

CHAPTER SIX

HYDROLOGY AND WATER RESOURCES

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Introduction

Nasarawa State is well endowed with enormous water resources, both surface and underground and is drained by many rivers whose sources are mostly from the North Central Plateau. The regime of the rivers is characterized by seasonal variations. The smaller streams are seasonal and intermittent while the larger streams are perennial in nature. In the dry season the volume of water is greatly reduced whereas flash flood is experienced for most rivers in the raining season. Flooding is common because of torrential rainfall, which tend to seal up soil pores and reduce infiltration capacity, thus causing accelerated run off. The rivers transport a lot of materials in suspension, which affect colour and turbidity of the water. Streams and rivers are both characterized by seasonal flooding, and deposition of large quantities of sediments along their banks. Little has been done by way of documenting stream discharges and sediment yields. The study of the characteristics of water bodies is important in planning of water schemes and in maintaining both quantitative and qualitative water supply.

Hydrology

Nasarawa State is drained by many rivers most of which originate from the North Central Plateau and have a dendritic pattern outlook because the streams and rivulets join the main rivers at oblique angles. Major river systems in the state as shown in figure 6.1 include; The Uke, Mada and Dep. The River Benue, which constitutes the major drain for the river systems in the state, originates from the Cameroon highlands and flows through Adamawa, Taraba and Benue states to form the southern border limits of Nasarawa state. The River Benue is perennial and flows throughout the year but with greatly reduced volume of water in the dry season due to high evaporation, lack of replenishment from atmospheric precipitation and the Lagdo Dam in Cameroon. The River Benue joins the River Niger at Lokoja in Kogi state. Most of the

rivers in Nasarawa State are tributaries of the Benue, among these are the Mada, Ayini, Uke and Dep

Major River Systems

The Dep

This river originates from the highlands of the Jos Plateau and cascades into Nasarawa State through the north eastern border. The river constitutes the major eastern border with Plateau State from Wamba Local Government Area down to the northern part of Awe Local Government Area where it cascades southwards and empties into the Benue River east of Tunga. The river is fed enroute by tributaries such as Farin-Ruwa, Akwenyi, Gwayak and Arikia rivers.

The Mada

The river takes its source from The Jos Plateau and meanders through the interlocking dissections of the Jema'a Platform and enters Nasarawa State through its northern borders. It flows centrally through the state almost bisecting it into halves and joining the Benue River east of Loko. Its major tributaries include Rivers Katari, Kogin Daji, Ekoalio, Kyeruku and Azuta among others.

The Uke

This is another major river in the state that flows through the northwestern corner of Karu hills to the southwest Kugwaru forest. The river takes its source from the North-Central Highlands and flows through towns like Panda and Nasarawa and empties into the River Benue east of Umaisha. Its major tributaries are Rivers Ado, Obi, and Antau (Figure 6.1)

