Quest Journals
Journal of Research in Environmental and Earth Sciences
Volume 7 ~ Issue 12 (2021) pp: 30-37
ISSN(Online) :2348-2532
www.questjournals.org

Research Paper

Analyzing the Root Cause of Farmers and Herders Conflicts in Ribadu District of Fufore Local Government Area of Adamawa State, Nigeria – Using GIS Techniques

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ABSTRACT
The farmers and herders in Ribadu district had been living together in peace for over a century, until recent times conflicts between the duo erupted. Government authorities and local chiefs in the district made efforts to maintain peace between the farmers and herders in the area but of no avail. However, Geographic Information System (GIS) techniques and oral interviews conducted on the residents of the districts were used to analyze the root cause of the conflicts. In this method, the satellite imagery of the study area was downloaded via Google Earth and imported into Arc View environment. The imagery was geo-referenced using UTM coordinates of four ground corner points of the study area obtained earlier using Differential Global Positioning System (DGPS). Shape files for features such as roads, water bodies etc. were created and digitized on screen using poly lines. Other features not visible on the imagery such as farms, cattle routes etc. were plotted on the map using their UTM coordinates obtained in the field. Maps of the study area were produced depicting all features required for the analysis. Oral interview was conducted as well based on a designed questionnaire to get the views of the residents as to the cause of farmers and herders conflicts in the district in recent times. It was found that the root cause of the conflicts is due to blockage of cattle roots by farmers' activities, disappearance of cattle routes, deliberate destruction of crops by herders, lack of water sources for livestock consumption, limitation of grazing areas among others. It is recommended that the authorities concern should order for unblocking, redefining, surveying and demarcating of all cattle routes with permanent survey monuments and construction of at least five dams in the district for livestock water consumption only.
Keywords:Farmers and Herders, Cattle Routes, Conflicts, Livestock, Grazing

***R**eceived 28 Nov, 2021; **R**evised 10 Dec, 2021; **A**ccepted 12 Dec, 2021 © The author(s) 2021.*
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I. INTRODUCTION:

Ribadu district is one of the seven districts of Fufore local government area of Adamawa state created in 1976 shortly after the creation of the local government area itself from the defunct Gongola state. The inhabitants of the district are majority Fulani by tribe whose occupation is cattle rearing. However there are some minor tribes like Vere, Chamba, Hausa, Bata and Godogodo/Laka living together with the Fulanis whose major occupation is farming. These communities had been living together in peace with one another. The Fulani herders took control of their livestock both at their base and while on grazing areas so that no havoc is done to any farm belonging to other tribes. This peaceful co-existence had been enjoyed by the farmers and herders within the district for over hundred years, until recent times, conflicts erupted among themselves.

The Federal Government of Nigeria in her efforts to promote peaceful co-existence among farmers and herders in the country, created international cattle routes in the late sixties which cut across the North and to section of the middle belt and to parts of the southern zone of the country. The international cattle route allow free movement of cattle from the neighboring countries like Niger Republic, Benin Republic, Cameroon, Chad, and Mali searching for greener pasture in the country, this is to ensure that the herders in transit do not cause any damage to crops while on transit. The villages within the study area through which the international cattle routes pass include Pariya, Ribadu, Njammare, Muninja, Gurin, Wurobokki, Paramparam and Chafajaule. To supplement the effort of the federal government of Nigeria, local cattle routes and grazing areas were also

created in the late seventies by the local government authorities in collaboration with the district and village heads in each local government area. The local cattle routes were created to serve as a route through which cattle can be moved from their base to different grazing areas created without causing any damage to any crop belonging to farmers. The efforts of the Federal and local governments towards ensuring peaceful co-existence among farmers and herders in the country has yielded fruitful results in some areas while in some areas like Ribadu district (the area of study) the narrative is different as the district started experiencing farmers and herders clashes in recent times, and the conflicts is on increase every year. However this study uses GIS techniques to analyze the root cause of the farmers and herders conflicts in the district.

