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A General Physiographic Study of District Azamgarh

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Abstract

This research paper presents a comprehensive physiographic study of District Azamgarh, situated in the eastern part of Uttar Pradesh, India. The study aims to investigate and analyze the diverse physical features that shape the landscape of this region. Through a combination of field surveys, cartographic analysis, and toposheets analysis (No. 63N, J, K and O), we explore the geological, geomorphological, hydrological, and climatic aspects that contribute to the district's unique physiographic characteristics.

The geological investigation provides insights into the underlying rock formations, their age, and structural patterns, shedding light on the geological history of the area. A particular emphasis is placed on the impact of various geomorphic processes like erosion, weathering, and tectonic activities on the landforms.

The hydrological assessment involves the study of rivers, streams, and drainage patterns, as well as the identification of water bodies and their significance for the region's water resources. Moreover, the research investigates the district's climate, including temperature patterns, precipitation levels, and seasonal variations, to understand the climatic factors influencing the physiographic diversity.

The study's findings reveal a diverse physiographic landscape in District Azamgarh, ranging from the elevated terrain in the northern and eastern parts to the flatter plains in the south. The district is dissected by several rivers and their tributaries, shaping intricate drainage networks that play a vital role in water resource management. Moreover, the geological formations and geomorphic processes have left a profound imprint on the landforms, contributing to the region's unique natural beauty.

This research serves as a valuable reference for understanding the physiographic complexities of District Azamgarh. The insights provided are crucial for sustainable development, disaster management, and environmental conservation efforts in the region. Furthermore, the study contributes to the broader field of geography by adding to the knowledge of physiographic processes and patterns in a specific geographic context. Actually, this type of datasets enable the development of environmental simulation models, which are valuable tools for scientifically assessing environmental issues and the impact of human activities on environmental quality.

Keywords: Physiographic study, geology, drainage pattern, topography geographical

Introduction

Agriculture, the most important primary economic activity, is closely related to physical environment, particularly relief, climate and soils. In any scientific, viable inquiry into agricultural phenomena, therefore, it is prerequisite to pay attention to the basic relationships between these physical determinants and agriculture (Singh and Dhillon, 1984). Hence, scholars have since long been attracted to the problem of explaining how variation in environment has affected agricultural landscape (Gregor, 1970). Till 1940, they were engaged in explanations for distribution patterns derived from the study of physical environment alone. In Indian context, Mukhopadhyay (1976) [4] has explained that nearly 60 per cent of variation in agricultural productivity is due to 'region effect' indicating differences in natural environment and innate human ingenuity.

Azamgarh district exhibits minimal variation in its physical environment, a significant factor influencing the evolution of

its agricultural landscape. Despite this, a thorough and clear study of the region is essential to comprehending the diverse agricultural development across its different parts.

Location and Extent

Azamgarh district is situated in the central part of Eastern Uttar Pradesh, spanning between latitudes 25°40' N and 26°27' N and longitudes 82°40' E and 83°32' E. Encompassing an area of 4054 sq. km, it stretches approximately 82 km from east to west and 85 km from north to south. Notably, the district's geographical extent can vary due to the dynamic erosive activity of the Ghaghara River, which alters its course remarkably from year to year.

The district shares its boundaries with Gorakhpur, Sant Kabirnagar, and Ambedkar Nagar districts to the north, Sultanpur and Jaunpur districts to the west, Jaunpur and Ghazipur districts to the south, and Mau district to the east.

The northern boundary of Azamgarh is demarcated by the

river Ghaghara.

