

Hydrological and Land-Utilization Profile of Pakur District: A Geographical Study

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ABSTRACT: The topography in Pakur is divided into three parts i.e. the hilly area, the rolling and the alluvial area. The hilly area includes the whole of Damini-Koh from north corner of the district up to the Southwest touching the border of Birbhum district of West Bengal. A narrow continuous strip of alluvial soil, lying between the Ganga feeder canal and the loop line of Eastern Railway, is very fertile. Rest of the part covers the rolling areas, which is less conducive for agricultural operation. The district is mostly characterized by undulating topography covered by basaltic flows of Rajmahal Trap which is the major rock type in the district. The other geological formations of the district are Laterite, alluvium, and Gondwana. In the Eastern part of the district, recent alluvium covers in patches which are mainly composed of sand and subordinate clay. Laterites are mainly of in situ origin and have been formed by sub-aerial erosion of

underlying basalts under favourable climatic conditions. Laterites provide a productive ground water reservoir due to very good porous and permeable nature.

Keywords: topography, hilly area, rolling, alluvial area, Gondwana, favourable climatic conditions, permeable nature.

I. LOCATION AND EXTENT

The Study area, Pakur, is located in the North Eastern part of Jharkhand. It was earlier the part of the district of Santhal Pargana and when Sahibganj became a district, it was one of its subdivisions. It became District on January 28th, 1994. The district is situated between 24° 49' 45" N to 24° 14' 00" N Latitudes and 87° 24' 00" E to 87° 55' 00" E Longitudes. Pakur is the district headquarters of Pakur District in the state of the Jharkhand.

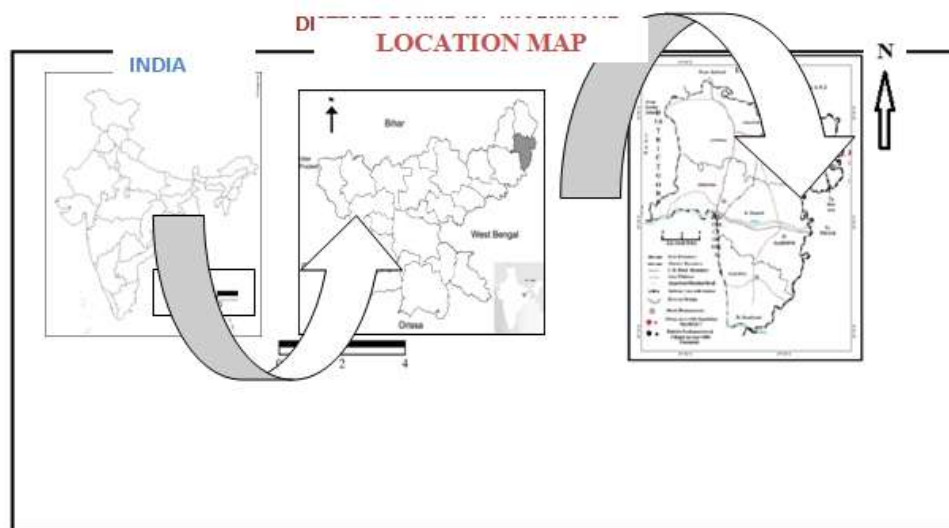


Fig: 1

The District, with a population of 900422 lakh (Census of India, 2011) is the 7th least populous district of Jharkhand. The total geographical area of Pakur District is 1805.21 sq. km. and it is the 4th

smallest district by area of the state. There are 6 blocks in the district, i.e. Littipara, Hiranpur, and Pakur in the north, & Amrapara and Maheshpur in the Centre and Pakuria in the south. Among them,

Pakur is the most populous block with population of about 3.3 lakh and Amrapara is the least populous block with a population of about 65 thousand only.

of alluvial soil, lying between the Ganga feeder canal and the loop line of Eastern Railway, is very fertile.

II. RELIEF/PHYSIOGRAPHIC FEATURES PHYSIOGRAPHY (GEOLOGY)

The district contains three distinct tracts viz. portion of Damin-i-Koh, Pargana Ambar and Pargana Sultanabad. Damin-i-Koh in the north western corner is hilly tract and covers 31 percent area of the district. Pargana Ambar and Paragana Sultanabad are rice plains. Geologically, the area has basaltic trap and sedimentary beds. Quartz and gneisses are found in some places. The principal rivers flowing are Bansloi, Brahamani, Torai and Gumani.

