Lower Plains of Northern Nigeria

4

Tasi'u Yalwa Rilwanu

Abstract

Northern Nigerian lower plains are extensive areas of lower topography situated within the relief region that comprises plains, basins and isolated hills. The region is composed of Sokoto Plain which acted as a watershed for most of the rivers in the sub-region. Among the lower plains of Northern Nigeria, areas around Kano, Kaduna and Zaria are higher than the rest of the region in terms of relief and landscape features, Maisaje hill is the highest at 1593 m above mean sea level. Riruwai Ring Complex with its old tin mining ponds serves as a source to the major rivers in the north-western part of the plain. To the north-east, the lower plain formed features such as sand dunes and isolated hills around Jahun, Katangare, Gudumbali, Bulatura and Lantewa Dunefields. Some of the dunefields are blessed with potash deposits. The major landscape features of the region include inselbergs, lake, dams, rivers, metasediments, sand dunes and isolated hills among others. In the north-east, Gwoza Hills an extension of the Cameroun Mountains appears to be the highest point of the sub-region surrounded by plains, basins, wetlands and the shrinking Lake Chad. The physical nature of lower plains and available water bodies provide a good environment for effective agriculture, fishing and mining among others. For that, it is important to identify, study and describe lower plain regions of Northern Nigeria for understanding the display and interaction between drainage sources, landscape, landform units and development processes.

Keywords

Lower plains • Inselbergs • Dunes • Northern Nigeria

4.1 Introduction

Plains are extensive, nearly level stretches of land that have no pronounced changes in topography. They are mostly lower than the surrounding lands; they can be situated along the coast or inland. Lower plains are associated with depressions or basins. The lower plain regions in Northern Nigeria include the Sokoto Plain, the plain of Central Northern Nigeria, the plain of the Sand Dunes Belt, the Chad Basin and some other pockets of the lowlands and depressions all over the region. The lower plains of Northern Nigeria are surrounded by higher areas such as the Jos Plateau, the Biu Plateau, the Mandara Mountains and the Adamawa Bamenda Highlands among others (Fig. 4.1). The plains which are the dominant features in this part of Northern Nigeria have resulted from alternating denudational and aggradational processes. The African denudational land surface of the early Cenozoic Age is the main landform occurring in the Plains of Hausaland. These wide plains are dissected by mature valleys, an example of which is the Kaduna river valley. They belong to the African denudational surface at a height of 600–730 m above sea level, although there are fragments of post-African and Cenozoic surfaces as well. Above the plains rise inselbergs and castle kopjes which may attain a height of over 300 m. The aggradational land surfaces in the country are usually found in the areas bordering the denudational land surfaces, and they comprise most of the remaining plains. The Sokoto Plain belongs to the Northern Nigerian lower plains and attracts a considerable population due to easy access to water, resources and other socio-economic activities of post-African aggradational surfaces of late Cenozoic Age and is composed of sedimentary rocks of Cretaceous to Tertiary Age, mainly sandstones, shales and sands which lie at about 240–300 m above sea level. East of the Jos Plateau lies the hills and plains of Kerri–Kerri and Gombe, which are underlain by sedimentary rocks of Cenozoic Age in the west and of Cretaceous Age in the east, mainly sandstones and

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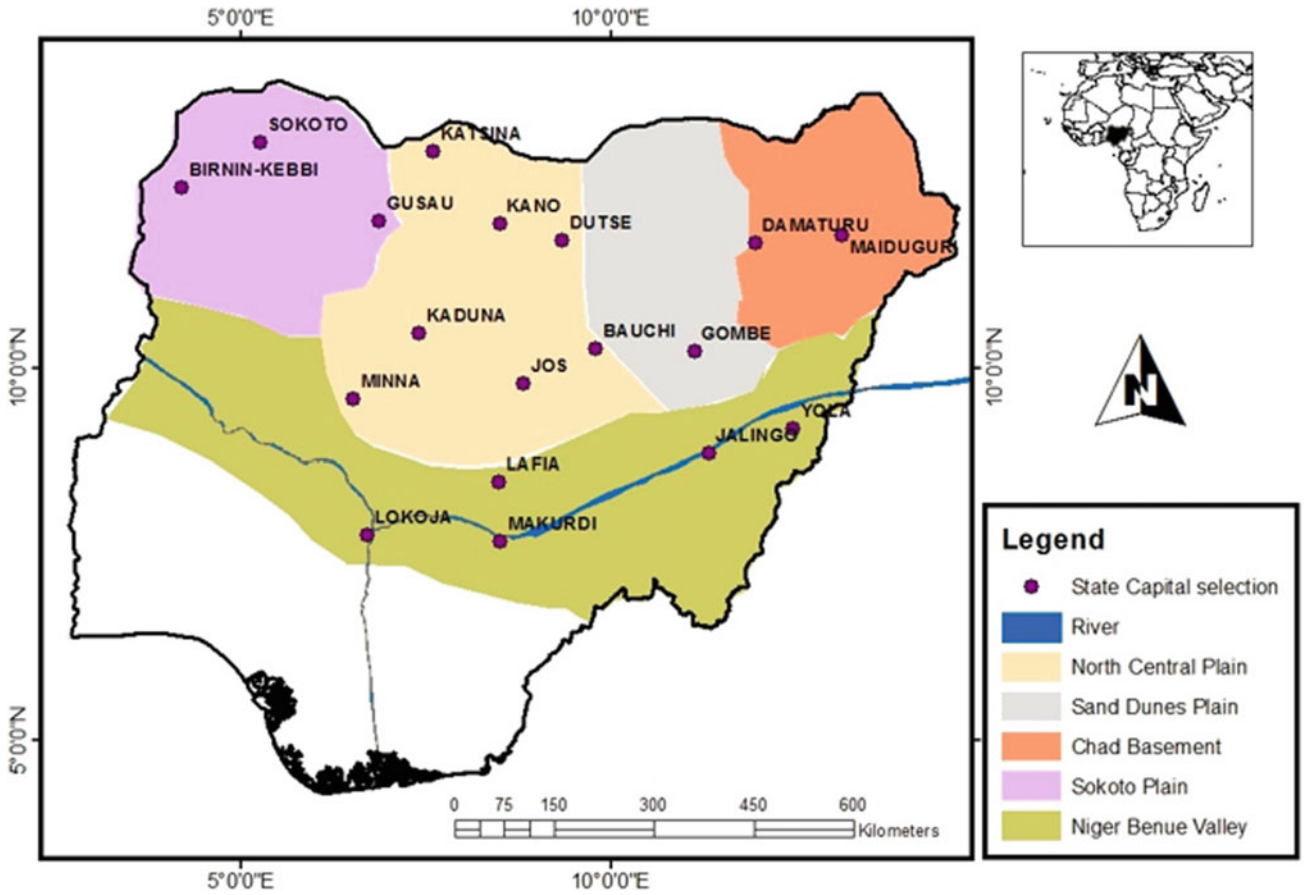

Fig. 4.1 Lower plains of Northern Nigeria. *Source* Cartography Lab Geography Department, Bayero University, Kano, 2019

shales. The higher elevations reach over 750 m above sea level, but these volcanic plugs composed of phonolite and basalt result from Cenozoic volcanism. The plains merge northwards with the Chad Basin, which is underlain by young sedimentary rocks of the Quaternary Age (See Fig. 4.2). The wide featureless plains are interrupted in their north-eastern sector by inactive dunes that have been colonised by vegetation. These plains are dissected by a centripetal pattern of river valleys. This chapter specifically describes the landscape of lower plain regions of Northern Nigeria and associated landscape features.

4.2 Lower Plains of the Sokoto Basin

The lower plains of the Sokoto region serve as a watershed for the major drainage systems in the area. River Rima and its tributaries originate from the dissected plateau of the western Rima Basin that drains this plain through Talatar-Mafara, Gwandu, Sokoto and Kebbi towns up to River Niger. The region is characterised by discontinuous plains from which rise steep-sided granite, gneiss and quartzite hills (Udo 1970). Around parts of Anka town and Ka river; the landscape has developed upon an extensive belt of phyllites. There are also extensive plains of sand or wind-blown materials which were believed to have been derived locally. The area also extends to the southern and south-eastern parts of Birnin-Kebbi City (Fig. 4.3). Around the Rima river, up to where the Niger State shares a border with the Kebbi State, there are good examples of such sandplains (Fig. 4.4). The average altitude in the area is around 400 m, with a few exceptions with up to 700 m in some of the hilly areas (Silviconsult 1992). Zamfara areas around the towns of Maru, Talatar-Mafara and Moriki and the north-western parts of the state around Gusau are characterised by granitic highlands of low heights rising above the plain. The relief of such landscapes is usually between 244 and 366 m (Thomas 1995). The landscape of the Sokoto Plain depends on the type of the underlying rock. It displays a monotonous spread of minor irregularities commonly found in areas of thick weathering mantle. The lower plains of Sokoto are categorised into two types: the Gundimi-Rima-Illo Plains, characterised by deposits of softer sedimentary formations which can easily be worn by agents of denudation, and the Gwandu Plains believed to have developed from younger rocks of the Eocene to post-Eocene periods and dominated

