

# PHYSIOGRAPHY, RELIEF AND RURAL LIVELIHOOD IN THE TERRAINS OF CENTRAL KATSINA REGION AND SURROUNDINGS, KATSINA STATE, NIGERIA

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## **ABSTRACT**

*The relationship between landscape and land use practices is clearly evident in the livelihood dynamics of people residing in various places of the earth surface. The aim of this research was not only to spatially categorize Central Katsina Region into different physiographic relief units, but also to study the correlation between each physiographic unit with its corresponding land uses as well as the overall impact of these on livelihoods. The research therefore assessed the impacts of relief and physiographic irregularities on the lives of rural and semi-rural people of the region through field observations and questionnaire surveys. The research project ran for five months (January to May, 2018). It commenced in January, 2018 with a reconnaissance survey and then followed by field work/data collection, data analysis, report writing and submission of the report in May 2018. A total of approximately 1075 questionnaires were administered in the Central Katsina Region comprising of Dutsin-Ma, Kurfi, Charanchi, Kankia Local Government Areas and Surroundings area comprising some parts of Safana, Batsari, Batagarawa, Matazu, Rimi and Bindawa which are characterized by rocky landscapes and rugged terrains. Interviews were targeted at specific group of people like farmers, quarry workers, well drillers, builders and town planners from local and state authorities. The nature of the terrain was found to have both positive and negative impacts on agriculture, economy, transportation, communication, access to groundwater, social life and security. The research recommended that authorities should invest in research to identify the peculiar needs of these types of communities so that priority can be given to them in any future development plan.*

## **KEYWORDS**

*Relief, Physiography, Livelihood, People and Environment*

## **1. INTRODUCTION**

The physical Geography of any environment has a lot of influence on the nature of cultural, socio-economic and sometimes even political dynamics of the people living in such environments [1]. On the earth surface, the relief and topography of a place combine to constitute its spatial landscape. This landscape is often beyond a mere geographic feature. Globally, landscapes are as much a product of geographical setting and natural processes as they are of cultural modification and adaptations over time [2].

Landscapes are the by-product of human adaptations of natural settings for the purpose of securing shelter, food and/or for pleasure. 'Landscape' therefore implies tangible physicality (field, orchard, settlement, or region), the product, but also perceptions and cultural valuations attached to this physical setting in the act of production [3].

Concept of 'landscape' includes not only tangible physicality but equally intangible, socio-cultural perceptions and valuation of the physical. Mountains are decisive for life. According to one estimate by Makhzoumi [3], mountains cover one-quarter of the world surface and are home to one out of every ten people on the planet. Mountains are the source of world's great rivers providing fresh water to drink, grow food and generate electricity. Mountains are sanctuaries for an innumerable variety of plants and animals and are precious niche of biological diversity for food and medicine. Mountains first time appeared on the political agenda of the United Nations Conference on Environment and Development held in 1992 on Rio de Janeiro, Brazil.

The Central Katsina Region comprising of Dutsin-Ma, Kurfi, Charanchi, Kankia and Surroundings comprising some parts of Safana, Batsari, Batagarawa, Matazu, Rimi and Bindawa are characterized by rocky landscapes and rugged terrains. These physical impediments have the potential to negatively affect agriculture, groundwater exploration, transportation, settlements and urban planning. Environmental degradation problems are also likely to occur. Disruptions of telecommunication networks and poor internet connection have been associated with Dutsin-Ma town and other areas where the landscape is most rocky, hilly and dominant.

This research therefore will examine the connections between these terrains and socio-economic activities and see the extent of the relationship, assess adaptation strategies by the population and make recommendations on how such can be improved for effective development.

## **2. STUDY AREA DESCRIPTION**

Katsina State was created out of the former Kaduna State on September 23, 1987. It is bounded in the east by Kano and Jigawa State, in the south by Kaduna State, in the West by Zamfara State and in the North by Niger Republic. Katsina State spread across three agro-ecological zones: its extreme northern fringes lie on the arid zone of the Sahel; the vast tropical grasslands of the Sudan savanna from the north through to most of the south; and the Guinea Savannah on the southern margins [4].