A Geographic Information System (GIS) is a computer-based tool for mapping and analyzing things that exist and happen on earth and other essential bodies. GIS technology integrates common data base operations such as query and statistical analysis with unique visualization offered by map and statistical analysis. These abilities distinguish GIS from other information system and make it valuable for explaining events, predicting outcomes, and planning strategies (Ezra and Sunday, 2005). Map-making and geographic analysis is not new but GIS performs the task better and faster than conventional manual methods. Before GIS technology, only few people had the skills necessary to use geographic information to help with decision making and problem solving. GIS can also be defined as a systems which allows the capture, updating, and displaying of a number of previously unconnected data set, bring them to a common reference system for spatial analysis from which relationship can be identified and decision made. A GIS is a configuration of hardware and software tools which links geographic–related data to statistical data. The results are presented in the form of maps. GIS can generate various types of maps according to the user's needs. The key to the use of a GIS is the input of the precise geographic data, such as the geographic coordinates of a village. The kind of information can be obtained either from existing maps or with Global Positioning System (GPS) receivers (Ezra and Sunday, 2005).

II. STUDY AREA:

The study area Ribadu district as mentioned earlier is one of the seven districts of Fufore local government area of Adamawa State located in North-Eastern part of Nigeria. Other districts include Pariya, Malabu, Gurin, Karlahi, Yadim and Mayoinne districts. The study area lies between latitude 09^0 12'N to 09^0 24'N and longitude 12^0 37'E to 12^0 53'E. The area has a Sudan type of vegetation and a tropical climate marked by wet and dry seasons (zembaetal, 2010). The minimum temperature recorded is about 15^0C and a maximum of about 40^0c (104.0^0F). Day time temperatures can easily exceed 40^0c during the dry season (April/May).

The district is located such that river Benue from the Republic of Cameroon entered into Nigeria by the North of the district and extended west-wards to Yola the Adamawa state capital and to the rest parts of the country. The river Benue form a boundary between Ribadu district (the study area) and Pariya district. Other geographical features include Bagale hill located on the North-west of the study area just less than a kilometer from river Benue on the side of the neighboring Pariya district. Lakes Gildi, Guddi and Rakau located on the North-West and Lake Njuwa located by the North, close to Ribadu town the district headquarters.

The major indigenous ethnic group found are Fulanis, however, there are some indigenous groups found in minority such as Bata, Vere, Chamba and Hausa. There are some few immigrants known as Godogodo/Laka who migrated from neighboring countries like Cameroon and Chad and are based permanently within the district. The major occupation of these people are cattle rearing by the Fulanis and crop farming by the minority tribes and immigrants. Both rainy and dry seasons farming are practiced in the area. The major crops produced are guinea corn, maize, groundnut, rice, and vegetables. Figure 1 below shows the maps of Nigeria, Adamawa state, Fufore local government area and Ribadu district (the study area).

