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'Kwara State: A Geographical Perspective'



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CHAPTER TWO

Geology, Relief and Drainage of Kwara State, Nigeria

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Preamble

Kwara State is topographically located in the western upland region of Nigeria. The state which stretches over a distance of 280km along its longest axis from western boundary of Nigeria to central region of the country is bounded in the north by River Niger. The climate of the area is humid with mean annual rainfall ranging between 1250mm in the southern part to 1000mm in the northern fringe. The temperature of the state is uniformly high throughout the year and open air isolation can be very uncomfortable during the dry season. The vegetation type in the region is made up of rainforest in Offa, Oyun, Irepodun and Ekiti Local Government Areas located in the southern fringe of the state; gallery forest along the river valley; and wooded savannah and grassland in other areas. Examples of tree species that can be found in the state include *lophira lanceolata*, *terminaalia glaucens*, *afzelia Africana* and *daniellia oliveri* while *andropogon gayanus*, *bekeropsis uniseta*, *panicum maximum* and *monocymbium cresilforme* are few examples of grass species in the region. The factors of location, climate and vegetation influence greatly the nature of geology, relief and drainage in the state.

Geology

Geology refers to the nature of rock. It is a function of past tectonic activities in a particular region and it exhibits a strong relationship with landform development of an area. More than 90 percent of Kwara State is underlain by pre-Cambrian Igneous and Metamorphic Rocks of Basement Complex. These rocks are neither porous nor permeable except in places where they have been deeply weathered or have zones of weakness. These rocks comprise of gneisses, migmatites, granites, phyllites and quartzites (Adelana, et al., 2008). Metamorphism of the rocks is in the amphibolites facies range. According to Oyawoye (1972), the rocks forming the geology of the state also consist of low grade metasedimentary and metavolvanic schists, intruded by Pan-African age granites and charnockites. The migmatites and gneissic metasediments in the state are mostly intruded by megmatite veins and dykes (Oluyide et al., 1988).

As can be seen from Table 2.1, undifferentiated metasediments in Kwara State can be found in numerous large patches in such areas as Lafiagi, Oke-Ode, Oke-Onigbin and Omu-Aran while older granite can be found in numerous patches in parts

of Moro, Asa and Ifelodun Local Government areas. Quartzites can be found in north-western part of Ilorin.

There are two main types of cretaceous rock in Kwara State; these according to Oyegun (1983) are the Illo formation and the Nupe sandstone. While the Illo formation which consists mainly of pisolitic clays and grits is found mainly in the northernmost parts of Baruten and Kiama Local Government Areas, the Nupe sandstone which is made up of felspathic sandstone and siltstone runs diagonally along the northeastern boundary of the state. Table 2.1 describes the geological characteristics in different parts of the state.

Table 2.1: Geological Characteristics in Local Government Areas of Kwara State.

LGA	Geological Characteristics
Asa, Ilorin West, East and South	Geology consist mainly of basement complex rocks of the older granite type and also the undifferentiated type. These rocks in many places have been greatly weathered in-situ, hence the several pockets of weathered sand and sandy clay lenses in the area. Some pockets of weathered material appear on surface in several places such as along River Asa channel and at Ganmo. The sand pockets in these areas form aquifer for underground water which recharge River Asa in dry season. River Asa channel is made up alluvial clays and gravels through which the river water is lost to underground storage. Borehole log for the area shows that water can be found at between 4 and 5.5 meters depth. However, for a borehole to be highly reliable in the region, it should penetrate at least 9.5 meters of the overburden.
Moro	The geology is underlain principally by older granites. The bedrock is covered by superficial sediments, which comprises mostly of lateritic sandy clay and in-Situ clay.
Baruten/Kiama/Edu/Patigi	This area is underlain by undifferentiated rocks of the pre-Cambrian basement complex and cretaceous sediments. The main rock type making up the basement here is biotite Gneiss. This has however been highly dissected by numerous granitic veins and dykes. The sedimentary cretaceous rocks overlying the basement is part of the Nupe group. 80 percent of the four local government areas is made up of cretaceous rock with potential groundwater resources
Irepodun/Ifelodun/Isin	This zone is made up of two types of rocks; the sedimentary and the basement complex rocks. The latter consist mainly of igneous and metamorphic rocks which are neither porous nor permeable, except where they have been deeply weathered or have zones of weakness such as cleavages, joints, fissures and shatter belts. Porosity of these rocks ranges between 1 and 3 percent
Oyun/Offa	These two Local Government Areas are underlain by basement complex comprising of granite, schist and gneiss which are intact in some places like Ijagbo and Offa and fracture in other places like Ikotun and Ojoku.
Ekiti/Odo-Ero.	The rock making up the geology of this zone is mainly made up of the basement complex which is composed of patchy, poor and confined aquifers with low water transmission potential. The average thickness of the weathered mantle here is between 15 and 25 meters, the groundwaters in these weathered rocks are in patches. The basement complex rock here have very limited storage capacity.