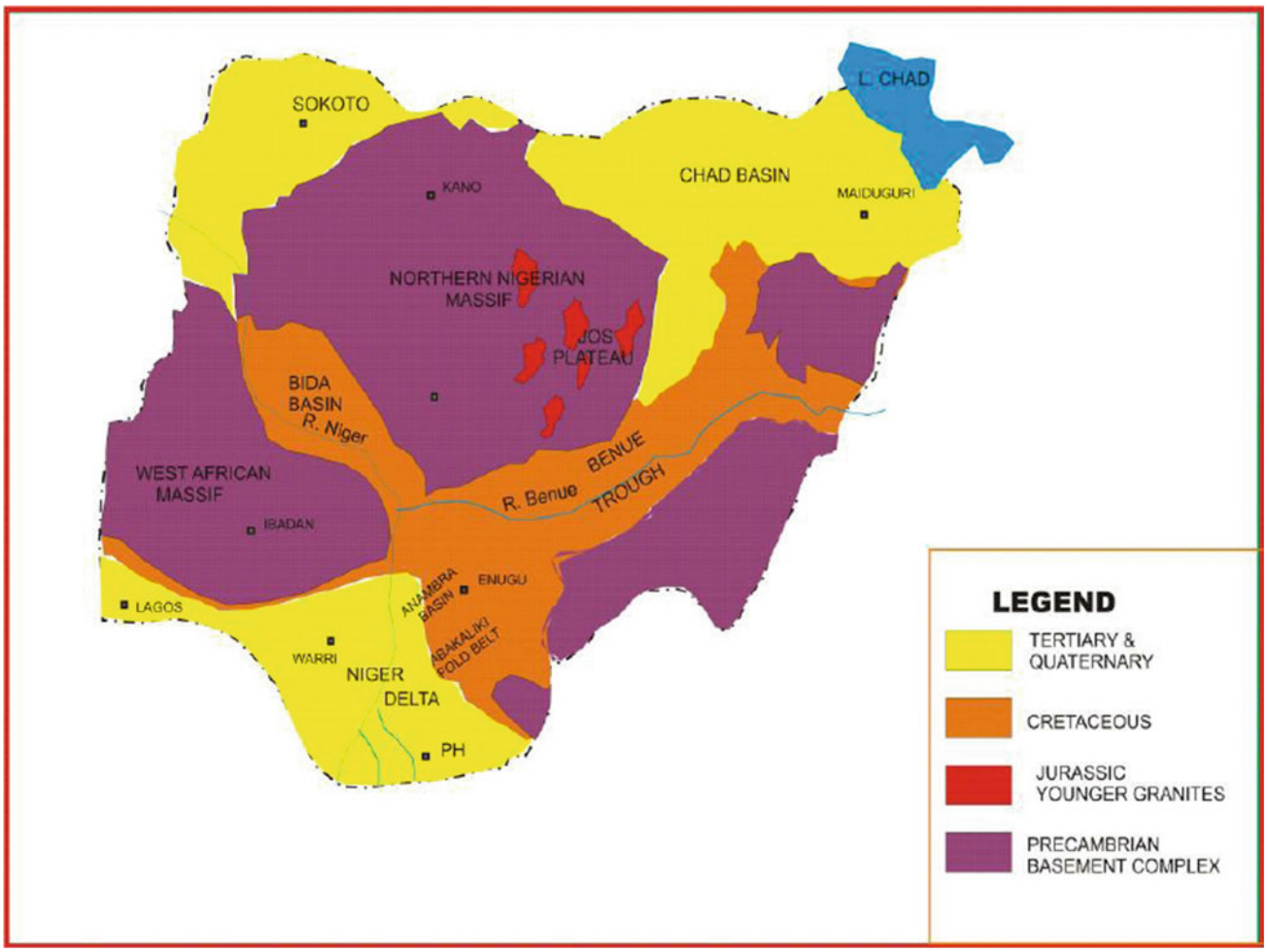

Fig. 4.2 Geomorphological and geological regions of Nigeria. *Source* Adapted from Dada et al. (2006)

by sandstone deposits, hence referred to as a plateau of sandstones (Fig. 4.5). In the lower plains of the Sokoto Basin, the predominant land use includes limestone quarrying and gold mining, farming and cattle rearing, among others.

Remarkable examples of sandstone plateaus are commonly found around Sokoto-Rima, stretching through ridges, escarpments and spurs. Other features include cliffs, the examples of which are the common rugged surfaces around Goronyo (Udo 1970). Other typical landscape features of these areas include hills of metasediments formed out of sedimentary rocks which form a continuous chain of hills that starts near Gusau and extends up to Dogon-Dawa (an extensive forest along Gusau−Sokoto road) where metasediments are also common. A typical example can be seen at a turn along Gusau−Sokoto road called *KwanarDogonKarfe* (Dogonkarfe Junction) (Fig. 4.6). Another remarkable landscape feature in this area is the confluence point of the Rima and Sokoto rivers at Asare in Sokoto (Fig. 4.7). The River Rima originates from the Adar Plateau around Maudou district and Birnin Kornni City in the Niger Republic, while the Sokoto river drains from the hilly areas around Talatar-Mafara and KotarKoshi towns in the Zamfara State. The surroundings of KotarKoshi town are another typical plain area surrounded by a well-known gigantic granitic hill range called KotarKoshi Hills (Fig. 4.8).

4.3 Lower Plains in North-Central Northern Nigeria

These are plain areas around most of Kaduna State, parts of Kano State and a small portion of Jigawa State. These are parts of the lower plains of Northern Nigeria that are higher than the rest of the plains in terms of elevation and landform features. The major landscape features in the region include residual hills, made up of lateritic materials like Dala, Gwauron-Dutse, Fanisau and Magwan Hills in Kano City (Fig. 4.9) and Ruwares in different localities within the region. The plain region is also characterised by ring

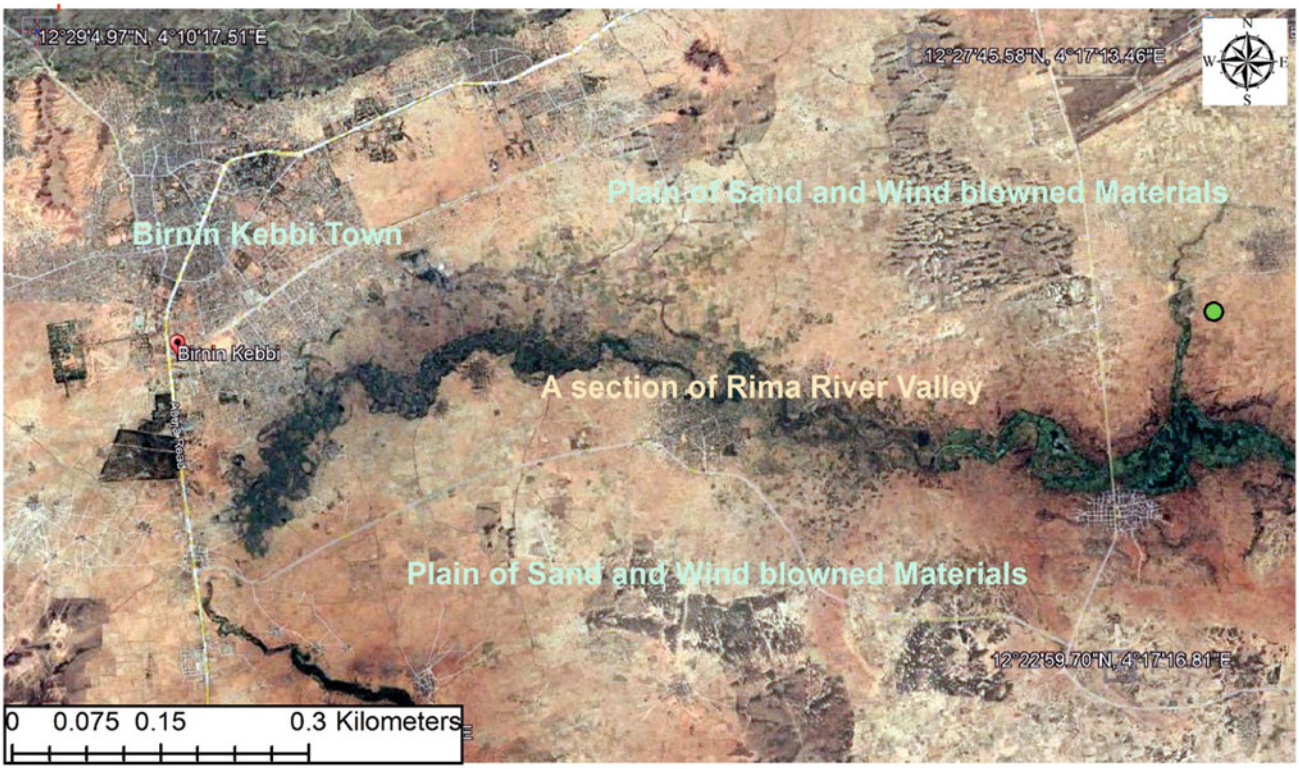

Fig. 4.3 Typical wind-blown plain in South-eastern Birnin-Kebbi City. *Source* Retrieved from Google Earth, January, 2022

Fig. 4.4 Landscape of the south and south-eastern parts of the Rima river

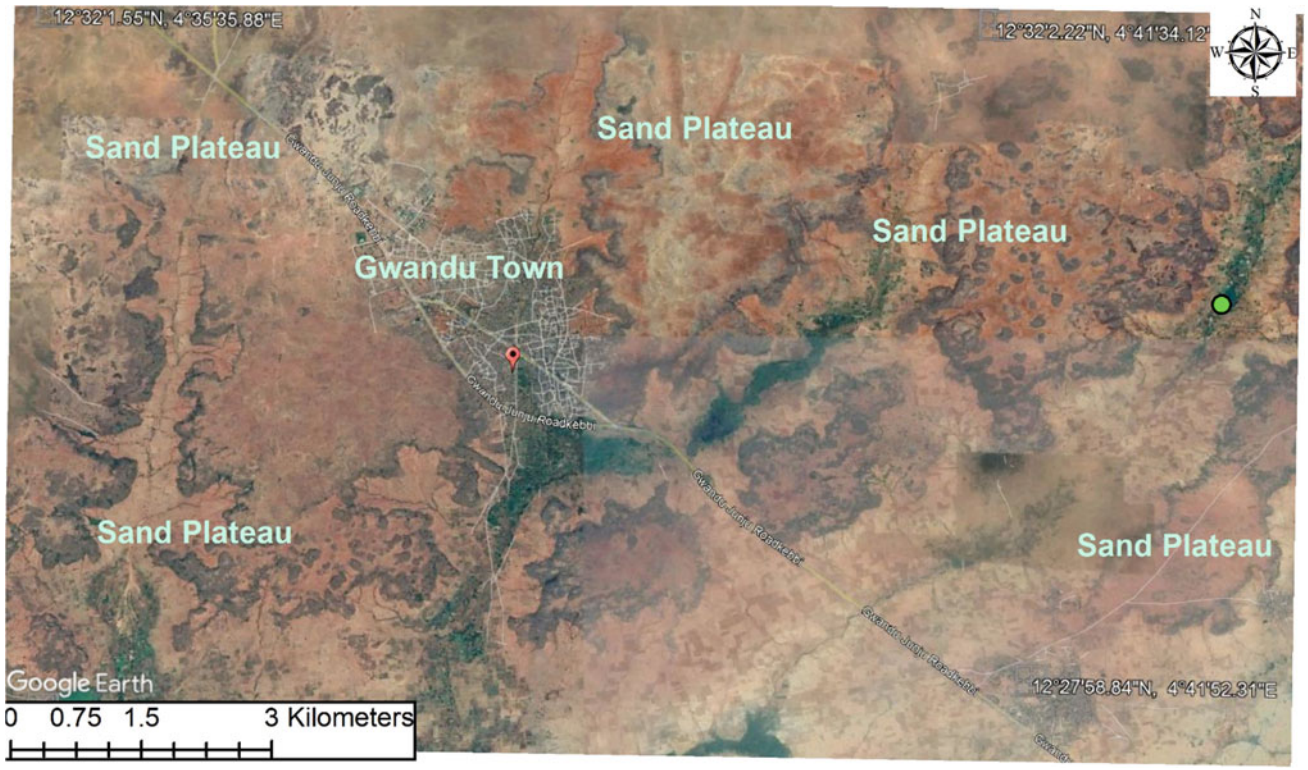

Fig. 4.5 Typical example of an extensive sandstone plateau around Gwandu town in Sokoto. *Source* Retrieved from Google Earth, January, 2022