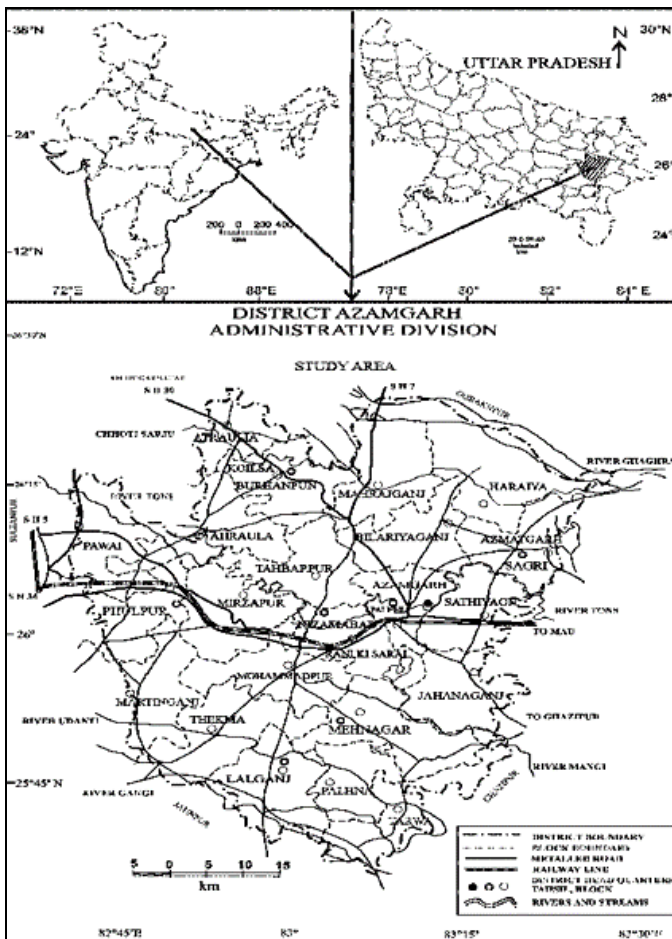


Fig 1: Location and Extent of Azamgarh District

Administratively, the district is divided into seven tahsils, namely Sadar, Sagri, Burhanpur, Lalganj, Nizamabad, Mehnagar, and Phulpur, and comprises twenty-two development blocks, including Atraulia, Koilsa, Ahraula, Mahrajganj, Haraiya, Bilariyaganj, Azmatgarh, Tahbarpur, Mirzapur, Mohammadpur, Rani Ki Sarai, Palhani, Sathiyao, Jahanaganj, Pawai, Phulpur, Martinganj, Thekma, Lalganj, Mehnagar, Tarwa, and Palhana. Additionally, the district consists of 288 Nyaya Panchayats, encompassing 2118 inhabited villages. Furthermore, there are 13 towns located across different parts of the study region (refer to figure 1).

Topography

Azamgarh district is situated in the Middle Ganga Plain, which owes its formation to the fertile alluvium deposited by the Himalayan Rivers. This vast plain, dating back to the Quaternary age, lacks any hills or mounds, except for variations caused by Bad Lands along the draining streams. Generally, the district gently slopes towards the southeast, with the exception of areas near the Ghaghara River.

Throughout the district, there are occasional high lying user plains and depressions of various depths and sizes, forming lakes and swamps. Topographically, the district can be divided into two main parts: the northern part and the southern part.

The northern part can be further subdivided into two sections: the uplands, known as bhangar, predominantly covered by fertile loamy soils, and the lowlands adjacent to the Ghaghara River, known as kachhar. The Chhoti Saraju and Tons rivers drain the bhangar land, while the kachhar area is characterized by sandy soil, interspersed with deposits of clay and silt of

varying thickness. This kachhar land forms a strip nearly 10 km wide across the district.

On the other hand, the southern part of the district lies south of the Tons river and is drained by rivers such as Gangi, Udanti, Besu, Mangai, and Bhainsathi. This area features a relatively lower ground surface and predominantly clayey soil. All the rivers in this region flow in an easterly and south-easterly direction.

Geology

The geological composition of the district mainly comprises Quaternary fluvial deposits, which consist of silt, sand, and clay. These alluvial deposits include both younger and older alluvial formations. In an effort to understand the district's geology, a significant borehole drilling of approximately 1136 feet was conducted, as documented by Smith and Crawford in 1902.

Throughout the drilling process, no hard rock formations were encountered. Instead, the boreholes consistently revealed the presence of kankar, brick-earth, and soil. Similar outcomes were observed in various other boreholes conducted, as reported by Oldham in 1961. Table 1.1 exemplifies the results of the boreholes conducted in the vicinity of Rainey village near Azamgarh city, indicating the absence of any specific rock structures.