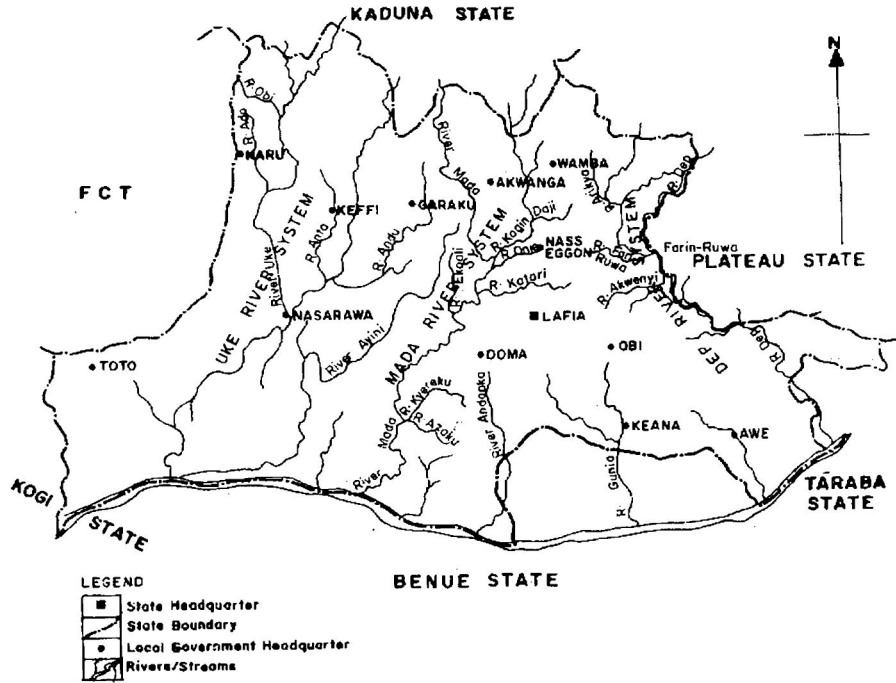


Figure 6.1: Drainage Network of Nasarawa State

Water Resources
Surface Water

Surface water in Nasarawa State is found in river channels, rivulets, streams, rivers, ponds and dams. The presence of water on the surface however, varies in space and time. The amount of water available for human exploit is affected by climate and the geology of the area. Rainfall is moderately heavy in the state, ranging from 1200-2000mm in the north and southern parts of the state (NIMET, 2005). The wet season is characterized by flooding of ponds, rivers and streams.

The volume of water on the surfaces however, begins to depreciate with the cessation of rains. Surface water becomes limited in the dry season and can only be found in the perennial streams and ponds. During the dry season surviving rivers include Mada, Dep and Uke While the ponds include Kwayaka, Alingani and Dogon Kurmi. The Northern part of Nasarawa state is made up of basement complex rocks.

which are exposed to the surface and raised to meaningful heights, thereby constituting the watershed for most streams and rivers. Surface water is further depleted in the dry season by high evaporation and seepage.

Ground Water.

Water embedded in underground sources is also important for water supply in most parts of the state. The occurrence of ground water in Nasarawa State shows that the northern part of the state, which is overlain by basement complex rocks, has an unpredictable quantity. It is therefore not surprising that most water schemes in the state are by river abstraction. The southern part of the state, which is also underlain by basement complex rocks, has appreciable layer of sedimentation, notable for water retention.

Groundwater in the state varies in space and time in terms of quantity and quality. This variation is attributed to the nature of rock, climate and environmental factors. The southern Local Government Areas of Obi, Keana and Awe have domestic water supplies by means of boreholes. In Awe and Keana Local Government Areas special attention is taken to avoid sites of salt rich rocks. However, places with clastic formations provide reliable aquifer for potable water (Adebayo and Umar, 1999). Such formations abound in the southern part of the state.

Water Supply Schemes

The increase in water demand for domestic uses requires effective use of water resources in the state. To achieve this, the state government in most parts of the state has established water supply schemes by abstraction along major rivers, construction of dams and boreholes. Despite the abundance of both surface and underground water, most communities' still suffer scarcity and the commodity is in short supply in most parts of the state. Water supply schemes are projects undertaken by governments and private enterprises solely to address potable water supply and to make available fresh water for human consumption. Table 6.1 shows the summary of domestic water supply of the state and that of all the Local Government Areas of the state, only Doma has a dam, which was constructed by the Lower Benue Development Authority for the purpose of irrigation. Nasarawa State

Water Board however, established a water supply station, which has a daily delivery capacity of 8,100 million cubic metres of daily supply as indicated on table 6.1. The Doma waterworks, which ought to have supplied water to the inhabitants of the town and probably Lafia, have not been able to meet the daily water requirement of the people and this is a common phenomenon of most water schemes in the state. The Lafia water supply scheme obtains its water from a weir structure on River Amba. This scheme has delivery capacity of 13,500 million cubic litres of water per day to Lafia and environs.

Apart from the Doma and Lafia water schemes all others rely on surface water through direct river abstraction. These include the Mada Water Supply Scheme, which is the largest surface water supply scheme in the state. The scheme has a capacity of 45,000 million cubic litres per day. Its services cover a greater part of northern Nasarawa state, comprising Keffi, Akwanga, Gudi, Garaku, Sabon Gida, Army Barracks and Gunduma. The Nasarawa Eggon Water Supply scheme abstracts water from River Arikia, with a mere capacity of 2,000 million cubic litres per day. The scheme handles water supply needs of Nasarawa Eggon Township, Gako, Anguwan Chiyawa and Kururuwa villages. The water supply schemes in Nasarawa Township and Toto are fashioned in liked manners, with the Nasarawa scheme abstracting water from River Uke providing 2.250 million cubic litres to the town and its environs. The Toto Water Scheme is also by abstraction on River Dep at Toto and supplies 1,125 million cubic litres per day to the town.