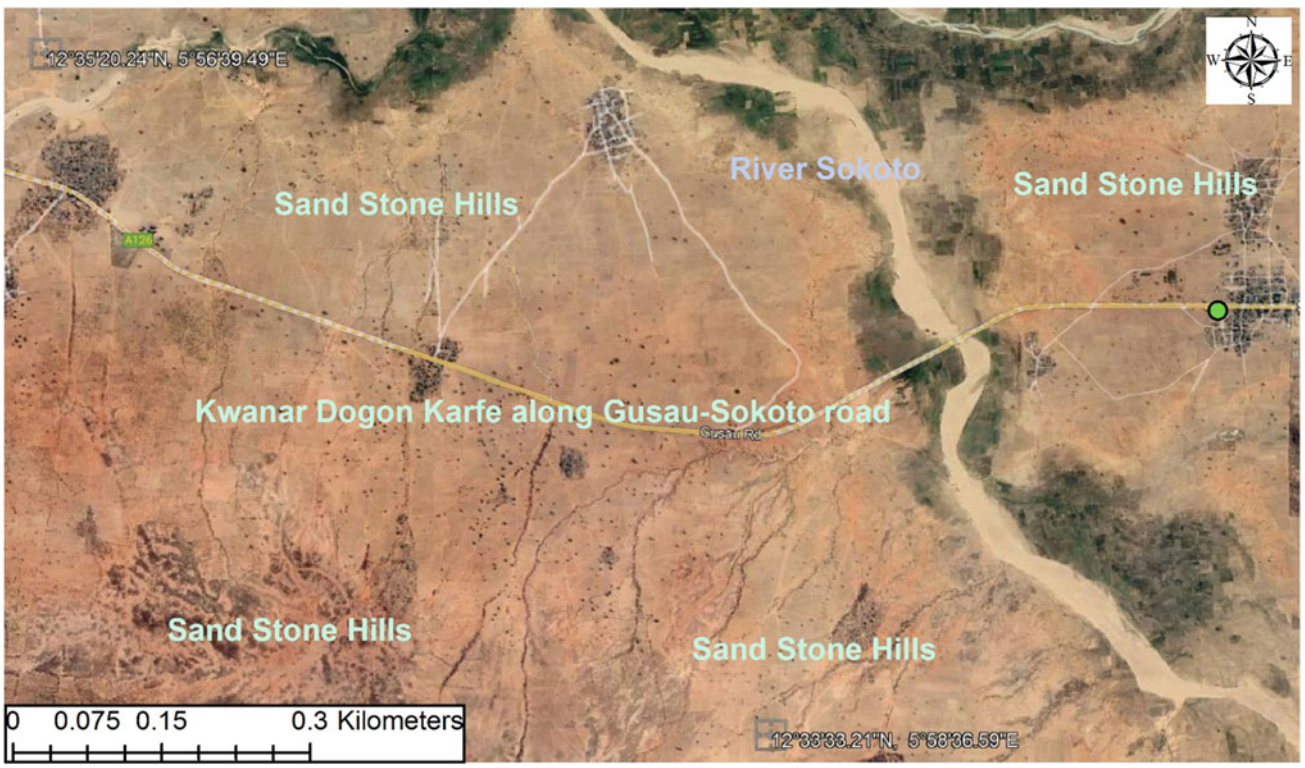

Fig. 4.6 Typical sandstone hill commonly found at *KwanarDogonKarfe* along Gusau—Sokoto road. *Source* Retrieved from Google Earth, January, 2022

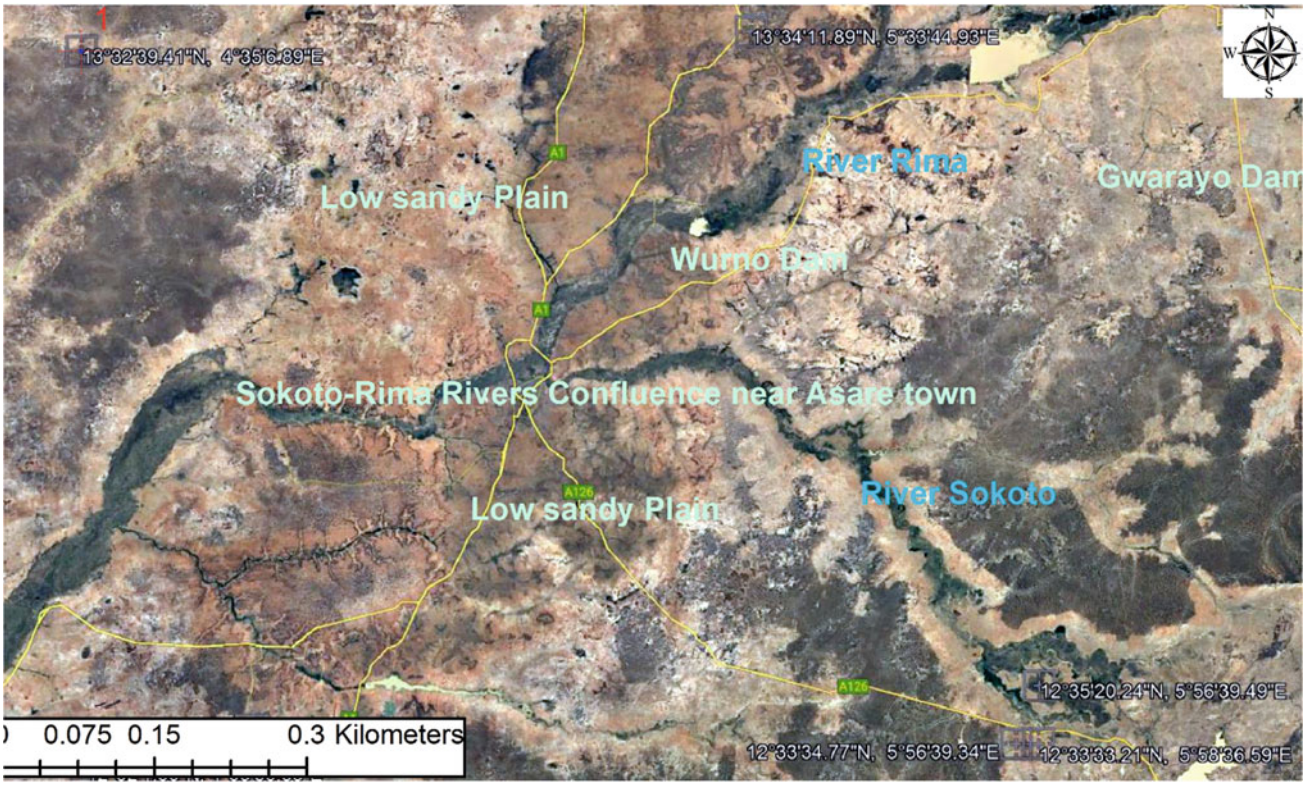

Fig. 4.7 Confluence point of Sokoto and Rima rivers at Asare along Sokoto—Wammako road. *Source* Retrieved from Google Earth, January, 2022

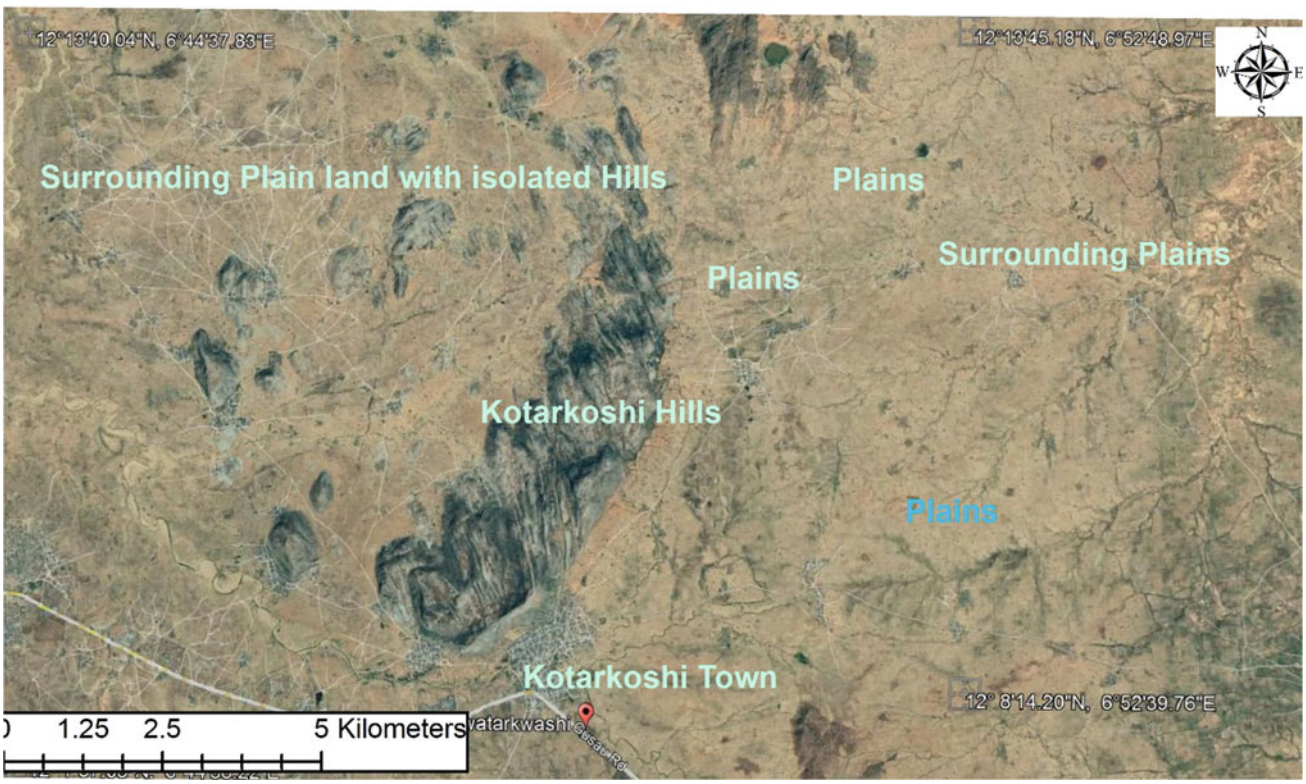

Fig. 4.8 Plain landscape with granitic hills around KotarKoshi town, Zamfara State. *Source* Retrieved from Google Earth, January, 2022

