

ENVIRONMENTAL MILIEU: A STUDY

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ABSTRACT

Salient aspects of environment prorated the geogenic conditions that give rise to the dispersal of certain diseases in specific areas and hence their importance in the present work. The southern uplands of Rajasthan having a lateral transition from sem-arid to sub-humid environment with a variety of landforms necessitates a brief discussion on its various environmental aspects like relief, geomorphology, climate, drainage, and vegetation which affect the morbidity pattern of the various diseases. Delimitation of the study area in terms of environmental characteristics is also significant in the present context.

Keywords: *Geogenic Conditions, Lateral Transition, Sub-Humid Environment, Geomorphology.*

Introduction

Any attempt at regionalization of the pathological regions of this broad homogeneous natural region also demands a portrayal of close coherence in the mosaic of various components of the natural environment. The region is a complete geographic unit marked by low hills of Aravallies which fan out in a S.W. S.W. to N. E. direction, intermontane plateaus and undulating terrain. Owing to its semi-humid climate which differentiates it from the other parts of Rajasthan, the pattern of increase and distribution of population in relation to its resources is often puzzling and complex. The objective of this chapter is, therefore, to present the physical environment of the region in its totality and thereafter to discover and derive the possible correlations between environmental factors and water-borne diseases.

The identification of relief, geomorphology, groundwater formations, climate, soils and demographic correlations constitutes the initial stage of aetiological research in epidemiology. Reviews of extensive literature also show that most of the attention in ecological research has been given to analysing these phenomena at the inter-regional or intra-regional level. Because of a strong coincidence between malnutrition and agricultural produce, an elaborate, analytical description of the structure and relief, climate, soils, agricultural crops is imperative in their studies.

The mode and speed of the transmission of diseases in spatially irregular outbreaks is also related to the physical conditions of environment and the distribution of susceptible population. The analysis of natural and cultural environment has long been a preliminary exercise of epidemiological investigations and a fruitful source that leads to more rigorous geo-pathological discoveries. Therefore, it is often alleged that much overlap exists between modern medical geography and epidemiology. In order to have a close allegiance to geography it is essential to maintain the strong tradition of analysing the region under study and to follow the aggregate approach to associate occurrences of specific diseases in ecological niches. The use of spatial analysis at different scales is the geographer's expertise within the domain of the subject and an attempt to overshadow these methodological trends will lead to hybridization of the subject. Hence in the succeeding pages the uniqueness of geographical variables with intra-regional disparities have been presented.

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The Region

The southern uplands region is a unique region of the state of Rajasthan, both physically and culturally. Covering an area of 52,513 sq. km. the region is marked by subhumid climatic conditions and clothed with deciduous forests. The of Rajasthan (23°5'N-26°2'N, region lies to the extreme south of Rajasthan 72°20' E-75°46' E) and spreads into six districts viz. Udaipur, Dungarpur, Banswara, Sirohi, Chittorgarh and Bhilwara.

Political Divisions

The region comprises six districts, having 52 tehsils, 32 towns and 9412 villages. Udaipur (17,279 km²) is the largest district, followed by Chittorgarh (10,856 km), Bhilwara (10,455 km²), Sirohi (5,136 km²), Banswara (5,037 km²) and Dungarpur (3,770 km²).

The population of the region is predominantly tribal consisting mostly of Bhils, Garasias and Meenas who have been the forest-dwellers since the beginning. Therefore, the villages are scattered far and wide quite often perched on the slopes of the hills and the towns have a low population. The towns having a population exceeding 100,000 are Udaipur (2,32,588) and Bhilwara (1,22,625) and are classified as class I towns of the state. The other towns which have some commercial importance and whose population does not exceed 50,000 are Chittorgarh, Dungarpur, Banswara and Sirohi.

The tribal population constitutes more than 50 per cent of the total population. The preponderance of the tribal population, which has little meant to earn a livelihood, has resulted in making this area economically backward and central administrative efforts are needed to raise the living standard of the native population and their quality of life.

Relief

The region has a peculiar configuration. It has two portions, somewhat separated from each other. The main portion approximately looks like a caterpillar and the smaller one resembles the shape of a horse-shoe.

The topography of the region is generally undulating but there are hills scattered all over the area. These rugged, hummocky hills rise upto a maximum of 617 metres and belong to the famous Aravalli range. In the southern part of the region viz., Banswara and Dungarpur district, there are vast exposures of high, flat-topped hills and ridges lying parallel to each other. The central part is a low-lying valley through which the Mahi and its tributaries flow. The highest peak which is in the extreme north- west is approximately 572 metres above the m.s.l.

The northern and eastern part of the region fall under the category of plains viz., Bhilwara and Chittorgarh district. There are hills between Asind, Hurda, Chhoti Sadri and Pratapgarh tehsils. The slopes of the hills are sometimes gentle and sometimes steep and are covered with dense forests.