Table 1: Geological Profile of Azamgarh District.

Bed number	Thickness in meters	Nature of Strata
1	0-3	Surface clay
2	3-20	Soil kankar
3	20-21	Sand stone
4	21-32	Hard clay with kankar
5	32-41	Fine to medium sand
6	41-71	Clay and kankar
7	71-81	Fine to medium sand
8	81-90	Clay and kankar
9	90-105	Fine to medium sand and bajri
10	More than 105	Clay and kankar

Source: Strata Register, Tube-well Division, Irrigation Office, Azamgarh.

The district has a limited presence of minerals, primarily found in the saline earths, which are the source of saltpeter and salt production. Additionally, limestone conglomerate, known as kankar, is commonly found in the older alluvial deposits and is extensively used in road construction. The yellow soils in the area are utilized for making bricks and roof tiles.

Regarding groundwater, it is typically found within 15 meters from the surface in the older alluvial formations. These older alluvial sediments serve as significant and productive aquifers for the district. The quality of water available for irrigation and public water supply is excellent, making it suitable for various purposes.

Drainage Pattern

Despite being the largest river in the district, the Ghaghara River receives very few seasonal rivers as tributaries. These tributaries mainly consist of nalas and small streams. The overall drainage system of the district follows a general slope from the north-west to the south-east, approximately running

in parallel directions (refer to fig 2). Several important drainage systems can be identified in the district.

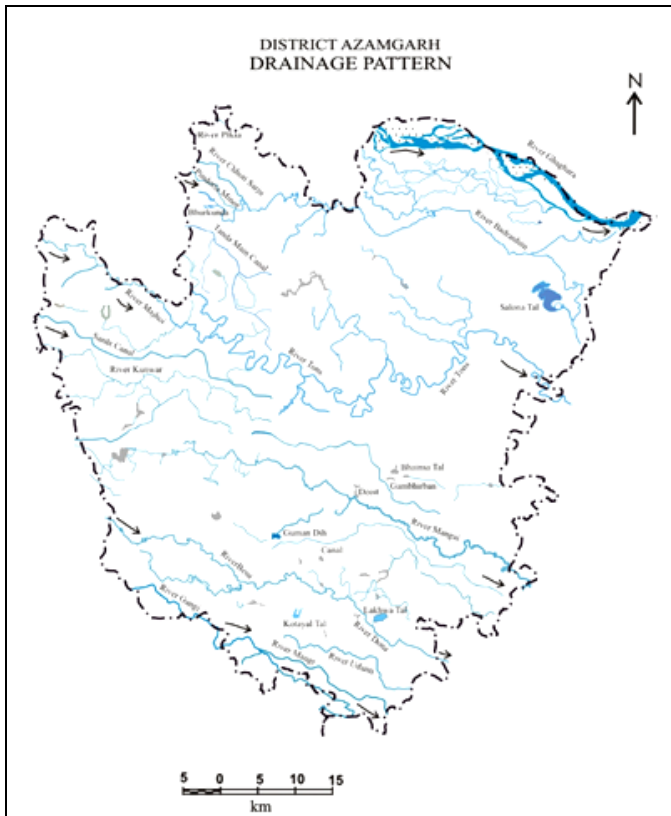


Fig 2: Drainage Pattern of Azamgarh District

The Ghaghara

The river Ghaghara holds significant importance, being navigable throughout its length within the study area and even extending beyond it for a considerable distance. Originating in the Kumaon mountains of Nepal, it is formed by the merging of various small streams, including Chauka, Kauriala, Rapti, and others. During the rainy season, the river swells to an immense size, resulting in rapid currents and often causing severe flood damage. As the flooded waters recede, the river deposits highly fertile alluvium in some areas, while leaving infertile coarse sand in others. Unfortunately, the high velocity of floodwaters can strip away fertile soil, leaving the land barren.