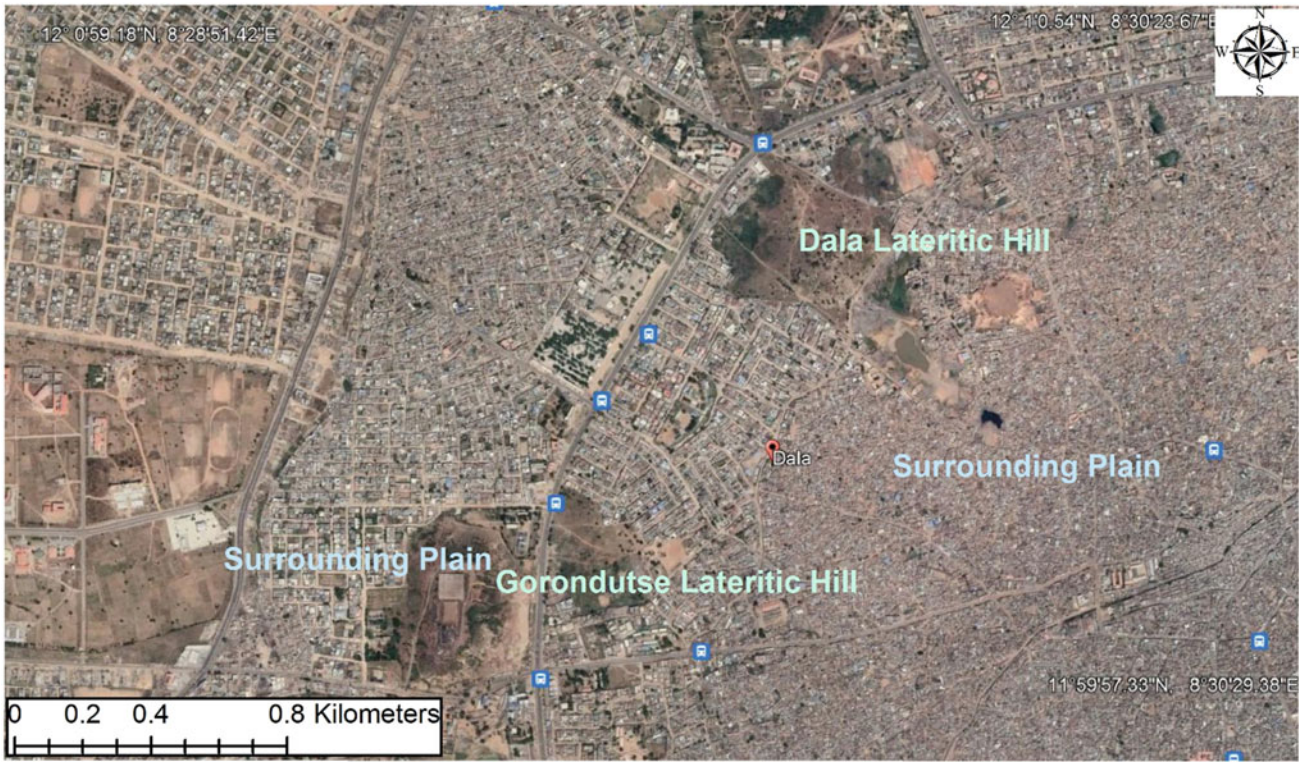

Fig. 4.9 Dala and Gorondutse Lateritic Hills in Kano City. *Source* Retrieved from Google Earth, January, 2022

complex hills of younger granite around Riruwai town in the southern part of Kano State, and the area is characterised by old Tin mining pits like green water and Kwalwa ponds (Fig. 4.10), which extend up to the Jos Plateau through Ningi-Burra Complexes in Bauchi State (Fig. 4.11). The highest point in the entire region is Maisaje Hill with 1593 m above mean sea level (Fig. 4.12). The plain region is also characterised by numerous woolsacks, tors and balanced rocks around Birnin Kudu town (Fig. 4.13). The major rivers that drain this plain are River Challwa, River Kano and their tributaries. The River Kano rises from the top of Jos Plateau foothill around Riruwai in Doguwa Local Government Area, Kano State. Parts of Kazaure town (Fig. 4.14), Amaryawa, Roni and Yankwashi towns in Jigawa State are also characterised by the presence of a plain with numerous hills built of metamorphic schist that rise to 620 m above the surrounding plains in some places, particularly in Kazaure. The hills and undulations commonly found in the Basement Complex areas of the Sahel in Nigeria are probably the results of the intrusion of older granites into the Basement Complex, which have undergone a long period of denudation (Buchanan 1955). Most of the extensive land within this plain is dominated by agricultural, commercial and industrial activities.

The areas around Kaduna represent a plain landscape with a morphology that is characterised by inselbergs, gently undulating plains and small river valleys associated with a bedrock of Proterozoic Age that belongs to the older granitic rocks (Bennett et al. 1977). These plains consist of gently undulating land broken by scattered inselbergs and shallow valleys draining into River Kaduna (Fig. 4.15). In another study conducted around the Kaduna Plain, Hartmann, et al. (2014) identified seven topographical units as inselbergs, upper pediments, lower pediments, river valleys, floodplains, lower plains and upper plains with elevations of 800, 670, 640, 600, 550, 640 and 670 m above mean sea level, respectively. In the southern parts of the Kaduna State, the area is dominated by plain land and the major landform features include granitic hills, rivers and streams. In Southern Kaduna, the area is surrounded by hills, valleys and plains which beautify the area and attract visitors (Omon 2014). There is also the Zaria Plain (Fig. 4.16), which comprises areas surrounding the Zaria City from the west, around Shika and Giwa towns, which includes plain land with granitic outcrops and inselbergs. In the north, it comprises parts of Makarfi and Hunkuyi towns among others, with the vast plain lands with undulations of granitic outcrops that extend up to parts of Rogo town in the Kano State. In the south-eastern parts of the Kaduna and Zaria Plains lie the towns of Soba, Kudan, Kauru, Ikara and Maigana, situated on plain topography characterised by rock outcrops, inselbergs, castle kopjes, streams and river valleys. The plain

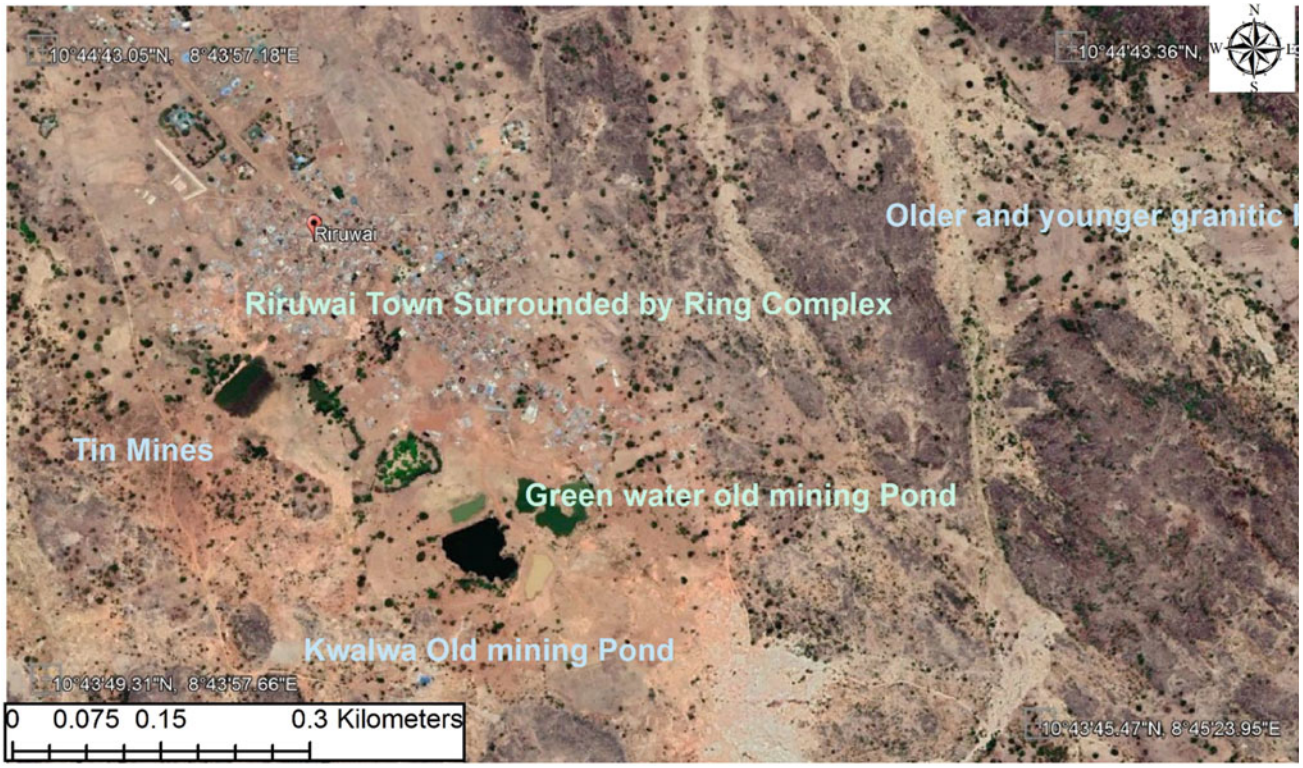

Fig. 4.10 Riruwai ring complex. *Source* Retrieved from Google Earth, January, 2022