The western part of the region is mostly covered with a labyrinth of hills covered with a mantle of fairly dense jungles is better known as the hilly tract of Mewar. The Aravalli range starts making its appearance in Bhim tehsil (Udaipur district) from Ajmer district in the north-east and continues south-westerly towards Kumbhalgarh and Jarga and then spreads towards the valley of Banas river. The highest peak of the western region is Gurusikhar (1722 m) above m.s.l. The slopes are covered with forest, loose rocky material and jungles affording shelter to big game. The area is most picturesque and presents some of the primeaval flora of the region.

Except for two culminations, one in Sirohi district and other in Bhilwara district, the general topography is of rolling plains deeply dissected by the ephemeral streams. The horse-shoe shaped Sirohi district has uprising between 300 to 600 metres above m.s.l. and it is here that the highest peak in Rajasthan, Gurushikhar is situated. Some parts of Chittorgarh district, extending north-west into Bhilwara are also in the range 300 to 600 metres. The mainland of the southern uplands is usually 150-300 metres above m.s.l. with scattered ranges of the Aravalli system.

There are two marked low-lying areas which are below 150 metres. These are in the south are in the south of Sirohi district of Sirohi district just where the Rajasthan boundary merges into Gujarat Gujarat through which the Mahi river makes its way to meet the Arabian Sea in the Gulf of Cam bay. The other low-lying area is again horse-shoe shaped, lying in the extreme south of the uplands spanning parts of the Dungarpur and parts of Banswara district.

Geomorphology

The geomorphology of the area greatly influences the availability of groundwater and the aquifers. A large part of the southern uplands is covered with sandstone laterite, Erinpura granite and

Deccan trap. The geological antiquity of the region belongs to pre-Aravalli, Aravalli, Raialo series, the Vindhyan and the Delhi systems. The rocks of the Aravalli series are the dominant exposures of the region. Pre-cambrian rocks also occupy some of the area of region. In the eastern part of the region the oldest geological formation is Bundelkhand gneiss which is successively overlain by a group of pre-Cambrian rocks. An unmetamorphosed facies of the Aravallies lies to the east of the great boundary fault of Rajasthan.

The geological succession in the region is given below:

Table 1: Geological Succession in the Southern Uplands

System	Series	Characteristic rocks
Lower Vindhyan	Semri series	Sukat shales, grits and conglomerate
Delhi Super group	Ajabgarh series	Schist, gneiss, marble, amphibolites
Raialos	Raialo	Khardeloa grits, Badesar quartzite
Post Aravalli	–	Ultrabasics and basic rocks granites
Aravalli Super-group		Phyllites, schist, quartzite, dolomite, conglomerate, marble, meta-volcanics
Pre-Aravalli		Schist, gneiss and migamatics

A close look at the geological structure of the region shows a varied picture of several geomorphological formations often juxtaposed with each other being present simultaneously. The eastern region shows two district formations, the Vindhyan system in the north and the Deccan trap in the south-east. This gradually gives place to an extended area of the Aravalli system interspersed with sandstone and laterites. Nearly the whole of Dungarpur, Banswara, Udaipur and Bhilwara districts show this formation. To the west of the region, lying in a belt running from north to south, is the Delhi system and the Gwalior series which also extends to the east of the Sirohi district. The central part of the Sirohi district once again has sandstone and laterite with intrusions of the Aravalli system except to the north of this district which is overlain with the older alluvium and wind-blown sand. Some basic rock formation are found in the Bhilwara and Sirohi districts and these roughly correspond in their structural their structural configuration to the highest mountain peak. Some granite deposits in central Udaipur and north-western Bhilwara are also prominently noticeable.

Climate

The climate of any region can be considered as one of the most important geographical factors which affects the distribution of population and establishes man-land relationships. Climate is generally defined as the average state of weather and includes a number of elements or component parts like temperature, humidity, rainfall etc. Among the various factors governing the climate of the region latitudinal position, mountain barriers, altitude, prevailing winds, and the thrust of the monsoon of great interest.

In the context of the present work climate is of paramount significant as the virulence of water-borne diseases is closely related to the diurnal and monthly extremes of temperature, the seasonality of rainfall, diurnal ranges of humidity and evaporation.

The climate of this region can be broadly described as sub-humid. It was a hot dry summer initiated in the month of March and prevailing from April to June. This is followed by a marked rainy season which continues till about September. Then there is a cold weather season from mid-October to February.

Temperature

May and the first half of June are the hottest months of the year, when the mean daily maximum is about 34°C and the mean daily minimum temperature is about 26°C. The sun is almost overhead and subsequently the atmospheric pressure sharply declines over the heated land. The winds are from west to east and since they came across the Thar desert they are warm and dry. There is a marked difference between the day and night temperature because of the sandy, rocky surface, which fast radiates out the heat radiations, and the mean value conveys a very inadequate picture of the true climatic condition.