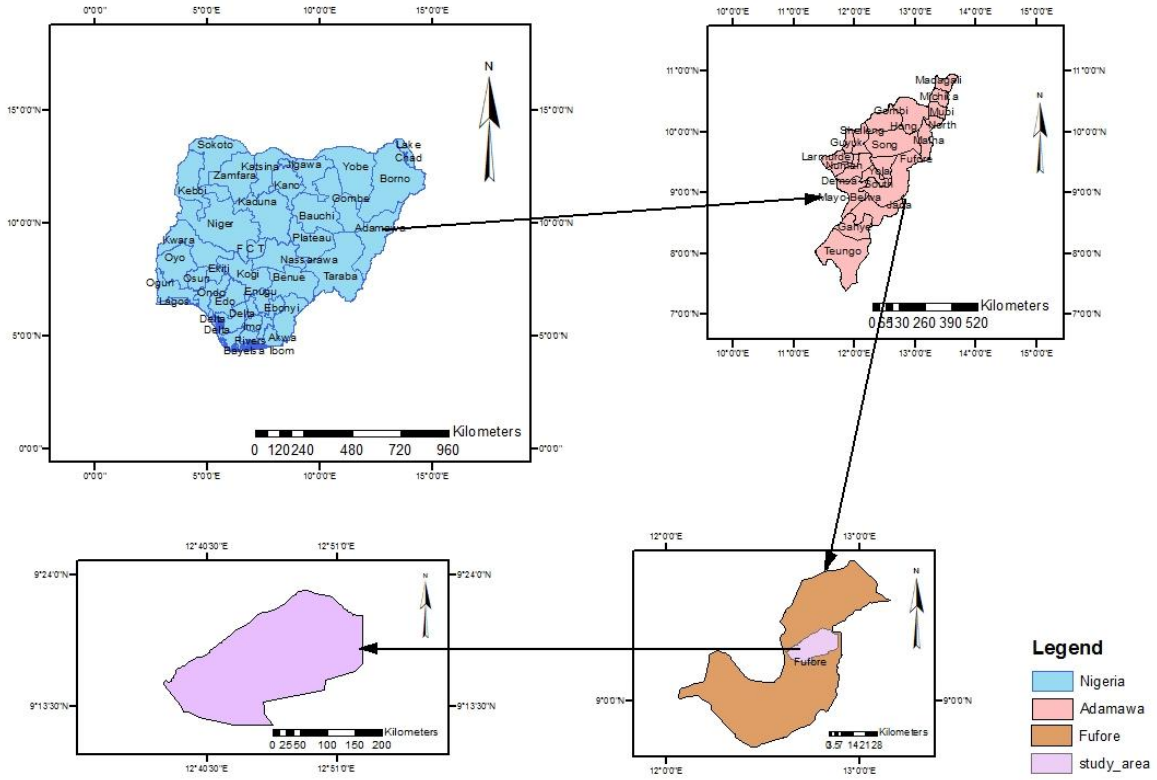

Figure1. Showing Map of Nigeria, Adamawa State, Fufore Local Government Area and the Study Area. Source: Ministry of Land and Survey, Yola, Adamawa State, 2021.

III. EQUIPMENT/ MATERIALS:

The equipment used for the study include; Hardware and Software. The Hardware are Differential Global Positioning System (DGPS) Promark3, HP Printer, HP computer laptop with its accessories. The Software include; ArcGIS10.3, Microsoft excel 2010, Microsoft word 2013 and Google Earth. The materials used for the study are spatial and non-spatial data. The spatial data are data that can be linked to locations geographic space usually via features on a map otherwise known as map information. The non-spatial data are oral services and social survey conducted through interviews on the residents of the district based on a designed questionnaire to get the opinion of the residents as to the cause and probable remedies of farmers and herders conflicts in the district.

IV. DATA SOURCE AND METHOD:

There are two types of data sources, primary source and secondary source. The primary source is the source of spatial data which include the satellite imagery of the study area, topographical map covering Ribadu district, analog administrative maps of Nigeria, Adamawa state, Fufore local government area and Ribadu district. The topographical and administrative maps were obtained from the ministry of land and survey Yola, Adamawa state while the satellite imagery of the study area was downloaded using Google Earth. The secondary data source is a direct acquisition of UTM coordinates of some features of interest using DGPS Promark3 instrument and one on one interview of the residents of the districts based on a designed questionnaire.

The method adopted for the study is therefore acquisition of analog maps and satellite imagery of the study area and direct acquisition of UTM coordinates of ground points for geo-referencing and UTM coordinates of points along the cattle routes, farms, minor and major roads, settlements, etc. using DGPS equipment, production of digital map of the study area and hence analyzing the root cause of farmers and herders conflicts base on the representations on the map and oral interviews conducted on the residents of the district. UTM coordinates of four ground corner points of the study area were obtained for geo-referencing as tabulated in table 1 below:

Table 1: UTM coordinates used for Geo-referencing

Ground Points	Northing (m)	Easting (m)
Point 1	1034630.135	268084.414
Point 2	1034630.135	257258.388
Point 3	1021946.877	257258.388
Point 4	1021946.877	268084.414

V. DATA PROCESSING:

The downloaded satellite imagery of the study area was imported into ArcGIS environment and was geo-referenced using UTM coordinates of four ground corner points of the study area. Different shape files for features such as major and minor roads, water bodies etc. were created with their respective colors. Polylines were used to digitize on screen of all visible features displayed on the imagery. Other features not visible on the satellite imagery such as farms, cattle routes, and some settlements were plotted on the map using their respective UTM coordinates obtained in the field. Map of the study area was produced depicting all relevant features enough to be used in analyzing the root cause of farmer and herders conflict in the district. The cartographic framework of the methodology is hereby presented in figure 2 below.