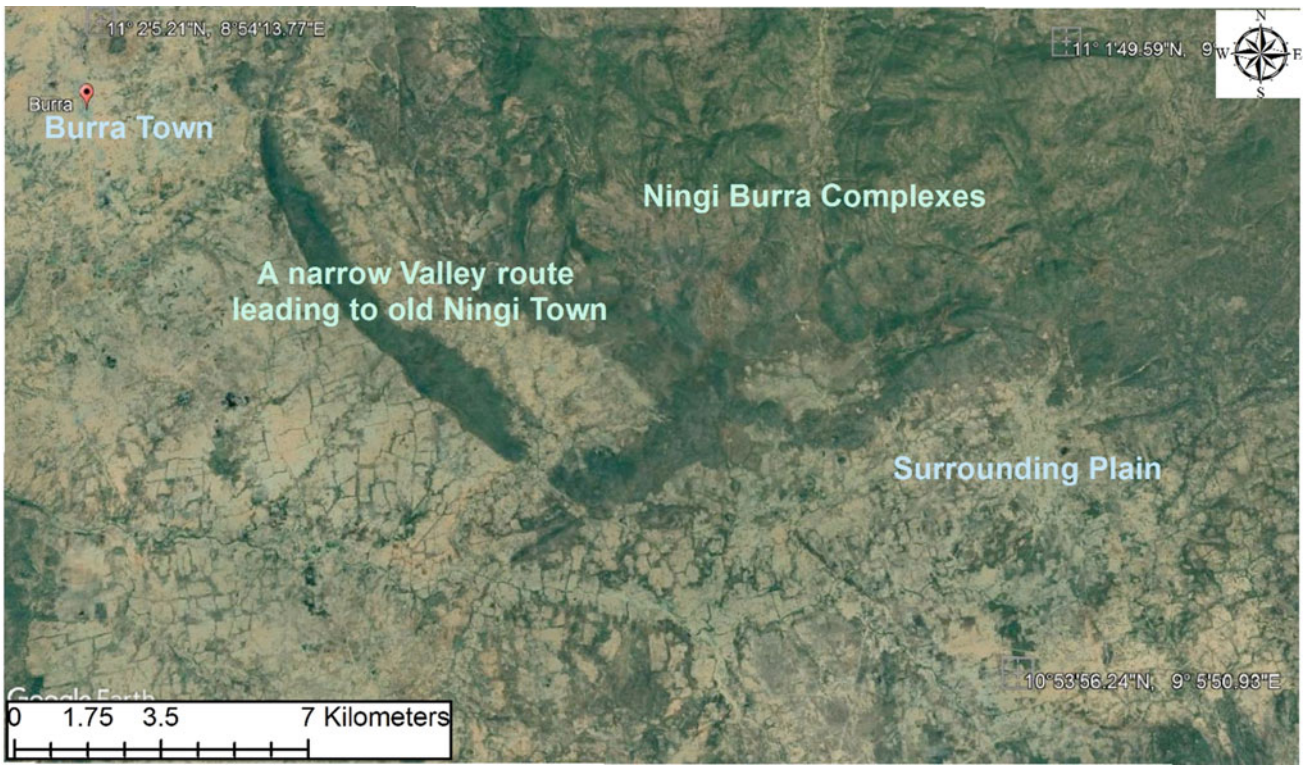

Fig. 4.11 Ningi-Burra complexes part of Bauchi State. *Source* Retrieved from Google Earth, January, 2022

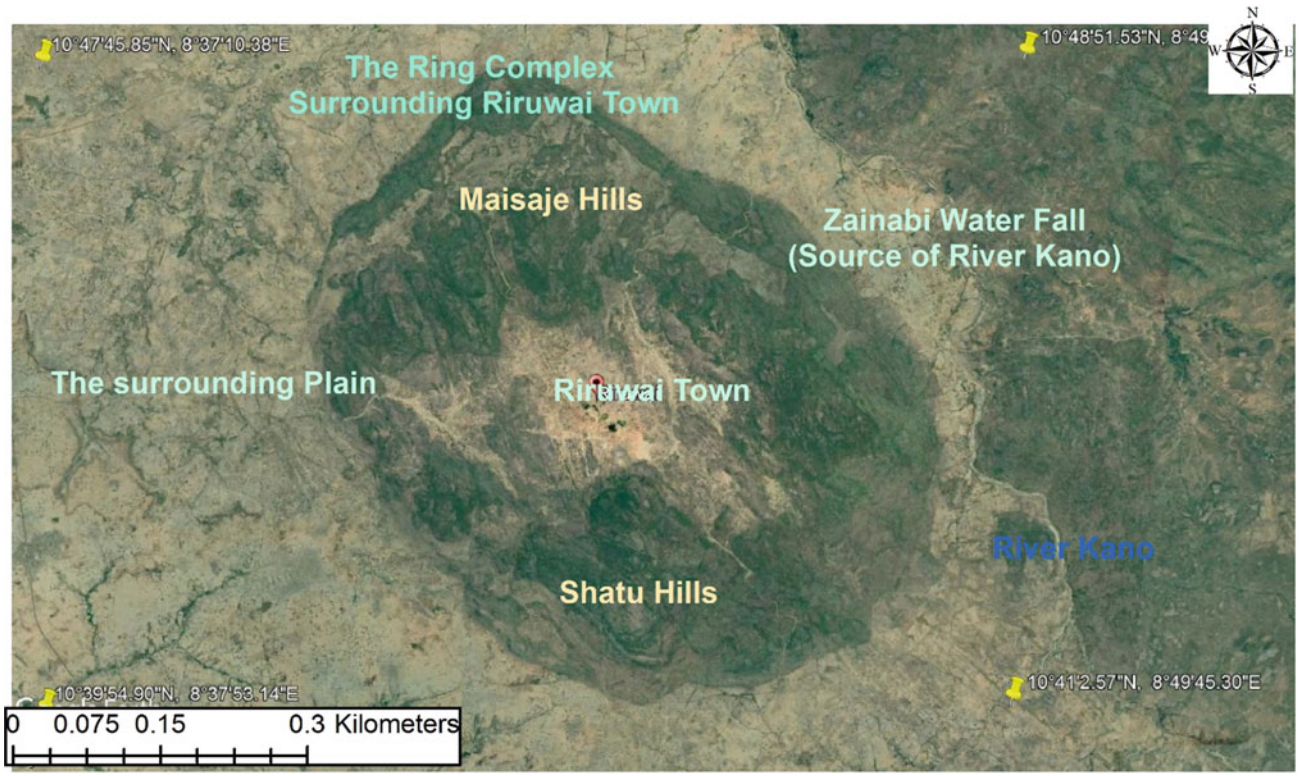

Fig. 4.12 Riruwai ring complex showing the highest point and waterfall. *Source* Retrieved from Google Earth, February, 2022

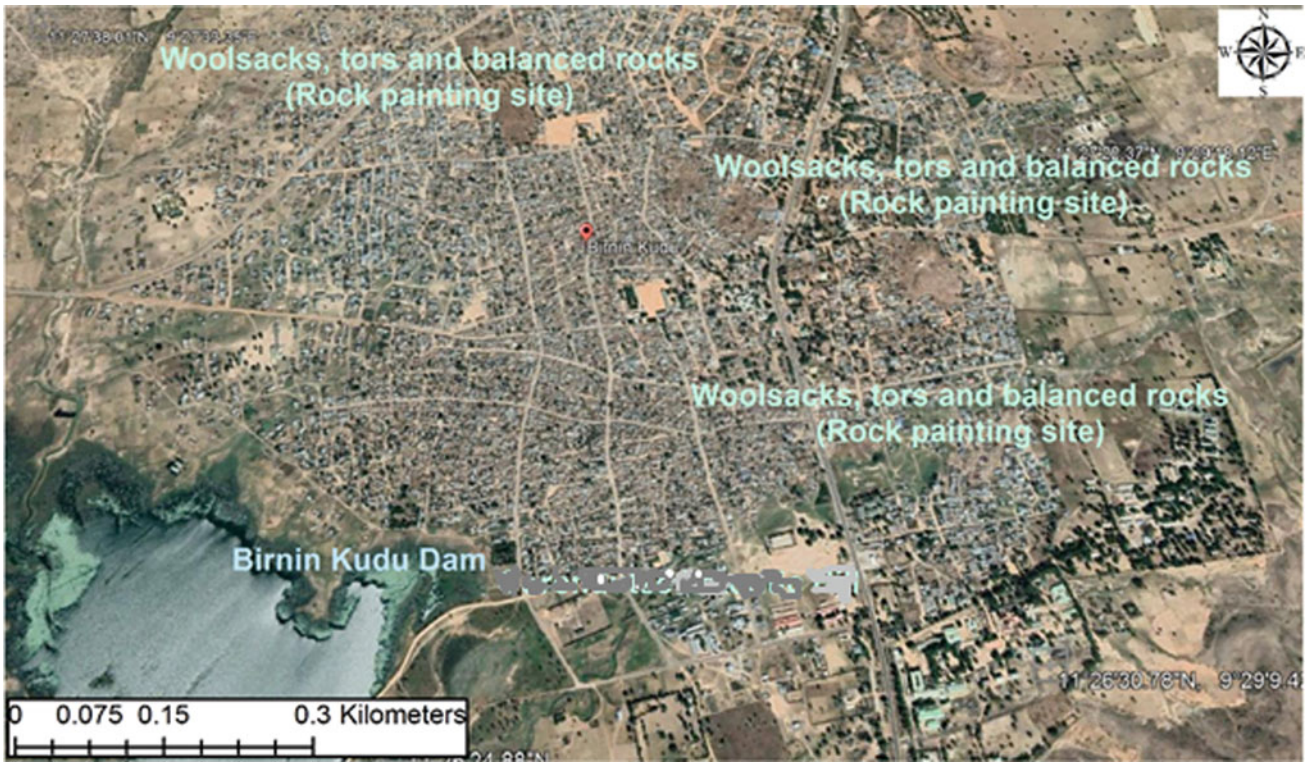

Fig. 4.13 Landscape features around Birnin Kudu town, Jigawa Stat. *Source* Retrieved from Google Earth, January, 2022

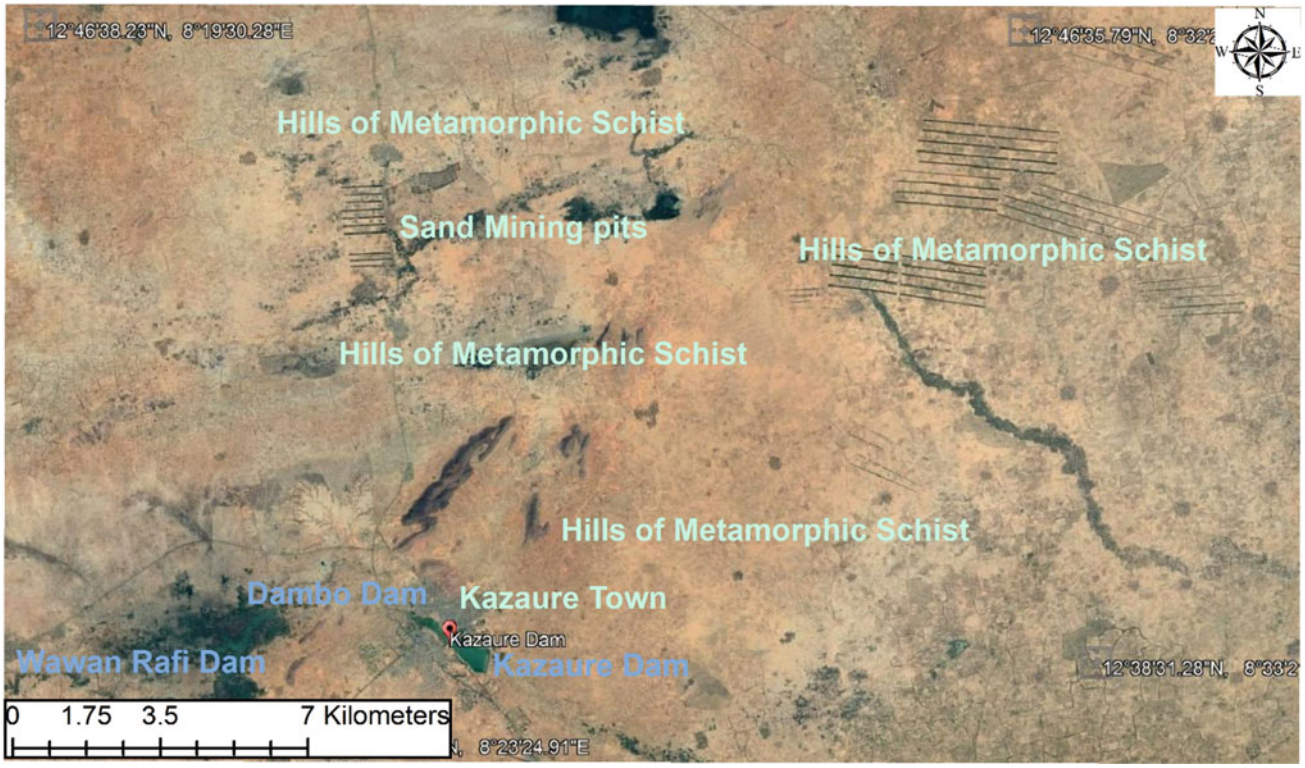

Fig. 4.14 Plain around Kazaure town surrounded by hills of metamorphic schist. *Source* Retrieved from Google Earth, January, 2022

