



A STUDY OF SOIL AND VEGETATION IN PUNPUN BASIN OF MAGADH REGION, BIHAR, INDIA

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ABSTRACT

This paper aims at geographical study of soil and natural vegetation in the Punpun basin of Magadh region of Bihar. The study area can be divided into the following soil zones: Soil of the Plateau surface and Soil of the Lowland. Soil of the Plateau surface consists of Soil of the Uplands and Valley side soil whereas Soil of the lowland consists of the older alluvium, the newer alluvium, the Tal Soil and the Levee Soil. As far as vegetation is concerned, nearly 121422 hectares of land or 13.45 percent of the total basin area is covered with forest. Including the land under miscellaneous trees and groves, this percentage rises to 13.79 only total area being 1, 24, 510 hectares.

Keywords: River Basin, Catchment Area, Soil, Natural Vegetation, Forest

INTRODUCTION

The river Punpun originates from Chotanagpur hills in Hariharganj Block of Palamu district in Jharkhand at an elevation of 442 m and at latitude 24⁰11' N and longitude 84⁰9'E. The river Punpun flows for most of its portion in a north, north-eastern direction and falls into the Ganga near Fatuha, about 25 km downstream of Patna. Its total length is about 235 km. The river receives a substantial portion of discharge from its right bank tributaries. Majority of the tributaries originate from the same range of hills in Palamu, Aurangabad and Gaya districts of Jharkhand and Bihar respectively.

Spanning over the parts of Palamu and Chatra districts of Jharkhand and Aurangabad, Gaya, Jehanabad, Arwal, Patna and Nalanda districts of Bihar it covers an area of nearly 9025.75 km which is nearly one per cent of the total area of the Ganga sub-basin in the country. The basin covers partially the areas of 8 districts viz. 32.51 per cent of the area of Patna district, 75.20 per cent of Jehanabad and Arwal districts, 52.60 per cent of Gaya district, 82.41 per cent of Aurangabad district, 0.88 per cent of Nalanda district, 6.26 per cent of Palamu district and 6.11 per cent of the area of the district of Hazaribagh (old).

STUDY AREA

The study area is a drainage basin. This river basin consists of a number of small tributaries like the Morhar, the Dardha, the Batane, the