Source: Compiled from Oyegun (1983); Adelana et al., (2008).

Relief

Relief refers to nature of land. It describes the surface configuration of the landscape. According to Thornbury (1969) the relief of any geographical area is a function of the geological structure. This observation is in line with Davies (1972) earlier submission which recognized structure as the most important of the three major landform factors of structure, process and time.

The term structure in geomorphology refers to all the ways in which the earth materials differ from one another in their physical and chemical attributes. According to Faniran (1986), structure includes such characteristics as presence or absence of joints, bedding planes, faults, folds, rock massiveness, the physical hardness of rock minerals to chemical alteration and physical breakup, the permeability or impermeability of rock etc. The correspondence between relief of an area and the structure of its underlying geology is often so close that the nature and the arrangement of the rocks are fundamental in the development of landforms (Cottle, 2004). While the structure of rock affect the general pattern of relief, the lithology (the specific make up of a rock type) of individual beds influences the relief in detail.

While the landscape of Kwara State reflects the rocks that underlie it, the climate of the region and the accompanying processes of weathering and removal by rivers and other agents of denudation can largely be held accountable for the nature of landforms rather than tectonic activities. According to Faniran (1986), apart from Rift Valley System of East Africa and a few other relatively minor tectonic features, Africa as a continent has not undergone great changes induced by tectonic activities since mid-tertiary.

The landscape of Kwara State which is generally undulating is marked by numerous domed or sugar-loaf hills and by occasional flat top ridges. These hills which are developed over the basement complex have their summits ranging between 300 and 600 meters above the sea level.

Apart from geology, other factors of landform development in Kwara State as reflected in lithology and structure include geomorphological process of deep chemical weathering, weathering by vegetation and fluvial processes of erosion and sedimentation. These factors have acted on the rock within the state to form various unit landforms and undulating landscape such as that of University of Ilorin permanent site.

Chemical weathering refers to the decomposition of some or all of the mineral constituents in a rock causing it to collapse within the rock itself. Deep chemical weathering in Kwara State just like elsewhere in humid tropics is encouraged by availability of weatherable rocks, climate, especially temperature and precipitation, vegetation, low relief surface, crustal stability, and availability of well drained sites.

Chemical weathering process in Kwara State is encouraged by presence of joints and faults in the basement complex rock of the state. These joints and faults promote the ingress of water thereby weathering the rock. The high temperature prevalent in the state encourages the solubility of certain elements in the rock while at the same time combining with the factor of high rainfall to induce rapid chemical weathering of the rocks.

Weathering process has encouraged the formation of various unit landforms in the state. Such unit landforms include Sobi hill in Ilorin, Agbona hill in Share, Okelute hill in Babanloma, Ora hill in Olla and Oreke hill in Oreke. Other spectacular relief features in the state include Imoleboja Rockshelter in Odo-Owa, an inselberg in Okuta, Wantana rock hill in Gwette Village of Baruten Local Government Area and Juju hill, which is an island hill formation in River Niger at Jebba. A prominent topographic feature, the Wanzaya cave which is located in Tsarahi, Edu Local Government Area of the state stretches over 25km to Apado village in Ilorin East Local Government Area of the state.