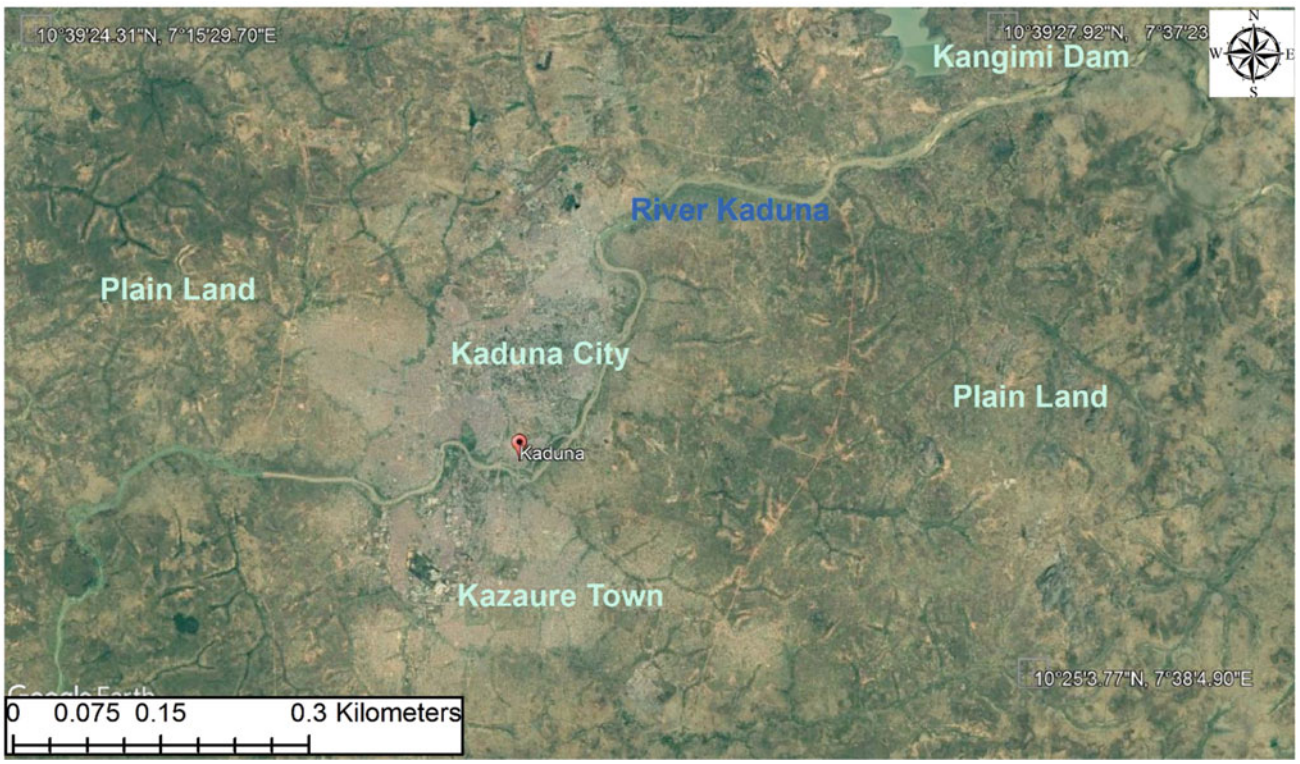

Fig. 4.15 Plains and rivers around Kaduna City, indicating River Kaduna and vast plain used for agriculture, both rain-fed and based on irrigation. *Source* Retrieved from Google Earth, January, 2022

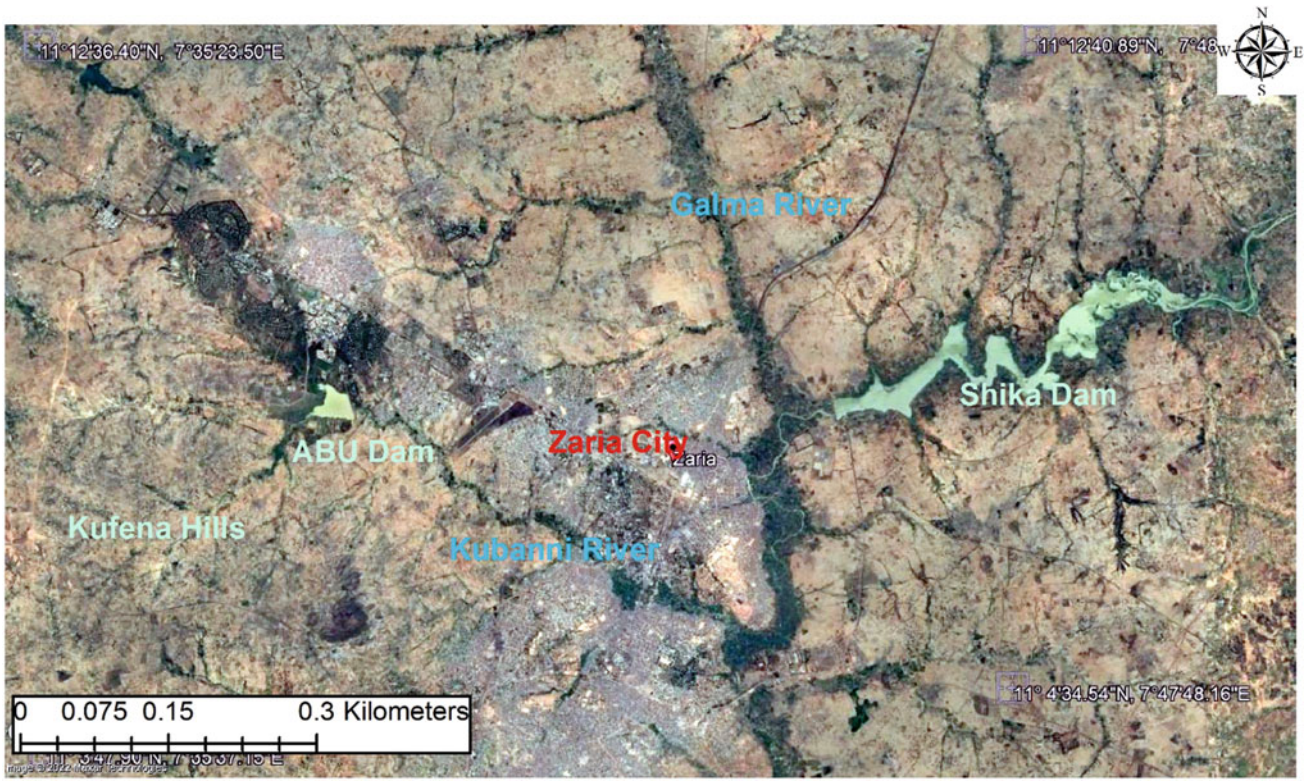

Fig. 4.16 Section of Zaria Plain with rivers, streams and hills. *Source* Retrieved from Google Earth, January, 2022

area is under intensive agriculture; it is the largest producer of cereals in Kaduna State. The Jos Plateau rises steeply above the surrounding areas of this vast plain to an average height of about 1300 m. In the north-east, the plain starts from where the Sokoto Basin rises and it ends where it grades into the Lake Chad Basin; the area is characterised by remarkably lower elevations, level terrain and sandy soils. To the north-west, the plain descends into the Sokoto lowlands.

4.4 Lower Plains of Sand Dune Belt of North-eastern Nigeria

The major landscape features of the lower plains around these areas comprise dunes and residual hills around Jahun town in Jigawa State (Fig. 4.17). The Jahun dunes were believed to have originated from sands deposited by marine regressions and transgressions during the Tertiary period (Eocene to Paleocene Ages). It is also believed that the dunes were shaped and reshaped by north-east trade winds (tropical continental air mass or Westerlies). The sand dunes are running in NE–SW and are currently static. They are between 12 to 20 metres in height. The name *Jigawa* was derived from Hausa language meaning "sand dunes". As one is coming from Dutse town to Jahun town, the road passes across the dunes through Shuwarin, Andaza, Jigawar-Kurma and Kiyawa towns and Katika village where the dunes ended a few kilometres after Jahun town the Headquarter of Jahun Local Government Area. The dunes are separated by depressions that are rich in shallow groundwater.

Likewise in part of North-eastern Northern Nigeria, there is the Manga Plain, which is an extension of sand dune plains that started from Jahun town in the Jigawa State. This plain is composed of alluvial and Aeolian sand deposits overlying the Basement Complex and younger granite pediments up to the hill range that extends north into part of the Niger Republic. To the south-east of these plains, there is also the Yobe river complex which starts from Kano and extends up to Lake Chad in the eastern part of Northern Nigeria. The riverine area is composed of deltas and alluvial plains that are an imprint of the fast fluvial processes believed to have been replaced by wind drift and Aeolian activities The area also displays a kind of flooded remnants of longitudinal sand dunes bordering the Yobe river floodplain that are called the Lantewa Dunefield (Fig. 4.18).