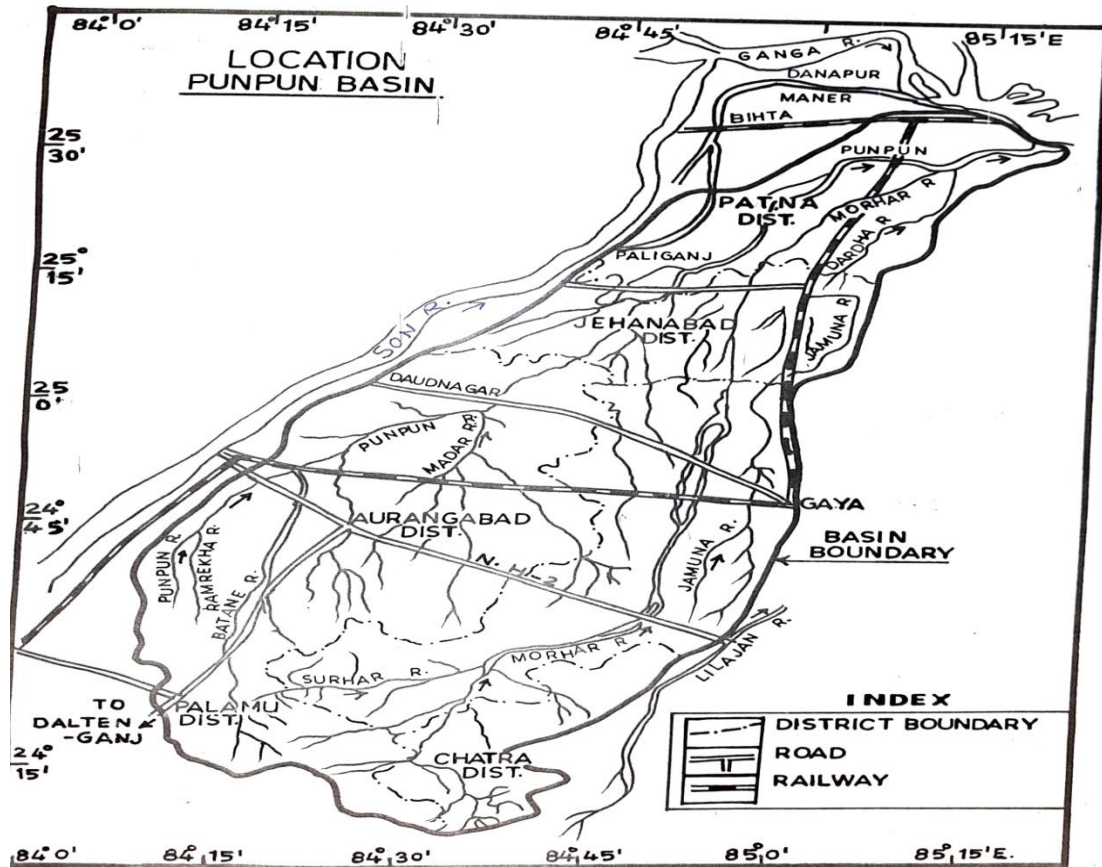


Madar, the Ramrekha, the Bakri, the Adri, the Neera, the Senane, the Begi, the Khudwa, the Mavaria and the panchanva etc. which join the main river Punpun. The drainage basin is bounded by the Sone basin on the West, the Kiul-Harohar-Phalgu basin on the East, the Ganga basin on the North and the North Koel basin on the South. The Punpun basin is situated between latitudes $24^{\circ}6'N$ and $25^{\circ}37'N$ and longitudes $84^{\circ}0'E$ and $85^{\circ}19'F$ (Fig1).

The study area is characterised by hills, hillocks, escarpment, plateau surface, channels, channel bars, badlands, winding divides, flood plains, natural levees and slopes of various types. Tors on the hill tops and on the foothills present some other important geomorphic features. The Dome-shaped hills formed due to spheroidal weathering and exfoliation is also very common in the basin.

The Grand Trunk Road (NH-2) divides the catchment into two parts in such a way that almost all the hilly parts of the basin falls on its south and plain areas on its north. The upper catchment which lies in the districts of Palamu and Chatra is characterised by low hills mostly covered under forest and the slopes with depression and valleys. The lower part of the catchment area are in the districts of Aurangabad, Gaya, Walanda, Jahanabad, Arvai and Patna is mostly plain or having some uniform mild slope and are being used for cultivation. The elevation of the Punpun basin varies from 442 m above MSL near the origin of the river to about 50 metres above MSL near its outfall into the Ganga. But the highest point of the basin is represented by Bljai Glr (610.0 metres above MSL) which lies in the south-western part of the study area.

Figure - 01



SOIL

It is the accumulation of loose weathered material which covers much of the land surface of the earth to a depth ranging from a fraction of a cm to many metres. It is a mixture of organic matter largely vegetable called humus and inorganic particles derived by weathering of the rocks. Texture or the relative size and the arrangement of the component minerals are an important characteristic of the soil. The study area can be divided into the following soil zones:

- (1) Soil of the plateau Surface
 - (a) Soil of the Uplands
 - (b) Valley side soil
- (2) Soil of the Lowland
 - (a) The Older alluvium
 - (b) The Newer alluvium
 - (c) The Tal Soil



(d) The Levee Soil

(1) SOIL OF THE PLATEAU SURFACE

The soils of the plateau surface are residual in nature being developed on the underlying parent rock. The common soil of the plateau surface is yellow and red soil. The Plateau surface is composed of granite, gneiss and schists. Granite, consisting mostly of orthoclase felspar, quartz and micas, gives rise to partly clayey and partly sandy soil. Sand consists of large quartz particles. Granite soil has enough potash. If granite contains hornblende in place of mica, lime is in good quantity. The soils at higher levels are coarse and sandy but in valleys they are stiff clays. The gneisses of the plateau surface have the same composition as granites and hence soils derived from gneisses are like those yielded by granites.

On the upper slopes of the plateau surface sandy soil is very common. It consists of 80 per cent of sand and 20 per cent of clay. Colour of this soil varies from red to yellow. The soil is light porous.