The topography of Pakur is divided into three parts i.e. the hilly area, the rolling and the alluvial area. The hilly area includes the whole of Damin-i-Koh from north corner of the district up to the Southwest touching the border of Birbhoom district of West Bengal. A narrow continuous strip

CLIMATE

The amount of precipitation for the year in Pakur is 1384.3 mm. The district is characterized by humid to sub-humid climate. The Koppen Climate Classification subtype for this climate is "Cfa". (Humid Subtropical Climate. The district receives an annual rainfall of 1500 mm. and most of the rainfall occurs during the rainy season. The average temperature for the year in Pakur is 25.6 degree.

RAINFALL

To show variation with months and monthly totals, the rainfall gain over a sliding monthly period is shown .Pakur experiences extreme seasonal variation in monthly rainfall. The area receives rainfall by South-West monsoon. Rainy season sets in the middle of June and lasts till September. The normal average rainfall in the district is 1399 mm.

Table 1: Monthly Rainfall in the distribution of the District Pakur

		YEAR		2012	2013	2014	2015	2016
Sl.No	Month	Avg	Avg	Avg	Avg	Avg	Avg	Avg
1	Jan	3.2	0	0	9.3	9.41	0	
2	Feb	2.5	24.9	34.7	0	3.6	0	
3	March	0.6	0	6.7	46.7	3.9	0	
4	April	52	9.5	3	47.4	17.9	3.05	
5	May	13.1	98.4	148.9	79.9	66.9	85.2	
6	June	140	224.7	207.3	310.6	143.4	177	
7	July	584.2	140.9	430.7	429.8	296.8	512	
8	August	247.9	429.4	258.7	294.8	201.2		
9	Sep	321.2	224.8	143.4	156.3	246.8		
10	Oct	112.6	374.5	61.9	19.9	46.4		
11	Nov	74.25	0	0	8.41	0		
12	Dec	0	0	0	0	0		

Source: government published mining report, Pakur

The Indian Meteorological Department, Nagpur, vide letter No. NAGPUR RMC/CS-312, dated 18th January, 2016 has provided the period of Rainy Season viz. Normal dates of Onset and Withdrawal of South West Monsoon over India as state-wise. The duration for the period is 10th June to 15th October.

NATURAL VEGETATION

The total area covered under forest in Pakur district is about 37373 acres or 15099 hectares. This district was once known for its thick

& extensive forests, the medicinal plants such as Sarpagandha, Raigami or Dhama, Kazwa, Chiryaita etc. are now almost extinct. There has been large-scale destruction of forests in the past few Years. So, the subsistence agro based economy, which was earlier supplemented by forest and forest products, has been badly affected. But the Paharia people of this district sustain their livelihood on the forest products like bamboo, sabai grass, tasser, silk cocoon, lac, simal cotton & kendu leaves. The area comprises of agricultural land. There are no National Parks, Sanctuary or ecologically sensitive

areas within the 10 km periphery of the district. Due to high temperature and humidity the area comprises of tropical moist deciduous vegetation. No wildlife protected area declared protected under “Wildlife (Protection) Act-1972” is located within 10 km radius of the district. Forest cover in the state, based on interpretation of satellite data of November 2008-January 2009, is 22,977 Km² which is 28.82% of the state’s geographical area (GA). In terms of forest canopy density classes, the state has 2,590 Km² area under very dense forest, 9,917 Km² area under moderately dense forest and 10,470 Km²

Flora of the area:-

The area harbors mostly of moist tropical deciduous vegetation. There is very little or no vegetation seen scattered in the area. Species like Mahua, Sakua, Karanj, Karam, Kathal, etc. are found along the boundary. Species of Agave, Lantana, Malva, Lantana, Ricinus, etc. are of common occurrence along the roads.

