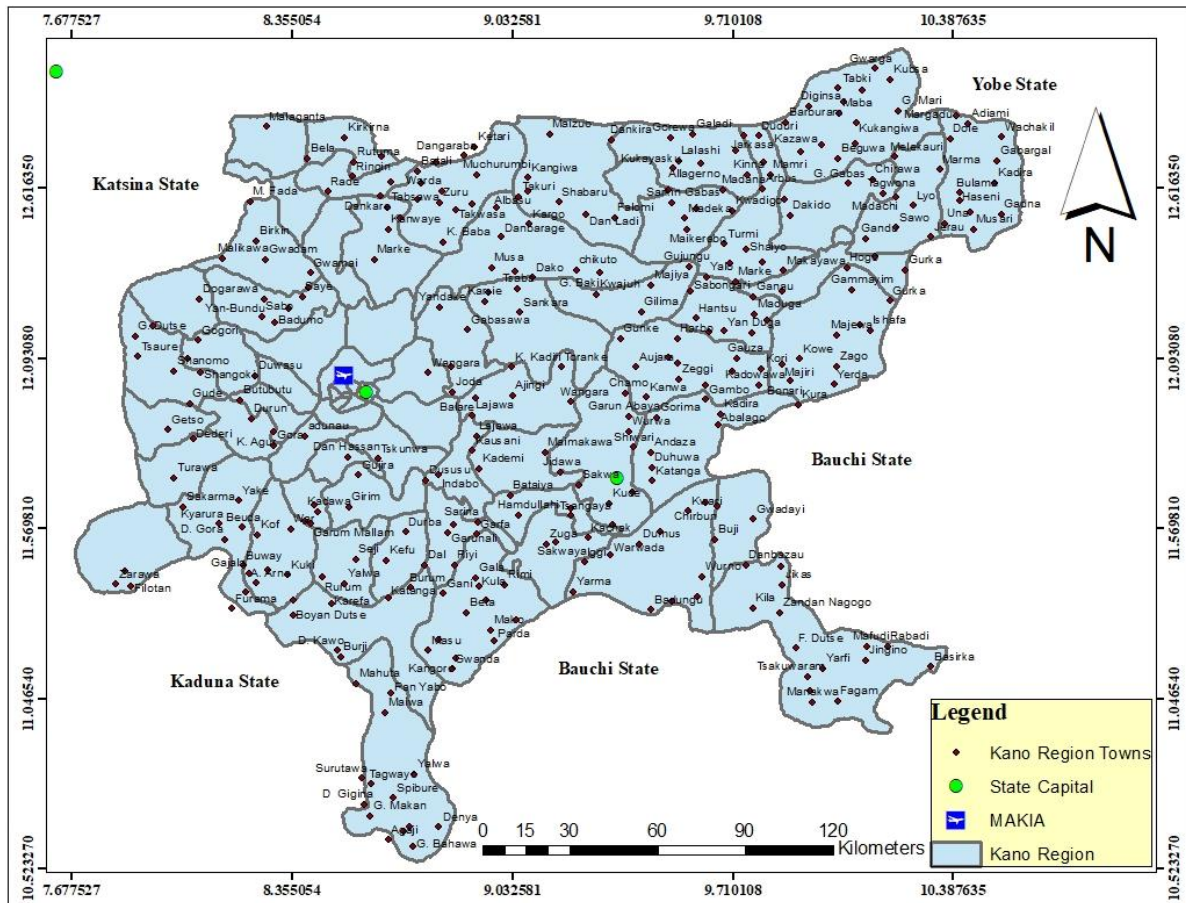


Figure 1: Map of Kano Region

The relief of the Kano Region is characterized by Basement complex rocks in the west and south and Chad formation to the northeast found in three zones; the south and southeastern highlands, the middle and western high plains and the northeastern low Chad plains Olofin, (1987, 2008; 2014) and Rilwanu, (2018). This made it possible for the older granites to produce some pockets of hills found all around (Barau, 2006) that are worthy for ecotourism.