### **2.1. Location and Land Area**

Katsina State lies between latitudes  $11.7^{\circ}$  and  $13.2^{\circ}$ N and longitudes  $6.5^{\circ}$  and  $9.2^{\circ}$ E. it is located in the semi-arid region of Nigeria [5]. It has a total land mass of  $24,192\text{km}^2$  out of which only  $2,420\text{km}^2$  (10%) are constituted into gazette forest estates, comprising of 96 forest reserves, one grazing reserve, 244 communal forest areas of which 80% have been threatened with extinction by desertification, drought and human activities [3]. Arable land in the area is classified into upland '*gona*' and bottom valley land '*fadama*'. The upland is used mainly for rainfed agriculture while the valley bottom is cultivated mostly in the dry season [5].

Nine Local governments were purposively selected (fig. 1) for this study not only because of their significant status in terms of ruggedness in the state, but also due to their vulnerability to other environmental hazards that affect land use and livelihood practices. The local governments forming the study area physically demarcated as central Katsina are the whole of Dutsin-Ma, Safana, Kurfi, Danmusa and Batsari as well as the parts of Kankia, Charanchi, Kusada and Batagarawa. Together, they form an area of about  $4,500\text{ km}^2$ .

Since the time of the old Kaduna State which consists of the present Kaduna and Katsina States, Dutsin-Ma, alongside seven other towns or regions have been of utmost significance not only to the Katsina sub-region which eventually became a state, but also to the old Kaduna state itself. Katsina as an emirate and royal headquarter stood out among the seven, with Daura, also another

emirate coming second. The other four towns that stood side by side with Dutsin-Ma were Funtua which was a newer town influenced by the railway [5] [6], Malumfashi, Mani and Kankia. All the seven towns were the headquarters of the then only Local Governments existing in the current Katsina State [7] [8] [9] [10].

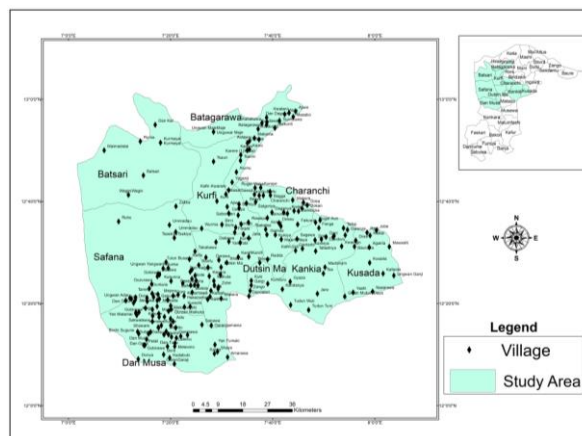


Fig 1: Distribution of towns and villages in the study area.  
Source: Fieldwork

### 3. MATERIALS AND METHODS

A total of approximately 1075 questionnaires were administered in the Central Katsina Region comprising of Dutsin-Ma, Kurfi, Charanchi, Kankia Local Government Areas and Surroundings areas comprising some parts of Safana, Batsari, Batagarawa, Matazu, Rimi and Bindawa which are characterized by rocky landscapes and rugged terrains. Interviews were targeted at specific group of people like farmers, quarry workers, well drillers, builders and town planners from local and state authorities.

This research project ran for five months (January to May, 2018). It commenced in January, 2018 with a reconnaissance survey and then followed by field work/data collection, data analysis, report writing and submission of the report in May 2018. The aim of this research was not only to spatially categorize Dutsin-Ma Region into different physiographic land use units, but also to study the correlation between each physiographic unit with its corresponding land uses as well as the overall impact of these on livelihoods.

**Field Observations:** A reconnaissance survey was conducted. The absolute location or coordinates of places of significance were taken with a GPS device for mapping. Quarry sites were visited enable the research have an idea on how the environment affects distribution of the quarry activities. The depths of some hand-dug wells were also be measured.

**Oral Interviews:** Oral interviews was targeted at specific group of people like well diggers, borehole drillers, farmers, builders, quarry workers, engineers, and town planners, from local communities and relevant agencies and authorities like Katsina State Ministry of Water Resources, Katsina State Rural Water Supply and Sanitation Agency (RUWASA), Katsina State Ministry of Works, Housing, and Transport, Katsina State Ministry of Land and Survey, Urban and Regional Planning Board (Katsina State), Katsina State Road Maintenance Agency (KASROMA), and the Local Government Departments of Works, Water and Sanitation.