The flora of the area comprises of Shorea robusta (Sal/Sakhua), Mango, Diospyros melanoxylon (Tendu), Madhuca latifolia (Mahua), Pterocarpus marsupium (Bia/Paisar), Anogeissus latifolia (Dhautha) etc

SOILS

The major soil type of the district is the Rajmahal type soil which is derived from basaltic lava. These soils black in colour are very fertile and restricted to Rajmahal lava areas. The other soil type of the district is Red soil, eroded scarp soil, foothills soils, Tal soil and alluvial soil. The yellowish red foothills soils occur in the eastern fringe of the district. The alluvial soil is found in back water belt

of the Ganga around Pakur when the rain water remains collected in the rainy season.

These soils occurring in different landforms have been characterized during soil resource mapping of the state on 1:250,000 scale. Three soil orders namely Alfisols, Inceptisols and Vertisols were observed in Pakur district. Alfisols were the dominant soils covering 80.4 percent of TGA followed by Inceptisols (17.0 %) and Vertisols (0.60 % Soil pH is an important soil property which affects the availability of several plant nutrients. It is a measure of acidity and alkalinity and reflects the status of base saturation. The soils of the district have been grouped under four soil reaction classes according to Soil Survey Manual (IARI, 1970).

The soil pH ranges from 4.9 to 7.7. The soil reaction classes with area are given in table 3. The data reveals that soils of 88.9 percent area are acidic in reaction in which 32.5 percent area have moderately acidic soils, 32.2 percent area have strongly acidic soils, 15.9 percent slightly acidic soils and 8.3 percent very strongly acidic soils. Neutral and slightly alkaline soils cover 6.5 and 2.6 percent area respectively. The soils occurring in different landforms have been characterized during soil resource mapping of the state on 1:250,000 scale (Haldar et. al. 1996) and three soils orders namely Alfisols, Inceptisols and Vertisols were observed in Pakur district. Alfisols were the dominant soils covering 80.4 % of TGA followed by Inceptisols (17.0%) and Vertisols (0.06%). The soil pH ranges from 4.9 to 7.7.

The major part of the district being rocky, it is difficult to dig wells. Where there exists facility for irrigation during Rabi season from the ponds, Wheat is the major crop growing in that area.

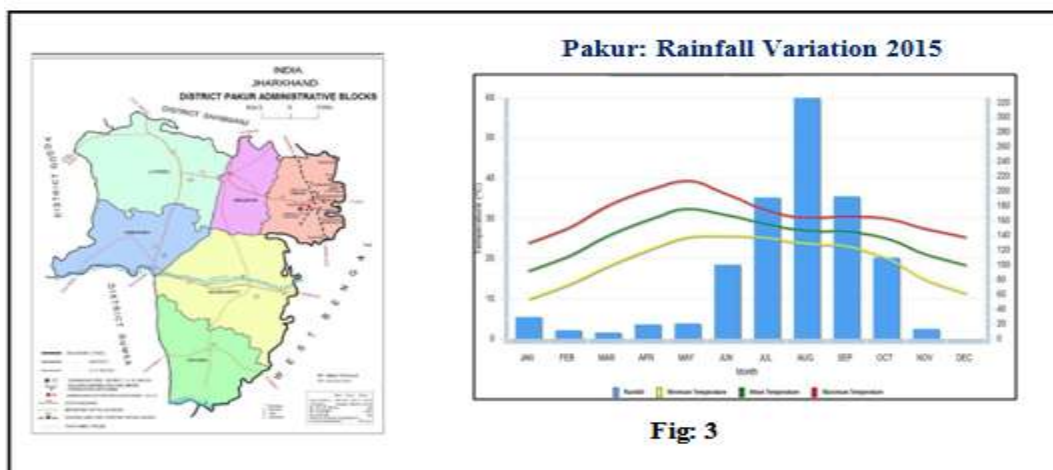


Table: 2. – Soils under Different Reaction Classes/ Spatio Temporal

Soil Reaction	Area (00,ha)	% of theTGA
Very strongly acidic (pH 4.5 to 5.0)	150	8.3
Strongly acidic (pH 5.1 to 5.5)	581	32.2
Moderately acidic (pH 5.6 to 6.0)	586	32.5
Slightly acidic (pH 6.1 to 6.5)	287	15.9
Neutral (pH 6.6 to 7.3)	118	6.5
Slightly alkaline (pH 7.4 to 7.8)	46	2.6
Miscellaneous	37	2.0
Total	1805	100.0