Some of these unit landforms have continued to play important roles in socio-economic activities in the state. For example, the Sobi hill where the fairly large acreage of arable soil around it is being used for farming activities. In some cases, the features associated with these landforms make them serve as tourist destination. This is the case with Owu-Falls located in Owa-Kajola settlement of Irepodun Local Government Area of the state. The water fall whose curtain stands at 120 meters above stream level and cascades 330feet down an escarpment of rocky outcrops is the tallest water fall in West Africa.

Drainage

Kwara State is blessed with abundant rainfall over large parts which feed a close network of streams and rivers, all draining into River Niger which forms the eastern and northern boundary of the state. The drainage pattern exhibited by these streams and rivers is mainly dendritic. This drainage pattern is a reflection of the uniform underlying geological formation which is horizontally bedded and crystalline in nature. Examples of rivers found in the state include Rivers Asa, Oyun, Yagi, Oli, Teshi, Moro, Imoru, Awun, Kampe, Oshin, Oyi, Oro and Orisa while Afon, Moro, Aye, Afelele, Arun, Eju, Agun, Aluko, Agba and Okun are few examples of streams that can be found in the state. Even though these rivers and streams are highly polluted, they serve as major sources of water for industrial, agricultural and domestic uses, especially in those settlements traverse by drainage networks. While the rivers are perennial in nature, the streams experience intermittent flows with substantial number of them drying up completely between the months of November and April.

One major problem with most of the streams and rivers in the state is that they are not gauged, hence the total volumes of discharges from them are not known. Few of the rivers being gauged in the state include Rivers Asa, Oyun, Orisa, Oshin and Yagi; and this gauging is even on adhoc basis. The rate of discharges from these rivers varies significantly; it ranges from 7.97 Cumecs observed in River Oyun at Ijagbo to 105.95 Cumecs observed in River Asa at Ilorin. River Orisa at Omu-Aran, River Oshin at Oro and River Yagi in Obbo-Aiyegunle discharges 22.99, 18.45 and 12.81 Cumecs respectively.

Flooding in some of the rivers, especially those located within the built-up environment is a common occurrence. This extreme hydro-meteorological event is encouraged, both by nature of paved surfaces which discourage infiltration process and

people's poor attitude towards solid waste generation and disposal methods. However, within the rural settings, flooding seldom occurs with the exception of northern fringes of Kiama, Edu and Patigi Local Government Areas where flood water from River Niger and its tributaries such as Rivers Oyi, Oro, Moshi, Olli and Teshi often inundate their banks. Overflow from Jebba Dam whenever it occurs often induce flood in settlements located downstream of the dam: such settlements include Gungu, Ganga, Fanga, Bele, Bere, Gaba and Baru. Though dams and rivers can be found on some of the rivers in the state (Table 2.2), residents in most settlements often experience water shortage, particularly during the dry season when the problem often reach crisis level.

Table 2.2: Water Supply Schemes in Kwara State

Location of Scheme	River	Types of Scheme	Production Capacity (Litres)	Nature of Treatment	Settlements Served
Obbo-Ile	Arun	Weir	552,000	Treated	Obbo-Ile
Osi	Eju	Weir	230,000	Untreated	Osi, Oko, Olla
Obbo-Aiyegunle	Yagi	Weir	552,000	Treated	Obbo-Aiyegunle, Etan
Iludun Oro	Osin	Weir	1,000,000	Treated	Iludun-Oro, Oro, Esie
Omu-Aran	Orisa	Weir	1,250,000	Treated	Omuaran, Rore.
Ijagbo	Oyun	Dam	75,000,000	Treated	Ijagbo, Offa, Erin-Ile, Ipe, Igosun, Omupo, Ajase-Ipo,
Offa	Afelele	Weir	250,000	Untreated	Offa
Ojoku	Ami	Weir	15,000	Untreated	Ojoku
Ilorin	Asa	Dam	125,000,000	Treated	Ilorin and Environs
Ilorin	Agba	Dam	6,000,000	Treated	Ilorin
Sobi	Moro	Dam	20,000,000	Treated	Nigeria Army Cantonment Ilorin, and Environs
Unilorin	Oyun	Dam	5,000,000	Treated	University Community

Source: Compiled from Oyegun, (1983); Okeola (2000); KSWC, (2009); Iroye and Jimoh (2014).