It can be seen further that in the region, there is a lower plain area called Bulatura, situated in the Yusufari Local Government Area of the Yobe State (Fig. 4.19), which has a series of swampy valleys separated by the beautiful scenery of sand dunes. The valleys contain rich deposits of potash which serves as an important mineral resource to the people

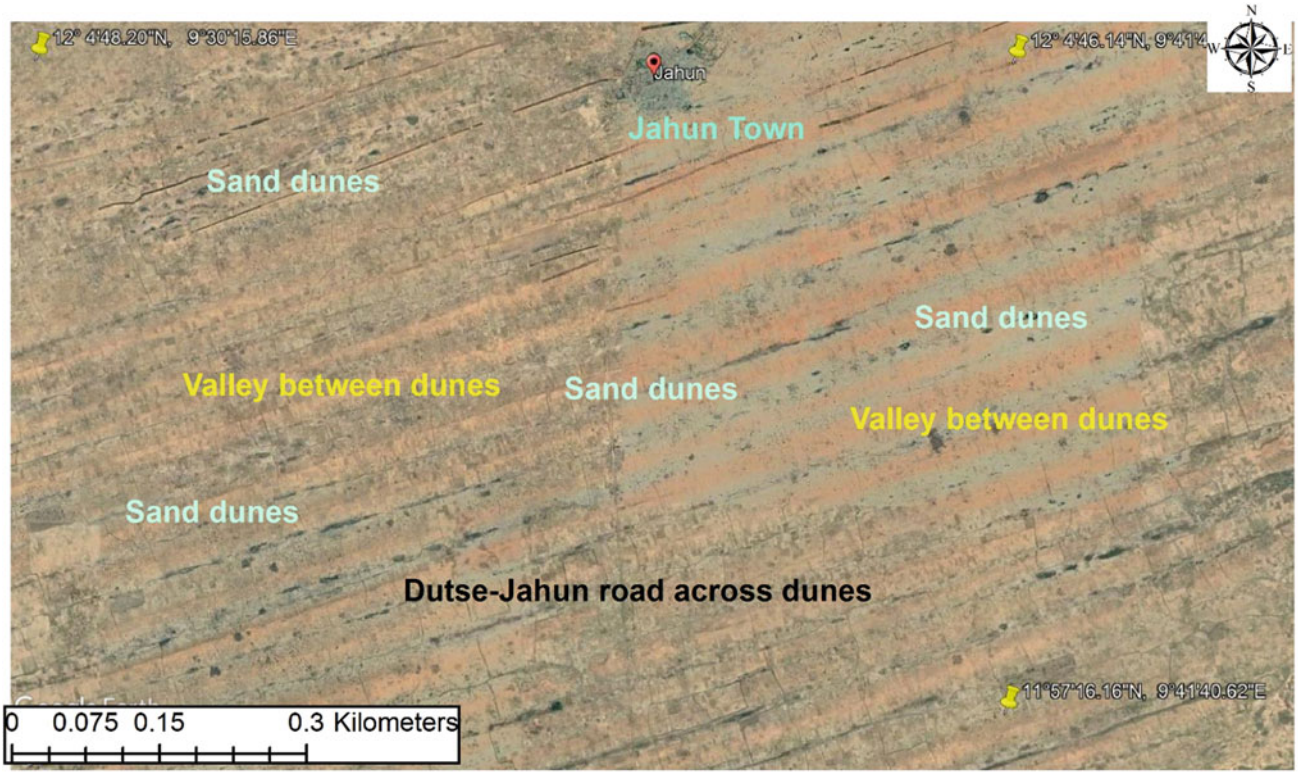

Fig. 4.17 Longitudinal sand dunes along Dutse-Jahun road separated by depressions or valleys. *Source* Retrieved from Google Earth, January, 2022

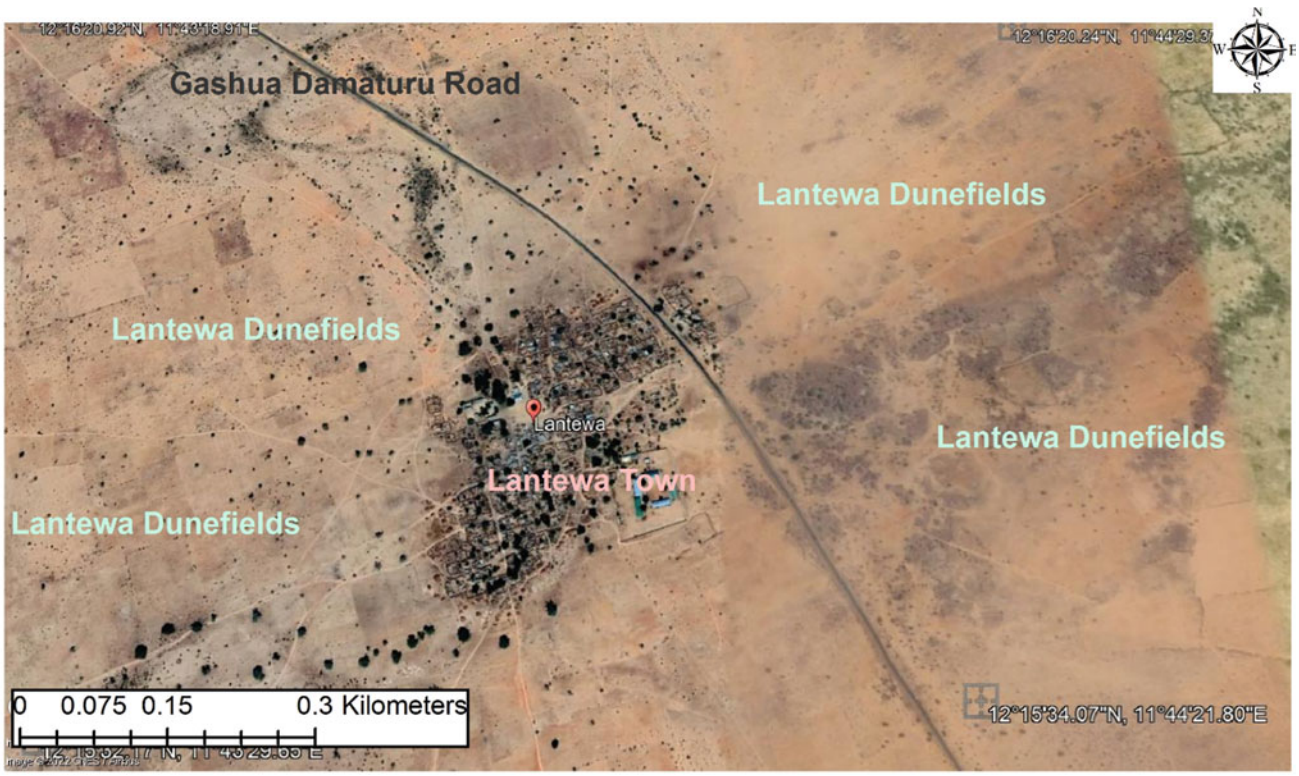

Fig. 4.18 Lantewa Dunefield along Damaturo-Gashua road, Yobe State. *Source* Retrieved from Google Earth, January, 2022

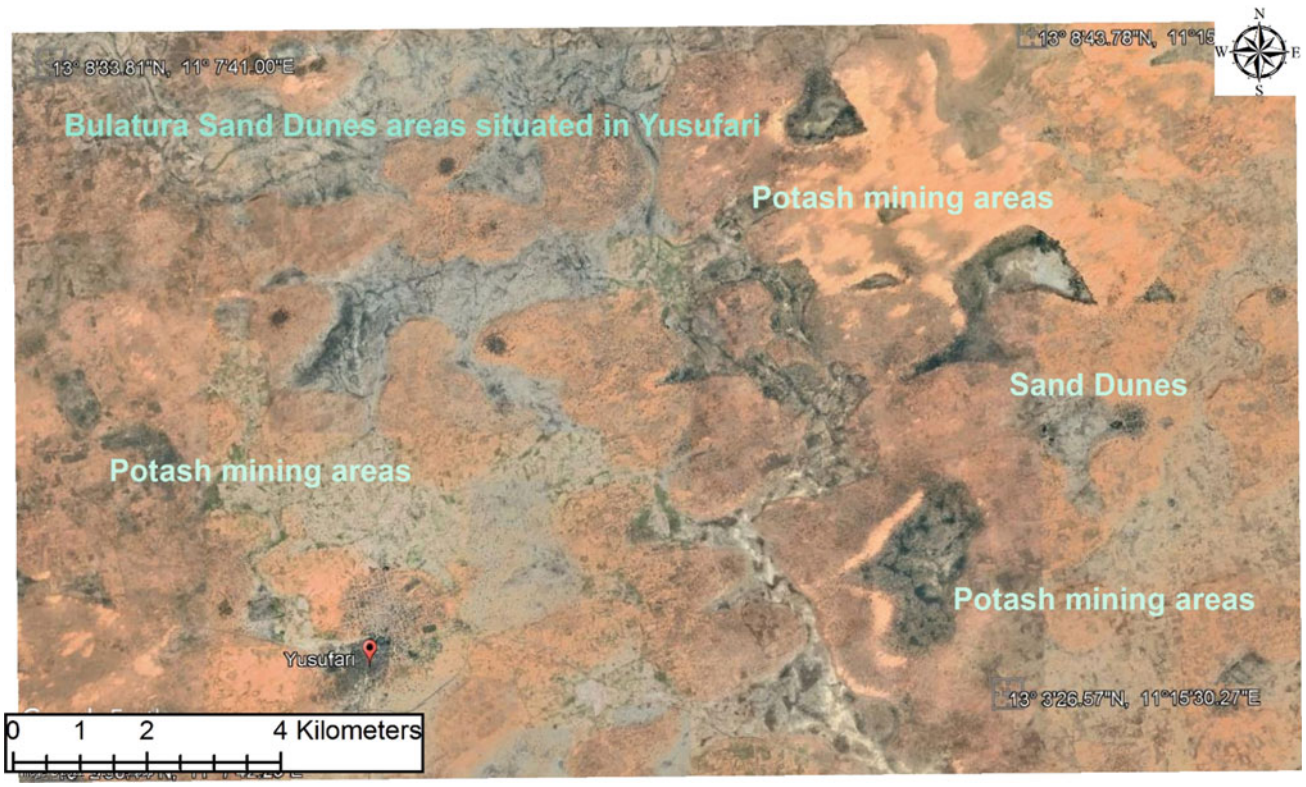

Fig. 4.19 Bulatura sand dune area situated in the Yusufari Local Government Area of the Yobe State. *Source* Retrieved from Google Earth, January, 2022

of the region and beyond (Michele 2005). The plain extends up to the Gwoudmoni region in the Niger Republic which is characterised by Oasis and potash deposits and mines as well.