Source: Irrigation Report Pakur 2016

DRAINAGE

There are three main rivers in this district namely Bansloi, Torai & Brahmini, Bansloi, Pagla, Torai and Mani rivers flow in the middle and Brahmini flows in the Southern part of the district. Owing to the natural drainage, However, a considerable portion of the district lying between the Ganges feeder canal and loop line of Eastern Railway is liable to waterlogging when sudden rains swell the rivers and its subsidiary branches. Although localized floods in the form of water logging are annual features but they make the soil

fertile. Thus, the damage is considerably compensated by higher yield.

AGRICULTURE AND LAND USE

The hilly area has considerable forest cover but in plain lands people have depleted forest cover. Important trees are sal, mahua, semal, sisam, kathal etc. Important crops grown in the district are rice, wheat, maize and ragi. Most of the area grow single crop due to unavailability of irrigation facility. Major sources of irrigation are tanks and wells.

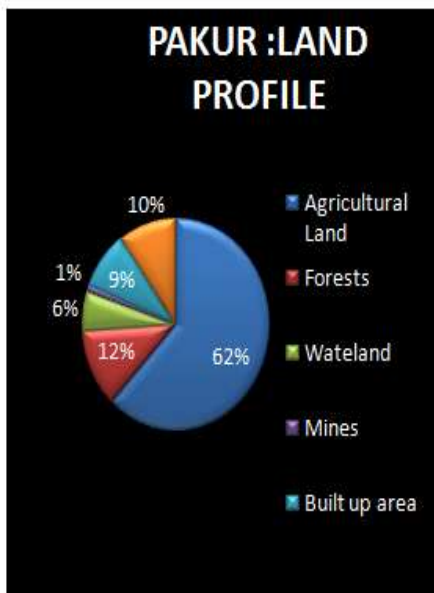


Fig: 4

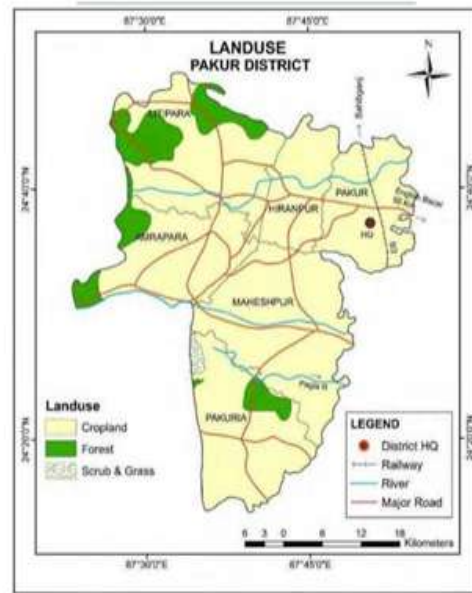


Fig: 5

Table: 3 Land Use Distribution in Pakur District, (2017-18)

Sector	Pakur	Jharkhand
Forest	11.44 %	29.2 %
Net sown area	33.74 %	22.7 %
Barren and unculturable waste	6.33 %	7.2 %
Non agricultural use		
Orchards	1.81 %	

Pasture	3.12 %	2.5 %
Culturable wasteland	4.12 %	3.5 %
Current and other fallow	28.28 %	25.0 %

Source: Fertilizer and Agriculture Statistics, Eastern Region (2003-2004)

Over a period of time, basically geographical pattern of agricultural land use are the outcome of concurrent interaction between the variable combinations of natural condition and human circumstances.