The climate of the study area is tropical dry-and-wet type, with more dry than wet month which classified by Koppen’s as Aw (Olofin, 1987, 2008). This explains the Region’s advantage of good climatic condition in influencing the choice of season to visit the region. The geological formation and climatic condition enjoyed in the region pave way for the existence of many rivers and dams as well as fauna and flora resources worthy for ecotourism development which if harness properly can sustain the character of the region and promote socio-economic development.

The major vegetation belts in the region include the gallery of forest of guinea, Sudan and Sahel savanna found in the southern tip of the region at Doguwa, Tudun wada and Hadejia local

government. Bichi, 2016; Muhammad, 2023). These areas houses forest reserves such Falgore game reserve in Kano state and Baturiya bird sanctuary at Hadejia-Nguru wetland Jigawa state rich in faunal and floral resources that support ecotourism development. The Sudan Savanna also is found in larger areas of Kano as well as to the northeastern part of Sahel where the zone is characterized with dwarf and thorny grasses in places like Maigatari, Gumel and Kirikasamma areas (Muhammad, 2023).

3.0 MATERIAL AND METHODS

Garmin Global Positioning System (GPS) was used for capturing coordinates of all the ecotourism resources found in the region. Documentary data on the inventory of the ecotourism resources were sourced from the Kano State Tourism Master Plan (2007), Kano State Tourism Master Plan and Strategic Plan (2013), Jigawa State Tourism Board, Rock painting Arts of Birnin Kudu, published and unpublished materials. The Global Positioning System (GPS) was used to collect the locational information of the resources in order to make an inventory of the resources, spatial distribution and classes of ecotourism resources.

The coordinates of the ecotourism resources were used to produce map, classes of the resources and analyses of their spatial pattern using Nearest Neighborhood Analysis (NNA) tools available in Arc Map 10.8 to ascertain either the resources are clustered, random or regular distribution pattern express as R_n and ranges from 0 to 2.15. R_n of 0 shows a clustered pattern and it means all the points of the ecotourism resources are close to the same point. R_n of 1.0 shows a random pattern which implies that there is no pattern. R_n of 2.15 shows a regular pattern which means there is a perfect uniform pattern, where each resources is equidistant from one another.

4.0 RESULTS AND DISCUSSIONS

4.1 Inventory of Ecotourism Resources in the Kano Region

Inventorying for the available ecotourism resources in the Kano Region is important in achieving ecotourism promotion and its sustainability. Based on the inventorying of the ecotourism resources found in the Kano Region, the result shows that the region is blessed with eighty-six (86) ecotourism resources (Table 1) found in different locations across the region that have the potential to attract different types of tourists and promote environmental resource conservation.

Table 1: Inventory of Ecotourism Resources in the Kano Region

S/N	ECOTOURISM RESOURCES	LOCAL GOVT AREA	STATE
1	Dutsen Marfu	Birnin Kudu	Jigawa
2	Dutsen Mesa	Birnin Kudu	Jigawa
3	Habude Rock Formation	Birnin Kudu	Jigawa
4	Asarki Karami hill	Dutse	Jigawa
5	Dutse Gadawur	Dutse	Jigawa
6	Dutsen Asarki Babba hill	Dutse	Jigawa
7	Baturiya wetland	Hadejia	Jigawa
8	Dutse Sanyi	Gwaram	Jigawa
9	Dutsen Gaya Rock Painting Site	Gwaram	Jigawa