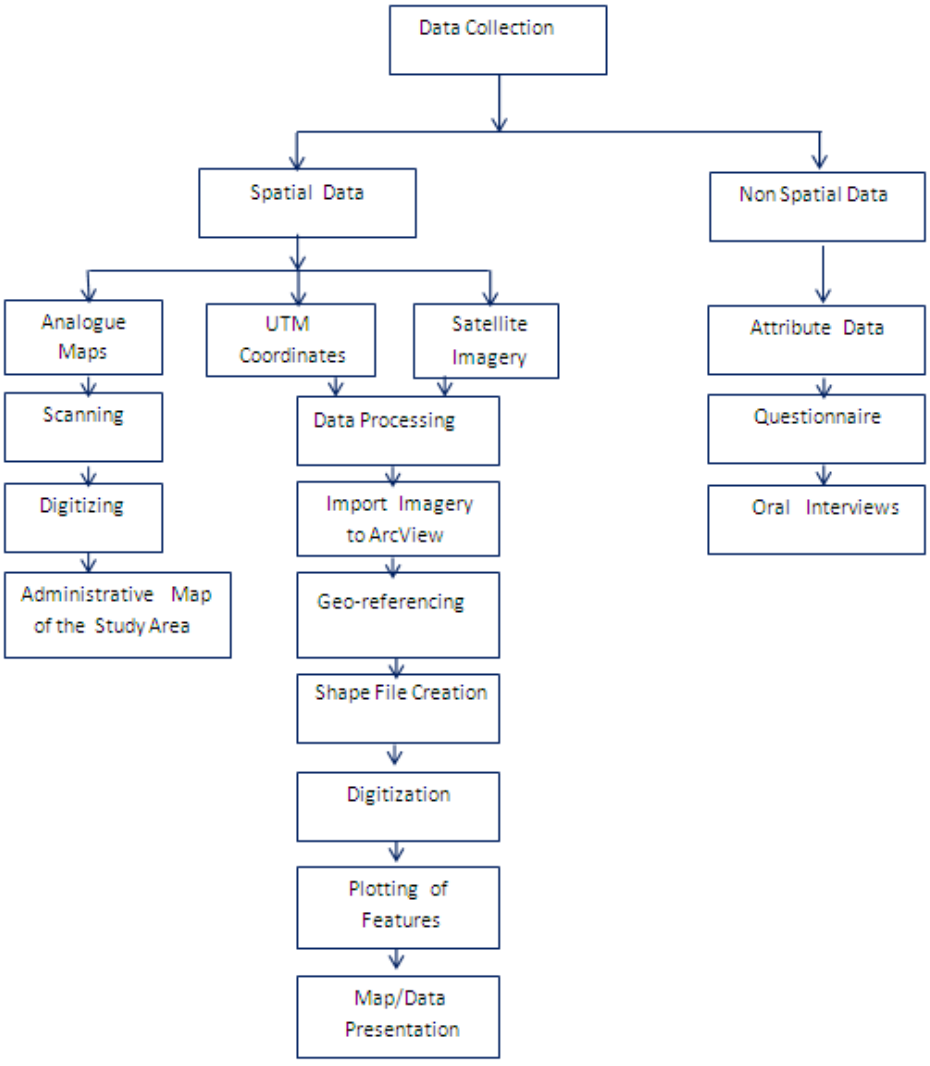

Figure 2: Cartographic Frame Work of Methodology

VI. RESULTS PRESENTATION AND ANALYSIS:

Having acquired and processed spatial data obtained from the field, the maps of the study area were thus, produced and presented in figures 3 and 4. Figure 3 shows different settlements, river Benue on the North, foot path, farm lands and network of cattle routes in the area. Figure 4 shows in addition to figure 3, water bodies like lakes, ponds, minor rivers access roads and major roads linking different settlements in the area.