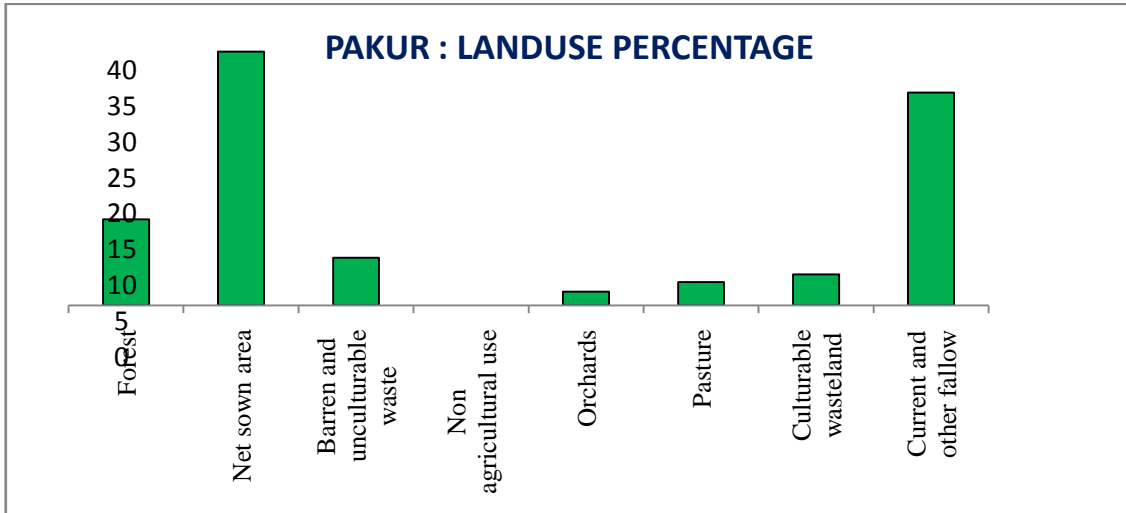


Fig :6

The analysis of land use in the present study area is based on district statistical data available at block level and revenue office. Following categories of land use have been recognized in the study area. In the analysis of land use pattern study

has been adopted at block level: Forest cover, Barren and cultivable waste land, Current Fallow land, Other fallow land, Barren & uncultivable land, Land put to non- agricultural use, Pastures and Grazing Land, Area under bush, forests & garden, Net area sown.

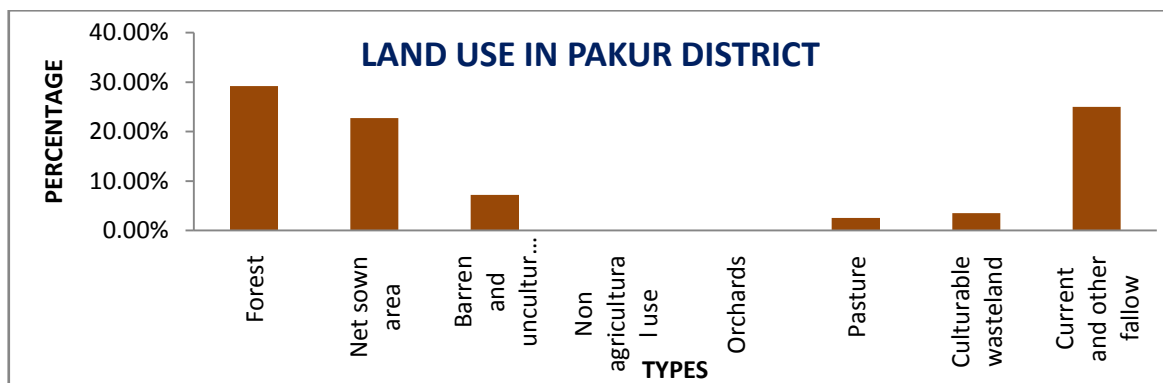


Fig: 7

A. LAND UTILIZATION		
SI NO	Year	Description
i) Total Area(in Hectare)	2010-11	179720.00
ii) Forest cover(in Hectare)	2010-11	15,099.46
iii) Non Agriculture Land(in Hectare)	2010-11	18571.88

Table: 4 Major Field crops (Crops identified based on total avreage)		
A. LAND UTILIZATION		
SI NO	Year	Description
iv) cultivable Barren land(in Hectare)	2010-11	106789.43
B. FOREST		
SI NO	Year	Description
Forest(in Hectare)	2010-11	15,099.46
Source: Fertilizer and Agriculture Statistics, Eastern Region (2003-2004)		