**Sampling Procedure/Techniques:** Due to the fact that, the study area is geographically large for the research to cover, the researcher adopted a suitable sampling procedure. Two methods of sampling were used; purposive sampling and systematic sampling. The systematic sampling technique was used in the distribution and administering of questionnaires in the already selected. A grid was imposed and drawn on a georeferenced map of the study area to divide the region into Forty (40) points where field surveys and questionnaire administration was carried out. Sampled locations of the data collection points 1 to 40 within the study area formed the systematic sampling.

## 4. RESULTS AND DISCUSSION

### 4.1. Demographics of Rugged Terrain Dwellers

Tables 3.2 to 3.5 gives a summary of the demography of dwellers in the study area. From the results males are obviously more for socio-cultural reasons coupled with the fact that most of the land use and livelihood practices are anchored by men and not women. While the level of education of the respondents in the study area which is predominantly rural is unsurprisingly mostly informal, the dominant age group is 30-44 which are mostly married.

The ethnicity and religion of the villagers is virtually 100% homogenous and hence not much attention was paid to it by the research. The respondents were skewed more towards males as they were obviously more accessible to the researchers. Furthermore, most of them constitute the farming population which appear to be most affected by the rugged terrain. The less than 13% females which the research was able to interview were mostly those were domestically affected by livelihood severities.

Table 1: Age of Respondents

| AGE          | Number      | Percentage |
|--------------|-------------|------------|
| Above 60     | 55          | 5.17       |
| 45-60        | 325         | 30.23      |
| 30-44        | 550         | 51.16      |
| Below 30     | 110         | 10.23      |
|              |             |            |
| No response  | 35          | 3.31       |
| <b>TOTAL</b> | <b>1075</b> | <b>100</b> |

Source: Questionnaire survey, 2018

Table 2: Gender of Respondents

| GENDER       | Number      | Percentage |
|--------------|-------------|------------|
| Males        | 932         | 86.44      |
| Females      | 135         | 12.56      |
| No response  | 8           | 1.00       |
| <b>TOTAL</b> | <b>1075</b> | <b>100</b> |

Source: Questionnaire survey, 2018

Table 3: Educational Status of Respondents

| EDUCATION | Number | Percentage |
|-----------|--------|------------|
|-----------|--------|------------|

|              |             |            |
|--------------|-------------|------------|
| Primary      | 165         | 15.35      |
| Secondary    | 185         | 17.21      |
| Tertiary     | 100         | 9.30       |
| Islamic      | 550         | 51.16      |
| No response  | 75          | 6.98       |
| <b>TOTAL</b> | <b>1075</b> | <b>100</b> |

Source: Questionnaire survey, 2018

Table 4: Marital Status of Respondents

| <b>MARITAL STATUS</b> | <b>Number</b> | <b>Percentage</b> |
|-----------------------|---------------|-------------------|
| Married               | 542           | 43.09             |
| Single                | 359           | 39.91             |
| Divorced              | 64            | 8.00              |
| Other                 | 72            | 7.00              |
| None                  | 10            | 1.00              |
| No response           | 8             | 1.00              |
| <b>TOTAL</b>          | <b>1075</b>   | <b>100</b>        |

Source: Questionnaire survey, 2018

#### 4.2. Awareness on Physiographic Effects Human Activities

Perception of widely varied among regions and groups of people. The challenges of terrain to land use and livelihood are closely linked to issues of defining terrain itself. Aside from there being various types of positive and negative effects, there are also regional differences that exist that further complicate the issue of defining effects. For example, a person living in a region characterized by mountains likely to have a different experience from a person living in a region with a relatively flat to undulating but still rugged surfaces.

#### 4.3. Impact of Terrain

The three major impacts were classified as general, environmental and socio-economic. Reports from villagers revealed impacts on agriculture, water supply, recreation and tourism, and small businesses. Villagers discussed drought impacts on livestock were included in the agricultural impacts. Hydrological impacts and damage to animal species make up the environmental impacts. The social impacts reported.