A critical look on the maps reveals that many farmlands are either located very close to or on the cattle routes. More than half of the local cattle routes initially created and demarcated using natural features such as trees were no longer in existence, such routes were re-defined with the help of the village heads and the coordinates along those routes were taken and used for plotting them on the map. Furthermore, as could be seen from the map on figure 4, most of the water sources which could be used by cattle to survive their thirst are situated North of the district leaving the Southern part with few ponds which are not enough to be used as source of drinking water for the cattle, and the few available ponds were taken over by farmers who use them for irrigation for dry season farming thereby making it difficult for stock to get access to waters in those ponds.

The oral interview conducted on the residents revealed that some of the areas reserved for grazing were acquired and fenced by the elites thereby denying the cattle access to grazing. It was also gathered that the herders on transit from Chad and Niger Republic would deliberately divert from the international cattle routes created by the Federal government and thereby causing havoc to the crops located along those routes. The herders on transit usually pass through the district in the months of November and December every year heading to Toungo local government area and then to Cameroon Republic searching for greener pasture for their livestock. The residents also lamented that they do not have dams where their livestock can drink water, usually twice a day. They (herders) also pointed out that they are facing problems of inadequacy of grazing resources more especially during dry season and that the crops residue which had been previously offered freely to their livestock is now commercialized by the farmers.