4.5 Lower Plain of the Chad Basin

In some parts of the Borno State around Gwoza town, characteristic landscape features include boulders, bedrock hills and inselbergs developed upon the Basement Complex. The Gwoza Hills along the Cameroon border in the Borno State (Figs. 4.20, 4.21 and 4.22) are part of the larger granite chains. The terrain of the Gwoza area is made up of rocky and hilly surfaces. The Gwoza Hills are a continuation of the Mandara Mountains, starting from Pulka town with an average altitude of 1300 m above sea level (Szentes 2009). The area is suitable for agriculture, hunting and fishing, among other economic activities.

Part of the sedimentary lower plains of the Chad Basin is an area with wind-blown materials, especially in areas like Jigawa. Here Aeolian deposits overlie younger sediments of the Chad Formation. Desert sands are transported by fierce harmattan winds from the Sahara Desert and deposited to form sand dunes of different shapes in the Borno State and other northern districts (Iloeje 1982). Landforms of the extreme eastern parts of Kano and some parts of Bauchi State are built from the sediments of the Chad Formation and belong to the sedimentary lower plain of the Chad Basin. Other landscape features in this area include fossil dunes and ridge dunes that are separated by shallow depressions, usually filled up with water in the rainy period of the year. In addition to these landform features, there are mesas and buttes built of residual lateritic materials around Limawa, Katangare, Dutse, Galadimawa, Zai and Iyaka towns.

In North-eastern Nigeria, i.e. around the Lake Chad Basin, the landscape is made up of longitudinal dunes at Lantewa Dunefield, which are replaced by transverse north-western dunes of the Gudumbali Dunefield. In terms of height, the dunes rise as much as 15 m above the surrounding plains. Around the northern parts of Munguno town, there are a series of dunes with flat clay surfaces, and between the Lantewa and Gudumbali Dunefields, there are sand ridges called the Bama ridges, up to about 12 m above the surrounding areas. These ridges and sand dunes extend to Geidam through Maiduguri and Bama towns up to the Cameroon border. East of the sand plains and dunefields of the Chad Basin are the Yedseram and El Beid rivers, which flow in northerly direction from the Mandara Mountains to the Lake Chad (Bawden 1972). The Lake Chad area displays

Fig. 4.20 Section of Gwoza Hills in Borno State is overlain by shrubs on mountain tops and tall grasses in the valleys between hills. *Source* Jeremiah and Falaju (2018)

Fig. 4.21 Boulders made of older granites in part of Gwoza town in Borno State. *Source* Jeremiah and Falaju (2018)

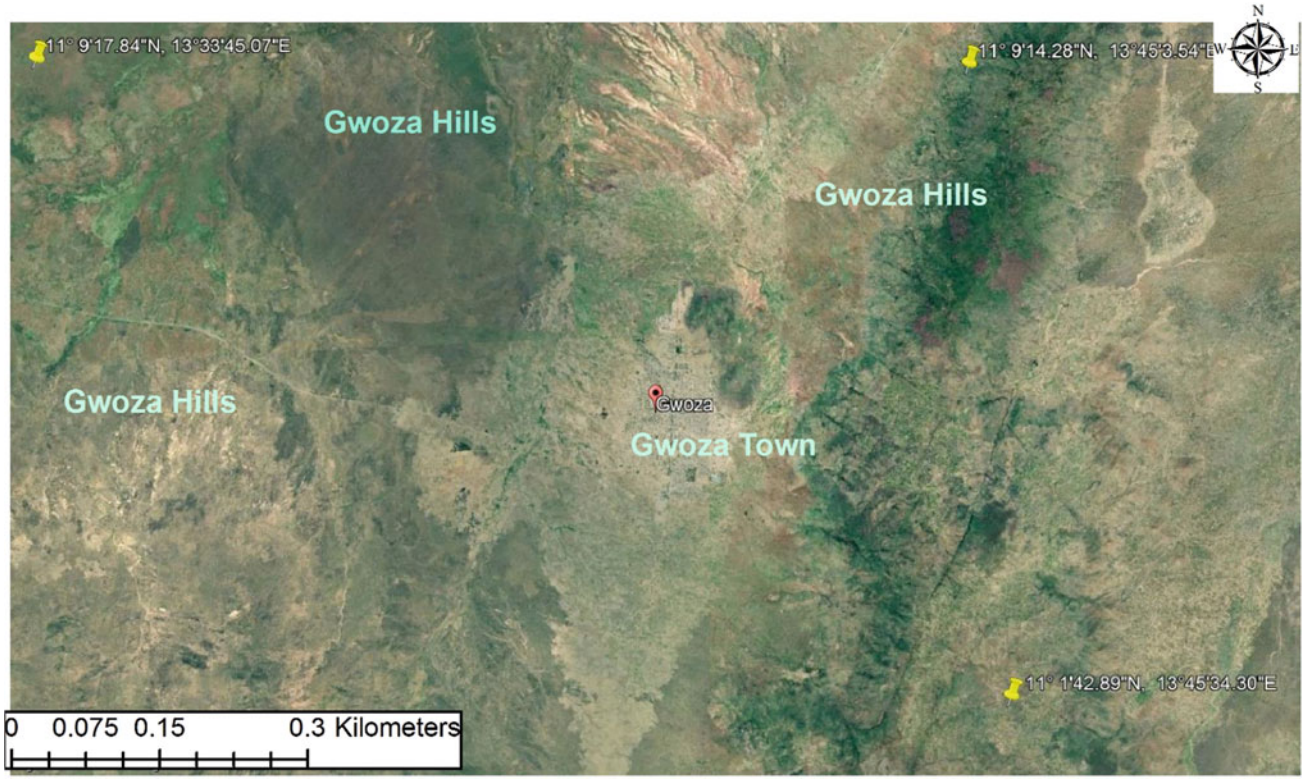

Fig. 4.22 Section of Gwoza town in the Borno State showing valleys, plains and hills. *Source* Retrieved from Google Earth, January, 2022

an attractively looking landscape with monotonous silty sand surfaces and tinted grasses (Fig. 4.23). The lake is in a constant state of shrinkage due to a lot of factors including climate change and anthropogenic activities among others. It has been reported by many researchers that the lake is reducing in size due to siltation and other factors like climate change (Jeremiah and Falaju 2018). Vegetation species commonly found around the area include acacia species,

Fig. 4.23 Part of Lake Chad and its surroundings showing fine sand deposit and wetland vegetation. *Source* Jeremiah and Falaju (2018)

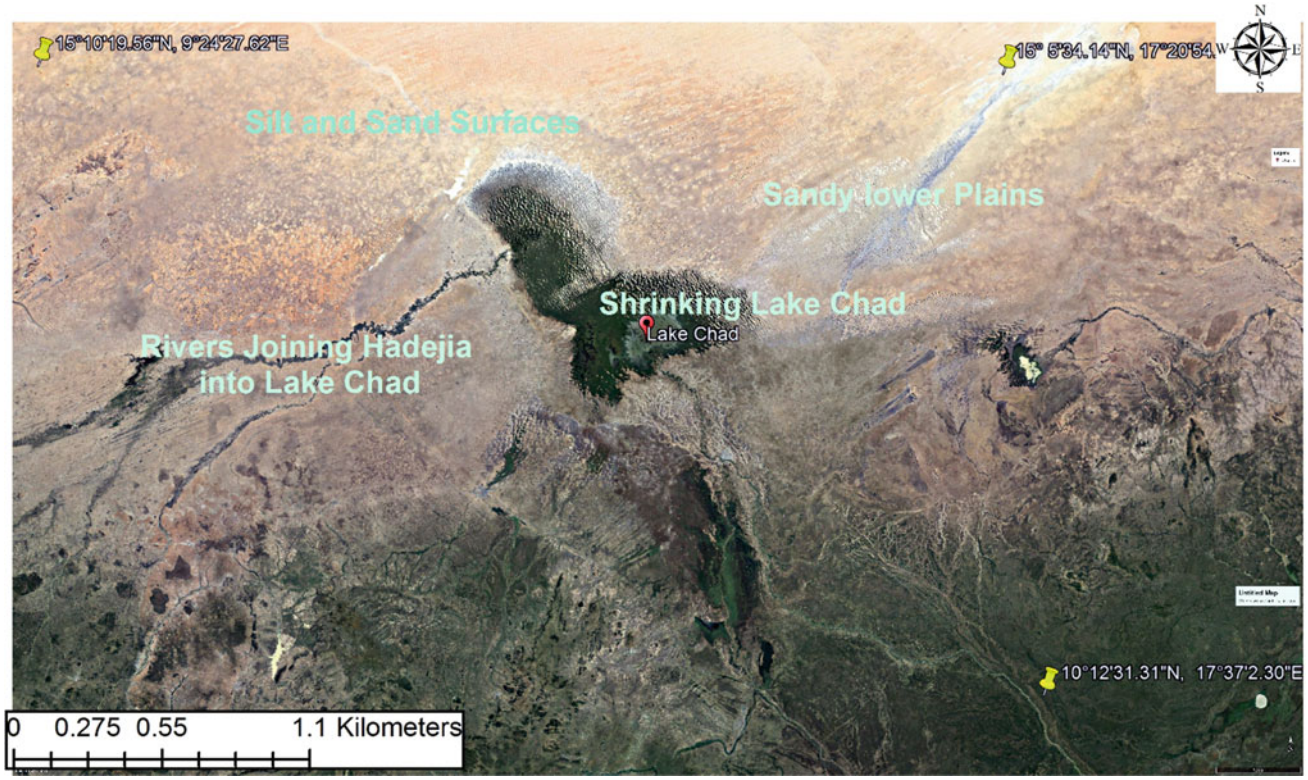

Fig. 4.24 Shrinking Lake Chad and its feeding rivers. *Source* Retrieved from Google Earth, January, 2022

African myrrh, desert date, palms, reeds, Papyrus, ambatch and baobab, among others. The major economic activities in the area are fishing, farming and rearing of animals. The major river that contributes to Lake Chad is River Hadejia with its tributaries like Gana, Yedserem and Yobe rivers (Fig. 4.24).

4.6 Conclusion

Plains in Nigeria are of two types and are described as higher plains and lower plains. The Northern Nigerian lower plains fall under different categories, including those on the Basement Complex and sedimentary formations. Although the chapter focused on the lower plains, it is noteworthy to say that the plains extend into parts of the Kaduna and Zaria cities, north-eastward across the Kano Plains through Rir-uwai, Ningi-Burra Complexes to Jigawa, Borno and Yobe States. To the north-west, it passes through Katsina up to Zamfara, Sokoto and Kebbi States. The major land uses commonly found in the region include agriculture, farming, fishing, animal rearing and mining. The lower plain regions of Northern Nigeria reflect the geology of the area and are composed of a series of spectacular landform features of denudational (inselbergs, residual hills, laterite mesas and buttes) and depositional (dunes) origin.

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