Table 5: Socio-economic effects according to respondents

| Socio-economic Effects | Respondents | Percentage |
|------------------------|-------------|------------|
| Quarrying              | 165         | 15.35      |
| Communication          | 46          | 4.10       |
| Farming                | 100         | 9.30       |
| Access to groundwater  | 550         | 51.16      |
| Movement               | 75          | 6.98       |
| Others                 | 93          | 9.00       |
| No response            | 46          | 4.10       |
| <b>TOTAL</b>           | <b>1075</b> | <b>100</b> |

Source: Questionnaire survey, 2018

Table 5 is the general summary of residents' views on the impact of rugged terrain and rocky landscape on land uses and livelihood in the study area. While 65% of those interviewed see it as an impediment, about 25% see it as an advantage, with some 10% seeing it as neither.

There are other effects of terrain which the research team observed on the field while others were narrations from residents through interviews and discussions. These secondary and mostly indirect effects were not studied in detail as those mentioned earlier. Some of these effects and influences are but not limited to the follows;

#### 4.3.1. History and culture

The terrain and rocky structures were discovered to have some historical and cultural significance in some of the areas studied. In Karofi town of Dutsin-Ma Local Government, some residents narrated that the old settlement was too rocky for expansion and hence the whole town had to migrate to a more favorable terrain, leaving the old place for farming and occasional burials. The research team took some elevation measurements in both the old and new areas. The old Karofi (12°29'45.0''N and 7°34'34.8''E) had an elevation ranging between 585 to 615m above sea level dotted with complex irregularities, as against the new town with an average of about 570m with little to no undulations.

An old settler, Tambayo Mai Igiya categorized both the new and old Karofis into 9 distinct physio-cultural units thus; Pan Jakkai, Pan Yakuwa, Pan Kambadi, Pana Makaranta, Pan Munguni, Pan Dunya, Pan Gi, Pan Tsage and Pan Dakau, all within the immediate settlement. Others are Pan Dabuwa, Pan Amale and Pan Tsatsawhoch constitute the environs. Some of the huge rocks have names, examples are Kowari, Gindimi, Banga and Madaurari among others.

In a similar note, some of the Rocks in Ruma village (also with old and new settlement) of Batsari Local government had historical significance and were used for tourist attractions. The abode of the great Danwaire, the legendary warrior that lived hundreds of years ago was thickly rocky and barely accessible. The research team were guided to his house (12°51'47.0''N and 7°13'48.9''E) by his great grandchildren which sat on a 526m elevation platy rocky terrain. The Zanda Rock (plate I) with an aesthetic view is used informally as tourist attraction.



Plate 1: Zanda Rock in Ruma which has potential for tourism Batsari LGA.

#### **4.3.2. Security**

From field visits, it was obviously deduced that the rocky terrain had facilitated banditry and other security challenges in significant parts of the study area. In one of the visits to Maidabino village of Danmusa Local Government, the research team drove for about 20 km along an area virtually shielded by rock impediments that constitute criminal hideouts and pose great danger to security. Areas like Gimi inselberg in Safana were believed to harboring criminals. The notorious Rugu Forest itself is dotted with rocks that are thickly vegetated.

#### **4.3.3. Access to groundwater**

One big challenge that rugged terrain constitute to many parts of the study area is making groundwater inaccessible. In Tinqi village of Charanchi LGA, it was discovered that over 50% of the area sat on a shallow plate-like granitic rock that makes it difficult or impossible to access groundwater by local drilling techniques. Similar situations were observed in parts of Dutsin-Ma, Kurfi and other places.



Plate II: A Large rock in Tinki village of Charanchi LGA

#### 4.3.4. Local economy

Numerous local quarry activities were observed in virtually all villages visited. It was obvious that residents have found opportunities provided by the granitic rock outcrops to blast, produce and supply concrete-grade gravels for nearby semi-urban and urban areas.

#### 4.4. Adaptations and Interventions

##### 4.4.1. Local Adaptation Strategies

Extensive fieldwork didn't reveal much significant visible efforts towards formal adaptation efforts to rugged terrains, despite the research spanning over several months. Furthermore, some questionnaire responses advanced by villagers often appear like recommendations more than adaptation strategies. The research team observed and took shots on the field of some conscious and subconscious adaptation techniques.