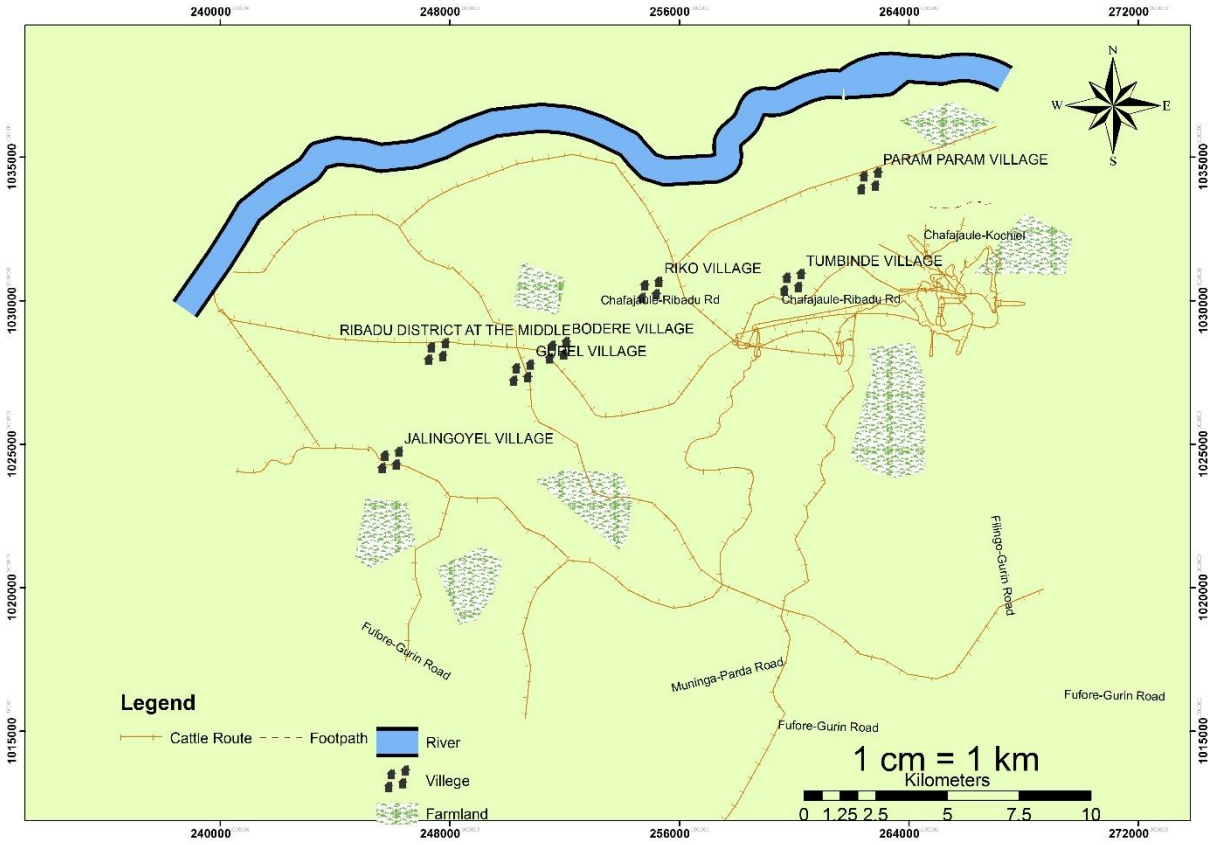

Figure 3. Map: Showing cattle route, farmlands, town/villages and River Benue

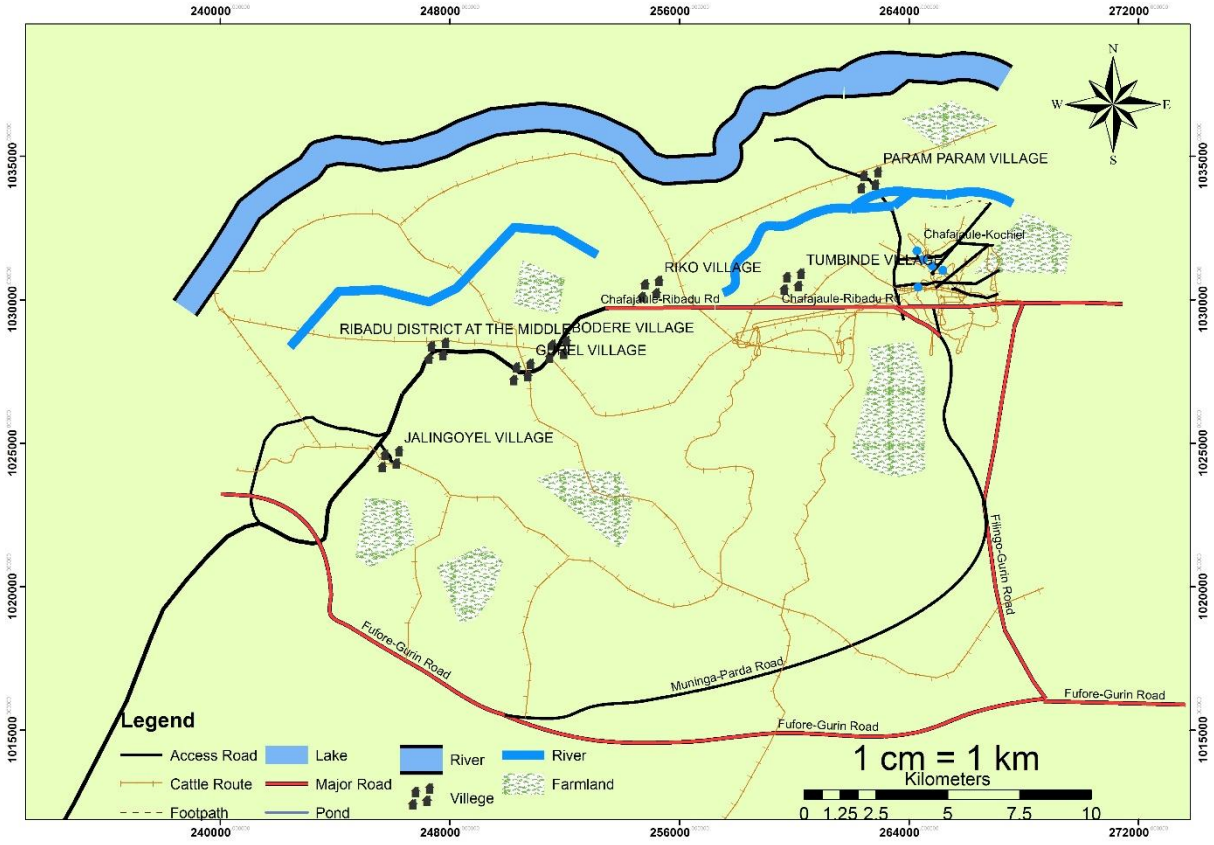

Figure 4. Map showing minor river, lakes/ponds, major and minor access roads

VII. THE ROOT CAUSE OF FARMERS AND HERDERS CONFLICTS:

Base on the results presentation and analysis discussed above, the root cause of farmers and herders conflicts in Ribadu district are hereby itemized as follows:

i. Cultivation of crops on tracks created/designated as local cattle routes by farmers, thereby denying the stocks access routes to grazing areas.