Pakur: Landuse And Agricultural Land Profile

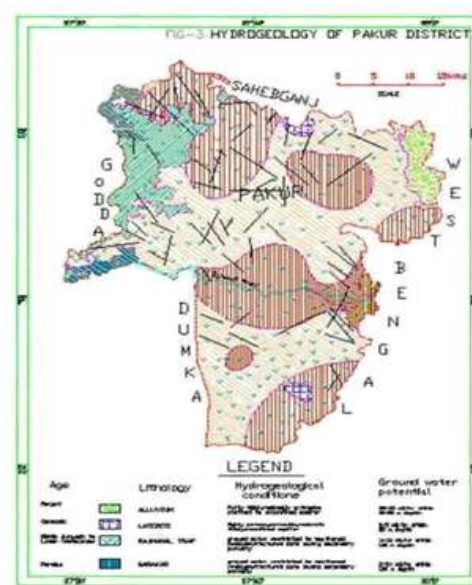
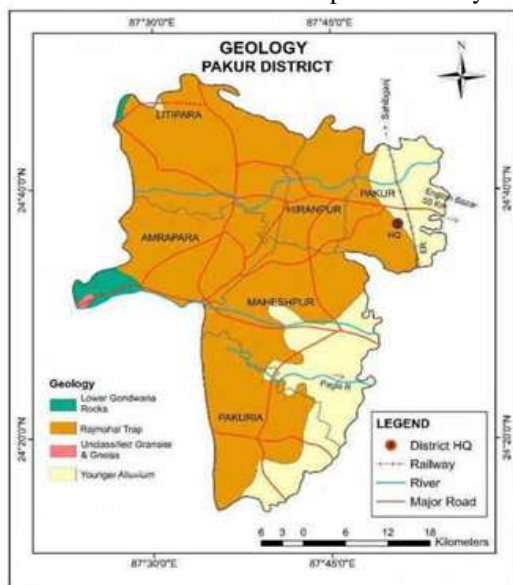
Land use is a function of four variables, land, water, air and man, each plays in its own role in composing its life history. Land constitutes its body, water runs through its veins like blood, air gives it oxygen and man acts as the dynamic actor to reflect its types, pattern and distribution. The land use shifts from agricultural uses to residential, industrial, transportation, and neighbourhood retail and service activities due to urbanization. A true nature of these dynamic qualities in land use emerges from a historical survey designed to reveal the successive development of inherent characteristics of land because 'some changes are short lived whereas others represent a more constant demand' (Jackson, 1963).

LAND USE CLASSIFICATION

The aim of this study is clear visualization of local land environment. The present study

focuses mainly on dimension, which is very important from the sustainability point of view that is distribution of different groups of land use, i.e. their ratios in the region. Therefore, it becomes very complex and diversified to study all the groups available at micro-level, homogenous groups are generalized to reduce the number of groups, and these simplified groups of land use are called generally land use classification.

The analysis of land use in the present study is based on district statistical magazine, data available at block level and revenue office. Following categories of land use have been recognised in the study area. In the analysis of land use pattern, study has been adopted at block level: Forest Cover, Barren and cultivable waste land, Current Fallow land, Other Fallow land,



HYDROGEOLOGY

Rajmahal Trap is the major rock type in the district. The other geological formation of the district in patches, which is mainly composed of sand and sub ordinate clay. Laterites are mainly of in situ origin and have been formed by sub-aerial erosion of underlying basalts under favourable climatic conditions. Laterites provide a productive ground water reservoir due to very good porous and permeable nature. The most significant Barakar coal measures of Gondwana formation are alluvium, Laterite and Gondwana. In the eastern part of the district, recent alluvium occurs occurs in western part of the district.

Rajmahal traps having a large thickness of basaltic lava flows occur in the major part of the district. The different units of the lava flows are the main water bearing horizons in basaltic formation. The basic properties such as the ability to receive recharge, holding capacity of water to take into storage and transmit it as ground water by gravity are different for different litho units of the trappean flows. The massive basaltic unit is hard and

compact in nature with negligible primary porosity and permeability. But the process of weathering and structural deformations, development of secondary porosity such as joints and fractures make it to act as good ground water reservoir. The vesicular units have abundant vesicles that contribute to high degree of porosity and permeability to serve as potential aquifers. The ground water occurs under water table conditions in near surface weathered, jointed and fractured basaltic zone. The water bearing zone occurring between depths of 15-40 m are either interflow weathered shear zones or directly connected to shallow aquifer in widely spaced major joints and fractures. These forms semi confined aquifer. Below the depth of 40 m, where the fracture porosity is insignificant, the weathered flow contacts are completely cut-off from lower aquifer on account of intervening high impermeable massive basalts and intertrappean beds give rise to confining conditions. The hydro-geological map is shown in figure.