The river's banks consist of soft sandy deposits, and the valley width can be quite extensive, occasionally reaching 8 to 10 km. During floodwaters, the river's current oscillates within wide limits, leading to the formation of subsidiary channels. At times, the river diverts its force into these channels, depositing sand. On other occasions, it confines itself to a single channel, leaving stretches of fertile soil.

The river Ghaghara is notorious for its tendency to shift its channel, causing erosion and devastating floods. Historical instances of such events occurred in various years, including 1872, 1885, 1895, 1905, 1938, 1955, 1963, 1964, 1965, 1971, 1976, 1980, 1983, 1984, and 1985. These occurrences have inflicted significant damage to both life and property, leading to rapid erosion of the southern bank and even forming a new channel near Hazipur in Sagri Tahsil.

The Tons

The river known locally as Tamsa finds its origin in a Tal situated in Barabanki district. It enters the study area approximately 10 km northeast at village Mahul, flowing

parallel to the river Ghaghara. Soon after, its tributary rivers, Majhui and Kunwar, join it on the right bank in Mirzapur block. The Tamsa is a perennial river, but during dry months, only a sluggish current of water flows in its channel. It follows a winding course of about 69 km until reaching Birman, from where it flows straight eastward. However, during the monsoon season, the river swells and causes flooding in the nearby villages.

The Chhoti Saraju

The Chhoti Saraju, originating from a lake about 24 km southwest of Faizabad at coordinates 26° 41' N and 82° 0' E, follows the abandoned course of the Ghaghara River. This can be observed from the presence of ox-bow lakes. The Chhoti Saraju was captured by the river Ghaghara through Badrauwan Nala near Latghat, now located in Mau district. After joining the river Tons near Maunath Bhanjan, the combined stream is known as Chhoti Saraju, ultimately emptying into the river Ganga.

Rivers of the Southern Low Land

In the southern lowland, several small non-perennial rivers, such as Mangai, Gangi, Besu, and Udanti, run parallel to each other. These rivers experience flooding during the rainy season and generally originate from small lakes or tals in the district, except for the Gangi, which joins the Ganga in the east.

Lakes and Jhils

The district boasts numerous and sizeable lakes and tals, particularly in the southern part. The main tals include Katyal, Goman Dih, Kumbh, Bhainsa, Askar, Lakhwa, and Gambhirban tal. Salona, Kotoyal, and Lakhwa tal are prominent among them. For instance, Salona tal's dimensions are approximately 3.658 km in length, 2.743 km in breadth, and with a depth of 6 meters. Swamps are typically found near tals, especially in the vicinity of the river Ghaghara.

Physiographic Division

Azamgarh district is a part of Indo-Gangetic plain formed by the alluvium of Quarternary age. The district is a level plain without any marked uplands. There are some variations in surface because of erosion by the rivers. The district slopes gently towards south east. There are some local depressions of varying depths and sizes scattered throughout the district forming lakes and swamps. There are some high lying usar plains. The maximum elevation of district is about 84 m. above mean sea level in the western part of the district near 'Pulki Sarai' village in Pawai block. On the basis of surface slope, drainage and soils, the study area can be divided into four physiographic divisions:-

- i). The Ghaghara Khadar Zone.
- ii). The Central Bhangar Upland.
- iii). The Tons and Chhoti Saraju Khadar.
- iv). The Southern Low Lying Bhangar Plain.

1. The Ghaghara Khadar Zone: This region occupies an area along the right side of the Ghaghara River. In the north-western part of the region, there are large numbers of nalas (small streams). Slope of the region is towards the north-east. This zone is normally flooded by the river Ghaghara every year which causes much loss to human properties and lives. Fertile soils are deposited due to floods every year which is good for crop production but whenever sand deposition takes place problems arise for

farmers. Soil of the area is sandy and sandy loam. There is good cultivation of Rabi crops. In the sandy soils near the river Ghaghara, Zaid crops are also well grown by farmers.