Problems of water supply shortage is even especially more acute in Edu, Patigi Kiama and Baruten Local Government Areas where streams draining those places neither have dam or weir on them. Residents in those areas mainly depend on direct collection of water from rivers and streams. These practices possess a great health hazard as diseases are easily transmitted by the free flowing water. Another problem is the long distance of some of these streams and rivers from settlements. Thus, residents in those places do either trek long distances to collect water or contend with other water sources such as shallow wells and boreholes.

Kwara State based on drainage network can be divided into seven water (hydrological) boundaries which cut across local governments areas in the state; these provinces as can be seen on Fig 2.1 include:

Eri/Olli Basins covering northern parts of Baruten and Kiama LGA

Moshi Basin covering southern Kiama LGA

Awun/Oyun/Asa Basins covering Moro, Offa, Oyun and Ilorin West, East and South LGA

Oshin/Oyi Basins covering parts of Irepodun, Ifelodun, and western Edu LGA
 Oro Basin covering parts of Irepodun, Ifelodun and southern Edu LGA
 Duku/Kuji/Eche Basins covering central Edu LGA, and
 Ebba/Kampe Basins covering Patigi LGA

The imposition of artificial local government area boundaries on hydrological boundaries according to Oyegun (1983) remains major hindrance to optimum water development programme in the state. According to him, hydrological boundaries should rather be used as basic unit for water production and distribution rather than local government boundaries. This arrangement which is called river basin approach is best not only in tackling the problem of water supply, but also for total environment planning and management (Iroye and Tilakasiri, 2015; Iroye, 2008; Faniran, 1991).

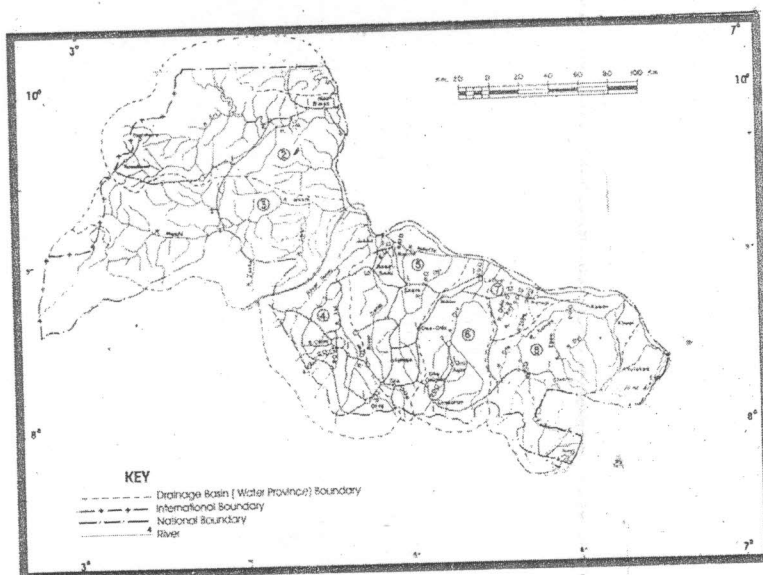


Figure 2.1: Drainage and Hydrological Provinces in Kwara State.
 Source: Adapted from Oyegun (1983)