Residents have turned the low-lying massive inselberg nearby into a laundry point (plate III), although, most of those seen were kids, but some adults were also sighted. It is also believed that, any of the children were sent by their parents. On top of the inselberg, there were some clean rain water collecting points which can be utilized for washing. Alternatively, others wash from hope and bring it to the top for drying. This is one of the adaptation strategies believed to be subconscious. Mountain and semi-mountain farming are also common (plates V). Rocks with significant soli cover were seen to be cultivated during the raining season. Some non-granitic hills and even the deeply weathered ones with favorable soil texture and structure were also utilized.



Plate III: Some residents in of Kurfi town washing and drying their clothes on an inselberg





Plate IV: Semi-mountain farming in Batsari.

Some construction works were seen to defy the rock terrain as settlements were built on the little available space as seen on plate V.

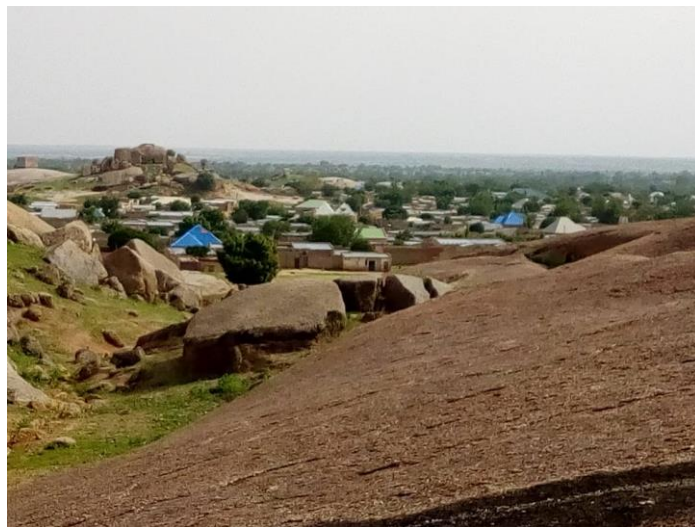


Plate V: settlements amidst rocks in Kurfi.



Plate VI: Rock used as playground in Kurfi

Plate VI shows kids using a nearby rock outcrop as a playing ground. The rock with a sliding slope offers the opportunities for kids to play. This may seem a bit risky. However, a discussion with some adults close-by revealed that it was a regular practice by the kids which posed little to no risk as the surface of the rock have been smoothed over time.

This is one of the subconscious and non-deliberated adaptation to the rocky and rugged terrains in most parts of the study area which the residents themselves are barely aware of. During raining season, the foot of the drain is used for rain harvesting according to residents that live close by.

One adaptation strategy that could be regarded as formal or official is the location of industrial quarries. All the three quarry plants visited by the research team were located in areas with dense concentration of rocks that guarantee the supply of virtually inexhaustible raw materials for as long as the plants existed.



Plate VII: Boulders produced by industrial quarries at ‘Yar Gamji

#### 4.4.2. Relief, Government Assistance and Role of Communities

Responses from interviews with state officials suggests that government is doing much towards mitigating terrain impacts, particularly on groundwater accessibility. One of such measures is the extensive drilling of boreholes across the affected local government areas of the state. The

government is also doing much towards construction of earth reservoirs and rehabilitation of dams.

On accessibility, officials have reportedly done a lot on defying terrains for road construction to improve accessibility to the remotest of areas. However, on proper documentation and databasing of terrain-related challenges and issues, the research couldn't find anything reliable.

## 5. CONCLUSION

Investing in people, particularly the vulnerable segments, could contribute much towards sustainable human development [11]. Being the poorest of the poor, the mountain communities are vulnerable to natural and man-made disasters and miscalculations. The sufferings of communities living on rugged terrains is often overlooked leading to gradual and many times unnoticeable lowering in standard of living as well as rising in the cost of living. Poor land use and regional planning at different scales coupled with neglect at policy and practice levels by the governments is partly responsible for this.

It is recommended that the Katsina State and Federal Governments should make necessary policies to cater for communities affected by rugged terrains in order to improve their conditions of living.

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