10	Dutsen Nassarawa Rock Painting sites	Gwaram	Jigawa
11	Dutsen Yawazo Rock Painting site	Gwaram	Jigawa
12	Jahun sand dune	Jahun	Jigawa
13	Babban Dutse (Malami da Allo)	Kazaure	Jigawa
14	Barada hills	Kazaure	Jigawa
15	Kurgungun hill	Kazaure	Jigawa
16	Wawan Rafi	Kazaure	Jigawa
17	Tsafau Forest (N) reserve	Ajingi	Kano
18	Dutsen Taushen Fage	Albasu	Kano
19	Rumbun Dutse	Albasu	Kano
20	Galawa hill	Bagwai	Kano
21	Bagauda lake/Tiga Dam	Bebeji	Kano
22	Dutsen Sata	Bebeji	Kano
23	Jatau/ Mugu hill	Bebeji	Kano
24	Kamfar Rawa	Bebeji	Kano
25	Kamfar Talakawa	Bebeji	Kano
26	Mainasara hill	Bebeji	Kano
27	Tariwa hill	Bebeji	Kano
28	Tsiriri Rock Formation	Bebeji	Kano
29	Ancient underground tunnel	Bichi	Kano
30	Gabosani hill	Bichi	Kano
31	Waire war hills	Bichi	Kano
32	Gafan Forest Reserve	Bunkure	Kano
33	Dala hills	Dala	Kano
34	Santolo hills	Dawakin Kudu	Kano
35	Falgore Game Reserve	Doguwa	Kano
36	Kwafsaye (Cup Site)	Doguwa	Kano
37	Maisaje hill	Doguwa	Kano
38	Shatu hill	Doguwa	Kano
39	Zainabi Water fall	Doguwa	Kano
40	Zanzarya hill	Doguwa	Kano
41	Joda river Banks	Gabasawa	Kano
42	Dal hills	Garko	Kano
43	Dutsen Kuraye	Garko	Kano
44	Kafin Chiri Dam	Garko	Kano
45	Lamire hills	Garko	Kano
46	Tsakuwar Dal hills	Garko	Kano
47	Cincin Rocks formation	Garun Malam	Kano
48	Garun Malam River	Garun Malam	Kano
49	Goron Dutse	Gwale	Kano
50	Getso hills	Gwarzo	Kano

51	Kare Tsallan Ka hill	Gwarzo	Kano
52	Guzuguzu Dam	Kabo	Kano
53	Magaga Dam	Kabo	Kano
54	Kano Zoo	Kano Municipal	Kano
55	Challawa Gorge Dam	Karaye	Kano
56	Dutsen Amare	Karaye	Kano
57	Kusalla Dam	Karaye	Kano
58	Dutsen Jagindi	Kibiya	Kano
59	Shike hills	Kibiya	Kano
60	Yan-naniya Rocky rooms	Kibiya	Kano
61	Dan-sociya Forest Reserve	Kiru	Kano
62	Dutsen Rangas/Hill Top Mosque	Kiru	Kano
63	Dutsin Koka Rocks and Caves	Kiru	Kano
64	Gari Dam	Kunchi	Kano
65	Chinkoso River	Madobi	Kano
66	Kubarachi River	Madobi	Kano
67	Tomas Dam	Makoda	Kano
68	Jankara Dama (Wasai)	Minjibir	Kano
69	Porto Golf Resort	Minjibir	Kano
70	Dashere hills	Rano	Kano
71	Draught hill	Rano	Kano
72	Kurgum hills	Rano	Kano
73	Mairama hills	Rano	Kano
74	Rurum Leisure centre	Rano	Kano
75	Dan-Isa hills	Rimin Gado	Kano
76	Shiri hills	Rimin Gado	Kano
77	Bokoni hills and Caves	Rogo	Kano
78	Koya hills	Shanono	Kano
79	Baji hills	Sumaila	Kano
80	Gomo Forest Reserve	Sumaila	Kano
81	Fajewa Rocks formation	Takai	Kano
82	Daba Site	Tudun Wada	Kano
83	Kurfa-Fiya	Tudun Wada	Kano
84	Panisau hill	Ungogo	Kano
85	Ramin-Bura Cave	Ungogo	Kano
86	Tanagar hills	Warawa	Kano

Source: Field work (2024) and Muhammad, (2023)