Table 5: Geological succession exposed at The Rajmahal area, eastern Jharkhand (after Ball, 1877; Sengupta 1988; Tiwari & Tripathi 1995; Ghose et al., 1996)

Group	Formation	Lithology	Age
		Alluvium	Recent
		Laterite	
Upper Gondwana	Rajmahal	Basalt and acid volcanics with intertrappean beds of pyroclastic material, argillaceous, and arenaceous sediments often contain plant fossils (<i>Ptilophyllum</i> flora)	Lower Cretaceous
	Dubrajpur	Pebbly ferruginous sandstone, conglomerate Triassic to an grit passing into siltstone and shale Usually forms high ridges and scarps Disconformity	Early Cretaceous
	Barakar	Sandstone, shale, and carbonaceous shale with coal seam Lower	Lower Permian Unconformity
	Talchir	Boulder bed, fine-grained sandstone, Yellow or green shal highly- weathered	Lower Carboniferous Unconformity
	Proterozoic	Chhotanagpur gneiss-granulite complex	

Source: mining report of Pakur district, Jharkhand.

Major part of the district is characterized by undulating topography covered by basaltic flows of Rajmahal Trap. The main geomorphological features of the district are the rolling pen plain in the south with numerous remnants of ancient ridges and resistant lava plateau of Rajmahal. These plateaus rise above the general level and occupy major part of the district. The general elevation of the hills and plateau varies from 70 to 371 m above MSL.

Rajmahal Trap is the major rock type in the district. The other geological formations of the district are alluvium, Laterite and Gondwana. In the eastern part of the district, recent alluvium occurs in patches, which is mainly composed of sand and sub ordinate clay. Laterites are mainly of in situ origin and have been formed by sub-aerial erosion of underlying basalts under favourable climatic conditions. Laterites provide a productive ground water reservoir due to their very porous and permeable nature. The most significant Barker coal measures of Gondwana formation occurs in western part of the district.

The district of Santhal Paragons is mainly a dissected upland of ancient crystalline rocks which are covered with thick flows of volcanic lava. The ancient crystalline rocks, collectively called the Archaean gneisses, cover the greater part of the district. The principal rock is a granitoid gneiss earlier known as the Bengal gneiss.

REFERENCES:

- [1]. District Mining Office – Pakur
- [2]. District Forest Office - Pakur
- [3]. Geology of Bihar and Jharkhand by T. M. Mahadevan
- [4]. National Institute of Disaster Management Report
- [5]. Report of Central Ground Water Board, Ministry of Water Resources – State Unit Office, Ranchi, September 2013.
- [6]. D. S. R. of Sand – Pakur
- [7]. Dixit, K.R. (2003). Human Resource Development., Vishwa Publication, Nagpur.
- [8]. Ghosh, B.N. (1984). Fundamentals of Population Geography. Sterling Publication Ltd. New Delhi.
- [9]. Government of Jharkhand (2010). Blockwise Ground Water Resource Estimation of District – Pakur, Groundwater Department Division, Santhal Pargana.
- [10]. Hussan M.I. (2005). Population Geography. Rawat Publication. Jaipur.
- [11]. Singh, O.P. and Pandey, D.C. (1968). Development Planning: Theory and Practices, Gyanodaya Prakashan, Nainital, p.98.
- [12]. Tiwari, R.C. (1998). Krishi Bhugol (Agriculture Geography). Prayag Pustak Bhavan, Allahabad, pp.75-97.
- [13]. <http://www.jharkhandminerals.gov.in>
- [14]. <http://pakur.nic.in/>
- [15]. <https://en.wikipedia.org/wiki/Pakur>
- [16]. https://sameti.org/Soil_Inventory/Pakur_Soil_Analy