The fertility of the soil depends upon closeness to habitation and the water bodies. The lower slope of the hilly tract is occupied by the loam or Domat. As per its structure and texture this soil is an intermediate soil with fifty-fifty of the sand and clay proportion. It is light porous and fertile soil. Here the soil cover is relatively thick fertile and more clayey than the eroded soil of the upland. A large proportion of the ground on upper slopes is under natural vegetation but near the settlements they are under terrace given to Maize, Ragi, Gram, Wheat, Arhar etc. The lower slopes are given to rice cultivation.

The soils of valleys and depressions receiving all the detritus washed down from the uplands and slopes are relatively moist, more clayey and given to rice. On the irregular slopes of the scarp and immediately below, the soil is composed of infertile debris.

(2) SOIL OF THE LOWLAND

The lowland part of the Punpun basin is an integral part of the Ganga plain. Unlike the residual soil of the highlands the soil of this part is drift soil or the alluvial soil developed drifted and deposited by the streams and rivers of the basin. Therefore, the soil is mature in nature and fine grained in texture. Near the fringe zone it is thin but its thickness increases towards North. The entire land is devoid of natural vegetation and has been given to cultivation.



The alluvium of this land is mostly loamy but local variations in nature of the soil cannot be ruled out. Local names of the soil are related to the proportion of sand, clay and chemical contents.

The lowland constitutes the following soil types:

Older alluvium

The old alluvium soils correspond to clayey loam and kewal soils of south Ganga plain. It is found in the areas away from the main rivers. The older alluvium is also called Bangar. It is heavier soil with greater clay proportion than the Khadar soil hence it is extremely sticky but when it is wet it is of impervious nature and drainage is often poor. The Bangar forms the typical paddy lands of the study region. It is, as a rule, richer in lime content and kankar than the Khadar.

Newer alluvium

It is conspicuously different from older alluvium in texture, chemical composition, drainage capacity, fertility and in respect of crops cultivated on it. It is a light friable loam with a higher mixture of sand and silt. This soil is found in a linear strip along the river Son and in the lower course of the Punpun, the Morhar, the Surhar and the Madar basins in patches.

Tal Soil

Tal soils are found in the backwater belt of the Ganga in the northern part of the basin where rainwater remains collected in the rainy season. This soil varies in width from 6 to 8 km along the Ganga bank. Tal soils vary in colour from light grey to dark grey. Their texture vary from medium to heavy having PH of 7.0 to 8.0. They are very fertile but Kharif crops are not grown where they are covered with water. With the shrinkage of water, lands appear where Rabi crops like wheat, lentil, gram and barley grow luxuriantly, proper drainage measures may release some lands for Kharif crops whereas irrigation plans may improve the Rabi and other crops in summer when the soils are unrolled by waning water of Tal lands.

Levee Soil

It is recent alluvium with or without calcareous contents. The levee calcareous soils occur along the bank of the Ganga. These soils are whitish to light grey in colour. They are light in texture and attain medium to high fertility status. The levee non-calcareous soils are



found extensively along the banks of the master stream of the basin and are famous for the cultivation of arhar, maize, wheat, millets and vegetables.

NATURAL VEGETATION

It is the vegetation of a region as it exists or has existed before being modified to a marked extent by man. A large percentage of the forested land is situated in the southern part of the study region. Here dense mixed jungle mainly bamboo is found. But a large part of the forests has been cut. It has been done for fuel purposes and for agricultural land due to increase in population.

Nearly 121422 hectares of land or 13.45 percent of the total basin area is covered with forest. Including the land under miscellaneous trees and groves, this percentage rises to 13.79 only total area being 1, 24, 510 hectares. For maintaining ecological balance and environmental protection of the basin, at least 33 per cent of its area should come under forest cover. As such, some of the areas from the barren land, permanent pasture, other fallow and cultivable waste may have to be brought under forest cover.

As a rule increase in vegetation inhibits erosion. The type of vegetation and perhaps the quality varies with the quantity of precipitation. Due to high temperature and high rainfall the study region abounds in deciduous forests. The southern part which is hilly has large area under forest cover. The northern part which is plain land has less forest cover as the land is extremely cultivated.

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