It can be seen from Table 1 that, Out of the 86 identified ecotourism sites in the region, Kano state possesses 81% (70) of the total ecotourism found in the region and Jigawa state possesses only 19% (16). The study further revealed from Table 1 that, Bebeji local government area recorded the highest 11% (8) existence of ecotourism resources in the region. Furthermore, out

of the ecotourism resources found in Bebeji local government area 88% (7) of the resources are rock formations that have different scenic attraction capable of supporting mountaineering and geomorphosite studies. On the basis of scenic importance of the resources in the region, Barau (2007) and Abba & Rilwanu (2018) described the area as a place rich of outstanding rock formations due to gradual weathering processes. Some of the important rock formations found in the region include; Dala hill, Tsangaya hill and Rumbun Dutse among others. These rock formation have long cultural background associated with them since time immemorial. For instance, Dala hill form the bedrock of the history of Kano which without it history of Kano is incomplete.

Moreover, the region is richly blessed with species in the forest reserve that are worthy for conservation and improvement of socio-economic development of the rural communities where the resources are located. Some of the available species found in the region especially at Baturiya wetland and Falgore game reserves include; *Tamarindus Indica*, *Acacia Nilotica*, *Hypenea Thebaica*, *Balanite Aegyptiaca*, *Bauhinia Rufescens*, *Mitragyna Inermis*, *Diospyrus Mespiliformis*, *Anogeissus Leiocarpa*, *Cassia Singueana*, *Securidaca Longipedunculata*, *Piliostigma Reticulatum*, *Ficus Carica*, *Albizia Chevalieri*, *Ziziphus Mauritiana*, *Bauhinia Rufescens*, *Faidherbia Albida*, *Celtis Integrifolia*, *Kigelia Africana*, *Hippocratia Guineensis*, *Stereospermum Kunthianum*, *Pericopsis Laxiflora*, *Scleroyacaryabiera*, *Sterculia Setigera*, *Daniellia Oliveri*, *Khaya Senegalensis* and *Sterculia Setigera*. These resources worthy for attraction and capable for sustaining the ecological balance as well as promoting socio-economic activities of the local communities around the forest

The availability of ecotourism resources of both natural landscapes, forest and water bodies in the region placed it to be the home of ecotourism in the North-western part of Nigeria. Therefore, protecting the resources for the achievement of sustainable socio-economic development, environmental integrity and ecotourism promotion became imperative in the region. As suggested by Hu, Xiang, Lin, Hou, & Dai, (2024) that identifying natural spaces suitable for tourism development is imperative to safeguarding ecological integrity and fostering sustainable economic progress.

4.2 Spatial Distribution of Ecotourism

The result of the spatial distribution of the ecotourism resources in the Kano region revealed that 8 out 10 of the resources are found in Kano state. The ecotourism resources found in the region are mostly found in the northwest, southwest and southeastern part of the region (Figure 2). The result of the study contradict the findings of Hu, Xiang, Lin, Hou, & Dai, (2024) in the southeastern Guizhou Province, China where the resources mostly concentrated in the northern, eastern, and southern regions relative to the northwestern area. The result of the distribution further revealed that rock formations and water bodies are the major ecotourism resources dominated the northwest, southwest and southeastern part of the region (Figure 2). This occurred as a result of locational advantage of the region in the basement complex rock of Hausa land in Northern Nigeria which Barau (2006) and Muhammad, (2023) describe as region of pockets of hills found all around due its simple and homogenous geological structure of basement complex that dominated most part of the region and weathering processes.