A river basin (also called catchment area or drainage basin) refers to all land area drained by a particular river and its tributaries, from source to mouth. Kington (1984) describe a river basin as a well-defined topographic and hydrologic entity that is of fundamental importance. It serves as a holistic and multi-pronged weapon for resolving problems of socio-economic development (Oyegun, 1983). It is the advantages which river basin approach holds that made USA government in 1933 to establish the Tennessee Valley Authority (TVA). From its inception to date the TVA has made substantial progress in comprehensive development of the drainage area, controlling floods, improving water supply, generating and distributing electricity, improving navigation, stimulating industrialization and employment, extending education and welfare, controlling soil erosion and improving agricultural production

(Finer, 1994; Newson, 1992; Ayoade, 1988). The achievement of all these goals is possible in Kwara State if river basin approach is embraced in her developmental effort.

Conclusion

The above briefly described the geology, relief and drainage of Kwara state, Nigeria. While the geology and relief are being acted upon by physical process of denudation, the drainages are being majorly influenced by anthropogenic activities of man induced through climate change and urbanization. The incidence of climate change in Kwara State, just like in any tropical environment has intensified the various components of hydrological cycle, bringing greater rainfall, both in intensity and duration with consequent effects on pattern of river discharge. As population rises in the state, especially within the urban centres, deforestation activities and rate of land pavement has increased thus leading to greater run off discharge. The large amount of solid wastes being generated in urban areas in the state which is also combining with peoples' poor attitude towards waste disposal has made the residents to dump wastes into flowing water which unfortunately is fast silting up the rivers in urban areas. This is partly responsible for the frequent occurrence of floods in major cities of the state.

References

- Adelana, S.M.A, Olasehinde, P.I., Bale, R.B., Vrbka, P., Edet, A.E. and Goni, I.B. (2008). An Overview of the Geology and Hydrogeology of Nigeria..... 171-197.
- Ayoade, J. (1988) *Tropical Hydrology and Water Resources* Agbo Areo Publishers 275pp.
- Cottle, R (2004) Linking Geology and Biodiversity English Nature *Research Report* No 56291 pp.
- Davies, J.L (1972) Geographical Variations in Coastal Development In: Clayton, K.W and Boyd, E. (eds.) *Geomorphology* 204pp.
- Faniran, A. (1986) *African Landforms: An Introductory Geomorphology* Heinemann Books Nigeria 376pp.
- Finer, H. (1994) The TVA: Lessons for International Application. *ILO Study Report* Series B, No 37, Geneva.
- Iroye, K.A (2008) Effects of Landscape and Climatic Parameters on Basin Management: A Case Study of Ilorin, Nigeria *Unpublished Ph.D Thesis* University of Ilorin.
- Iroye, K.A and Jimoh, H.I. (2014) Reservoir Sedimentation of Regional Water Development Scheme in Tropical Rural Settlement of Kwara State. *Nigeria Geographical Journal* 10 (1): 133-143.
- Iroye, K.A and Tilakasiri, S.L (2015) Watershed Management and Sustainable Development in Nigeria. *International Journal of Multidisciplinary Studies* 02 (02): 31-42.
- Kwara State Water Corporation (2009) *Water Supply Situation in Kwara State Nigeria*.

- Newson, M.D (1992) *Land, Water and Development: River Basin Systems and their Sustainable Management* London: Routledge.
- Okeola, O. G (2000) Evaluation of Effectiveness of Oyun Regional Water Supply Scheme, Kwara State. *Unpublished M.Eng. Dissertation*, University of Ilorin.
- Oluyide, P.O., Nwajide, C.S. and Oni, O.A (1988) The Geology of Ilorin Area with Explanations on the 1:250,000 Series, Sheet 50 *Geological Survey of Nigeria Bulletin*, 42:1-84.
- Oyawoye, M.O (1992) The Basement Complex of Nigeria In: Dessauvage, T.J.F and Whiteman, A.J. (eds.) *African Geology* University of Ibadan Press 66-102.
- Oyegun, R.O. (1983) *Water Resources in Kwara State* Matanmi Publishers, Ilorin 113pp.
- Thornbury, W.D. (1969) *Principles of Geomorphology* John Wiley, London.