ii. The source of water for livestock consumption is so limited in the district and the available ones like rivers and lakes were taken over by farmers for irrigation purposes, thereby denying livestock access to water for drinking.

iii. The elite from those areas who are not farmers and are not residing in the area do acquire and fence vast area of land with the guise of farming on such lands, thereby limiting the available areas reserved for grazing.

iv. Some of the local cattle routes to grazing areas created and demarcated with natural features like prominent trees are completely vanished due to human activities of failing trees for domestic use. This phenomenon, in some cases made the stocks to take any available routes and would eventually destroy crops along the way.

v. The herders on transit from neighboring countries of Chad and Niger Republic deliberately divert from the international cattle routes created and destroy crops belonging to the farmers in the area and the suspicion and blame is pushed to the herders that are based in the area.

vi. In adequacy of grazing resources. The crops residues such as hay and straws are now commercialized by the farmers, contrary to the earlier practice where herders were invited after harvest to feed their livestock free of charge. The policy of commercialization of the crops residue is sometimes violated by herders and they forcefully feed their livestock without the consent or purchasing the residue from the farmers.

VIII. SUMMARY:

The Ribadu district of Fufore local government area of Adamawa state is located in the North Eastern part of Nigeria. The inhabitants of the district had been living together in peace with one another for over a century until recent times conflicts started between the Fulani herders and other tribes who are majority crop farmers. The government authorities in collaboration with the local chiefs in the district took necessary measures to bring the situation under control but of no avail. However, GIS techniques as a computer-based tool for mapping and analyzing things that exist and happen on earth was used to analyze the root cause of the conflicts in the district. This was achieved by downloading the satellite imagery of the study area via Google Earth and importing it into ArcView environment. The imported imagery was geo-referenced and all visible features such as major roads, water bodies etc. were digitalized on screen. Ground features such as farms and local cattle routes that were not visible on the imagery were plotted on the map using their coordinates obtained in the field using DGPS equipment. Oral interview on the residents of the district were also conducted to get their views as to the root cause of farmers and herders conflicts in the district. The map of the study area produced and the response to oral interviews conducted were used to analyze the root cause of farmers and herders conflicts in the district. It was found that the root cause of the conflicts are blockage of cattle route by citing farms on them, dry season farming around the water sources thereby denying stocks access to water for drinking, limitation of grazing areas by the attitude of the elites, varnishing of local cattle routes cause by human activities, inadequate grazing resources among others.

IX. CONCLUSION:

The analysis of farmers and herders conflict in Ribadu district of Fufore local government area has been made base on the representation of ground features of the area on map and interpretation of the views of the residents in the area through oral interviews conducted on the residents. Features on the map clearly shown that lots of cattle routes has been blocked by farmers activities thereby denying stocks access to grazing areas, and most of the cattle routes are no longer in existence and the herders took any available route which would eventually cause damage to crops belonging to farmers. The oral interview revealed that some of the herders would deliberately abandon their routes and cause havoc to crops belonging to farmers. The water sources for drinking by livestock, has been taken over by farmers for irrigation purposes and a host of other problems. From the analysis, it is clear that both farmers and herders do overstep their boundaries which led to conflicts among them, and these conflicts escalate every year. Government authorities concern and the local chiefs in the area must take appropriate measures to bring the situation under control.

X. RECOMMENDATIONS:

Base on aforementioned analysis, I hereby make recommendations thus: 1.The government authorities concern and the local chiefs in the area should order for un-blocking of all cattle routes by relocating farm lands cited on such routes. 2. All cattle routes should be re-defined, surveyed and demarcated with survey monuments made of concrete. 3. Government should construct at least five dams in the district for livestock water consumption only. 4. The federal government should ban herders from transiting through her territory from neighboring countries of Chad and Niger Republic until farmers in the country harvest all their farms products. 5. The leaders of farmers and herders in collaboration with the local chiefs should, from time to time organize a forum for memorandum of understanding between farmers and herders in the area.

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