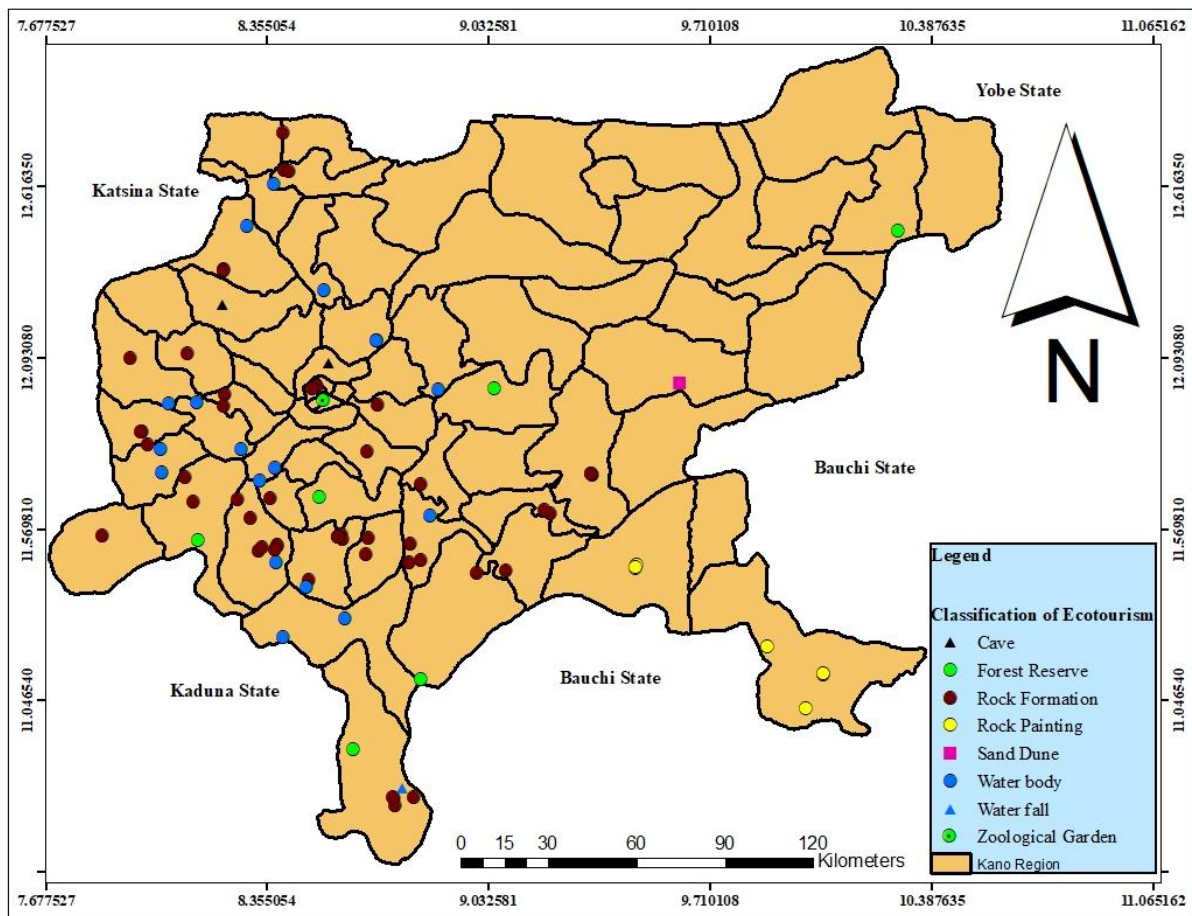


Figure 2: Distribution of Ecotourism Resources

Source: Fieldwork, (2024)

The concentration of the ecotourism resources in the northwest, southwest and southeastern part of the region can be used for achieving different socio-economic development that can reduce poverty, rural-urban migration and improve infrastructural development in the region. In fact, ecotourism play substantial roles in the socio-economic and infrastructural developments of the local communities where they have resources.

Moreover, the result of the nearest neighbourhood analysis of the ecotourism resources in the region revealed that the pattern of the distribution is cluster having R_n value of 0.673248. The result of the z-score of the R_n of -5.79693779446 indicated that the random distribution of the resources in the region is the reason of the cluster pattern of the resources. This shown that the distance from one ecotourism to another is not far from each other which make it easy for Eco-tourist to easily move from one fascination site to another within a shorter distance and time. The findings of the study of nearest neighbour analysis corroborated with the study of Odum, Akukwe, Andrew-Essien, & Eja, (2018) in Anambra state-Nigeria where their study revealed a regular distribution pattern of ecotourism resources. In essence, the clustering pattern of the resources can put the region’s ecotourism resources to be a means of regional development if properly harness and developed to meet the market demand of sustainable tourism. To emphasize on the developmental advantages of cluster pattern of the ecotourism resources

Odum, Akukwe, Andrew-Essien, & Eja, (2018) stated that the pattern will reduce the risk of exceeding carrying capacity of a community, equality of population growth, reduce rural-urban migration and overcrowding of cities.