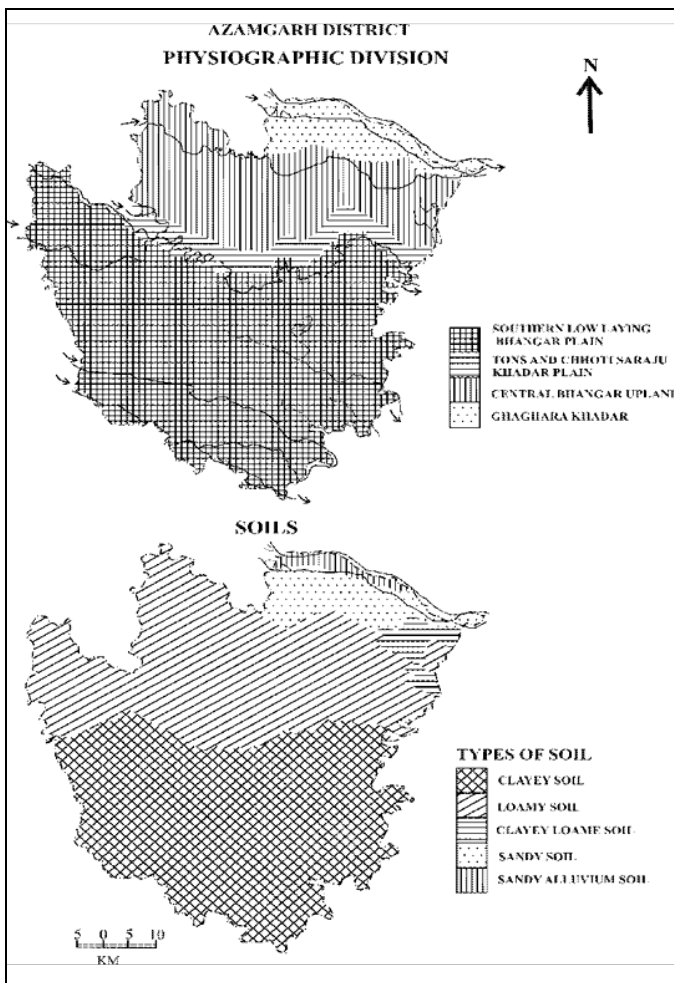


Fig 3: Physiographic Division and Soil types of Azamgarh District

2. The Central Bhangar Upland

It is situated in between the Ghaghara Khadar and the river Tons. Slope of the region is towards south-east. This is the most fertile part of the district. A part of it is cut-off from the rest in the north east by the river Chhoti Saraju. This is drained by the Chhoti Saraju and some small channels joining into the river Ghaghara, but rest of the land is drained by the river Tons and its tributaries viz. Kunwar, Ungari, Majhuai, Silani, Saksui and Kyar. This is the heart land of the district. A large number of urban centres like Azamgarh, Mubarakpur, Hafizpur, Ibrahimpur, Azmatgarh, Jiyanpur, Bilariyaganj, Mahrajganj, and Atraulia are situated in this region. Soils of the region are loamy clay to loam with some small patches of clay which is found in the narrow depression. There are also some isolated patches of usar land. Loamy soils become lighter in the neighborhood of the rivers and in some cases it becomes sandy loam. This region is occasionally flooded by the river Tons and its tributaries.

3. The Tons and Chhoti Saraju Khadar Plain

The Tons and Chhoti Saraju Khadar plain occurs as narrow strips along the rivers. The soil is mostly sandy which is covered with some new silt at the time of frequent floods. It is less liable to floods specially in the upper course as compared to their lower parts. The land is intensively cultivated in Rabi season.

4. Southern Low Lying Bhangar Plain

Covering 41.8% of the total district area, it occupies the southern part of the district comprising Phulpur, Rani ki Sarai, Thekma, Martinganj, Mehnagar, Tarwa, Palhana, Jahanaganj, and southern part of Sathiyaon and Palhani blocks. It lies roughly south of the river Tons. The soil of this portion is mostly clayey but with some usar lands. Much of the land is low where marshes and lakes abound. It is drained by the river Gangi, Udanti, Besu, Mangi, Manjhuai, and Bhainsahi which rise from swamps depression etc. and flow almost parallel from the west to east upto the eastern border of the district. In this region, where the soil is good and not infested with usar, varieties of crops are grown.

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