From Figure 6.1, it is obvious that most of the southern Local Government Areas of Obi, Keana and Awe, which rest on sedimentary rocks, have potentials for groundwater resources and thus explore them more. Water supply schemes in these areas are through boreholes and their water yields are presented in Table 6.1. Water as a natural occurring physical resource is quite abundant in Nasarawa State, but its potentials have not been fully explored to meet the ever-increasing demand for domestic water supply. With an estimated population of about 1.5 million people and an annual increase of about 2.5 percent, with proper management of water resources the state is not envisaging water shortage, as there is abundant water in both surface and sub-surface reservoirs.

Table 6.1: Water Supply Schemes in Nasarawa StateS/No

Location	Capacity/ Source	Town Served	Purpose
1 Lafia	13,500m ³ /day/ weir structure on River	AmbaLafia and environs	Domestic water supply
2 Doma	8,100m ³ /day/ earth fill dam on River Ohena	Doma town	Irrigation domestic water supply and Fishing
3 Mada	45,000m ³ /day/ abstraction on River Mada	Keffi, Akwanga, Gudi, Geraku, Army barracks and Gunduma	Domestic water supply
4 Nasarawa Eggon	2,000m ³ /day/ abstraction on River Ankia	Nasarawa Eggon, Gako, Angwan Chiyawa and Kwurutwa Villages	Domestic water supply
5 Nasarawa	2,250m ³ /day/ weir structure on River Uke	Nasarawa and environs	Domestic water supply
6 Toto	1,125m ³ /day/ river abstraction at	Toto Toto	Domestic water supply
7 Obi	1,000m ³ /day/ boreholes abstraction	Obi and Aloshi	Domestic water supply
8 Keana	500m ³ /day, boreholes abstraction	Awe and Keana	Domestic water supply

Source: Nasarawa State Water Board, Lafia (2005)

Development Prospect

Naturally, there exists a relationship between water availability and economic development. Industrial location, agricultural schemes and urban growth have all been linked to water availability. The amount of water available to any geographic location is always a function of climate particularly rainfall. Surface water resources abound in the state, occurring in the form of streams, rivers and ponds. The northern part of the state has a greater distribution network of this, partly because most of the rivers and streams take their source from there. Its contribution in fresh fish supply cannot be over emphasized especially the perennial rivers, streams, ponds and the Doma dam.

All aspects of agriculture from planting to harvesting are water dependent. The rainfall occurring in the state is adequate to sustain the production of a variety of crops of which the state is reckoned for. The slight variation in rainfall between the north and southern parts of the state does not affect greatly the types of crops grown in the two zones though there seems to exist a time lag between the south and the north in terms of land preparation.

Another advantage to be derived from water resources is in the area of irrigation. The northern banks of the River Benue, which also constitute the southern borders of the state is a zone of maximum irrigation practice. The fertile alluvial soils coupled with the presence of water throughout the year makes the area attractive for irrigation. Irrigation activities also blossom inland along the perennial streams and rivers and there are great potentials for its development at points of

abstraction and sites where weir structures have been build to reserve water. Irrigation if promoted will provide Nasarawa State not only with food and fibre for its growing population, but also raw materials for its local industries and as well as providing employment for a portion of the population. There is also the need to dam the major rivers in the state so as to enhance economic development and enjoy other benefits accruing to activities like fishing and hydropower generation.

Water pollution, though not a serious problem in Nasarawa State, should be guided against domestic discharge, urban run off and agricultural return flow, which contribute towards lowering water quality in receiving bodies. The increased disposal of domestic wastewater into streams and urban areas has reduced the quality of water especially in the dry season a period when water is in dare need. Alternative water disposal medium should be established instead of the usual disposal of domestic wastewater into open drains, canals and streams which eventually find their way into the drainage system.

The government of the state should be more responsive by financing water schemes so as to meet water requirements of the people and also to make effective utilization of the abundant water resources the state is endowed with. Water related diseases could best be dealt with by provision of clean water, which is lacking in most parts of the state. The provision of water for domestic usage should be of utmost importance in water resources development, though irrigation, hydroelectric power and fishing may also be developed alongside. The Doma dam which has great potentials for irrigation, water supply and hydroelectric power development should be explored to the fullest. Farin Ruwa waterfall in Wamba Local Government Area can be elevated to international tourist attraction status and which has the potentials also for hydroelectric power generation.

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