4.3 Classification of Ecotourism Resources

The nature and characteristics of the forest vegetation and geological formations found in the region resulted into different types of ecotourism resources capable of supporting ecotourism activities and conservation practices for sustainable development. The finding of the study as revealed in Figure 3 shown that the region is blessed with different types of ecotourism resources that can satisfy the interest of different Eco-tourist ranging from caves, gallery of forest reserve, rock painting arts, rock formations, sand dunes, water bodies, water fall and zoological garden.

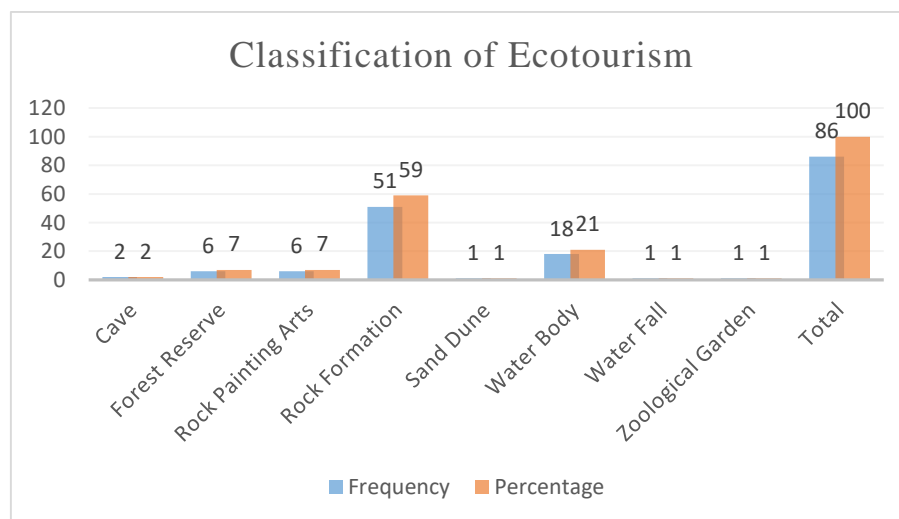


Figure 3: Classification of Ecotourism Resources

Field work (2024)

Out of the eighty-six (86) existence of ecotourism resources found in the region 59% are rock formation, 21% are water bodies and 7% are forest reserve and rock painting arts. The finding of the study corroborated with the findings of Sisriany, & Furuya, (2024) in Indonesia who revealed that ecotourism sites in the study area are predominantly parks and protected forest, mountainous and hilly terrain. This shows the region advantages of mountaineering activities, scenic beauty, sightseeing, game viewing and scientific studies.

5.0 CONCLUSION AND RECOMMENDATION

Based on the finding, it can be concluded that Kano region is home of ecotourism resources found in different locations across the region that have the potential to attract different types of tourists and promote environmental resource conservation.

Rock formations and water bodies are the major ecotourism resources dominated the northwest, southwest and southeastern part of the region that can be used for achieving different socio-economic development, satisfying the interest of different Eco-tourist and improve infrastructural development of the region.

On the basis of these, the study recommended that;

Government at both National, state and local in collaboration with Non-governmental organizations should and private individuals put more emphasis in the development of ecotourism resources through provision of basic infrastructure at each sites in order to continue attracting different types of tourists and promote environmental resource conservation.

Government at both National, state and local in collaboration with Non-governmental organizations should leverage on the advantages of different ecotourism resources of the region to improve the socio-economic status of the local communities through incentives to provide local craft and souvenirs around each sites for the promotion of ecotourism in the region.

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