A major part of Udaipur and almost the whole of Bhilwara, Chittorgarh, Banswara and Dungarpur districts have above 32°C temperature in summers summers. The western belt of Udaipur consisting of of the Aravalli ranges has a slightly lower range of temperature which gradually decreases to 28°C in the Sirohi district owing to its higher altitude. The temperature in Mount Abu are much at a much lower than in surrounding areas because it is located at a higher altitude.

With the retreat of the south-west monsoon in late- September, the temperatures decrease and the relative humidity increases. The cold season starts in the month of November culminating into severe cold in January. The isotherms for the month of January which almost follow the latitudinal sprawl indicate a contrast from that of May. The diurnal range of temperature is high even in the cold season. The average mean temperature for the month of January is about 16°C with a lower gradient in the north. Once again in the Mount-Abu region it is less due to its higher elevation. Here, the lowest temperatures quite often near the freezing point have been recorded. Elsewhere, the mean dailies are in the comfort zone.

Rainfall

Nearly 85 per cent of the fall is by the south-west monsoon. Occasional showers in winters by the passing secondary depressions also occur. The monsoon current coming across the Arabian Sea is the main source of post-summer rainfall in the region. Due to orographic barriers in the south, the highest yearly average rainfall is recorded in Banswara and Dungarpur districts. The yearly average gradually decreases in the north and north-east. In spite of the monsoon current towards the western part of Rajasthan there is a considerable decrease in rainfall due to variety factors.

July and August are the rainiest months. The annual rainfall decreases from south-east towards north-west. The average rainfall for the region works out to be 62.5 cm which is fairly high as compared to the entire State. The mean annual rainfall varies from 50 cm in the extreme north to about 100 cm on the western edge of the region. 50 Cm is the minimum that the region receives during the rainy season which gradually increases as we move south. The extreme south-west of Udaipur and south-east of Banswara district receives the highest rainfall that is about 100 cm. Mount-Abu in the south also receives a higher rainfall in the state because of its higher altitudinal position.

Humidity

Except during the south-west monsoons when the relative humidities are high, are high, the air is generally very dry. The summer season is the driest part of the year when the afternoon relative humidities are only about 20 to 25 per cent.

The humidity increases to a maxima (75 to 95%) during the rainy season. Coupled with the scorching heat of the post-summer season, the high humidities of the region, not only make the weather unbearable for human comfort but also promote the multiple regeneration of several virus, virus, bacteria and orthopods which are the causal agents of various diseases. The resurgence of malaria in this season is quite common and so also the multiplicity in the incidence of water-borne diseases like diarrhoea, dysentery, viral hepatitis and enteric fevers.

The relative humidity decreases to less than 50 per cent in the post-monsoon season and with the onset of winters, the virulence of diseases also declines. The average humidity in the winters ranges from 35 to 50 per cent and with the occasional overcasting of the sky on account of mediterranean disturbances, which do not visit this area for more than 10 days in a year, the may increase. Occasional showers and high relative precipitates in the form of dew, are humidities humidity, which usually helpful in the cultivation of certain agricultural crops like black gram, mustard and wheat.

Drainage

The relief and climate of the region have greatly effected its drainage pattern. Most of the rivers and the streams in Banswara and Dungarpur district flow in the north-east to south-east direction to meet the Arabian Sea. In Chittorgarh and Bhilwara districts they flow south-west to north-east and join Chambal river. While a vast area in the western part of the region has an inland drainage pattern (Fig. 2.6A).

The major drainage system of the area is constituted by the Banas river which flows in a north-north-easterly direction. It is the main river of Rajasthan. The main tributaries of Banas which drain the district are the Berach, Kothari, Khari, Uuli, Menali and Chandrabaga rivers which are all ephemeral and flow for a few days in the rainy season. Sukali is the most important tributary of western Banas which meets the Arabian Sea.

Jawai, Sukri, Bodi and Kapalganga are the main rivers and tributaries of Jawai catchment. The Mansi and Nakadi rivers form tributaries to Khari river. The Banas river takes an abrupt change in its course after crossing Nathdwara (Udaipur district). In the Dungarpur district three rivers, Mahi, Erau and Som flow. In the catchment area of the Mahi the non-perennial streams are Jhakham, Majham, Vatrak, Bhader, Gangli, Sapan and Veriganga.

The Mahi river, which is the main river of southern uplands, originates from the Mahi Kauta hills in the western part of Madhya Pradesh. It enters Banswara district and flows north, along the borders of Udaipur, Banswara and Dungarpur districts, before entering Gujarat near the Salakari village. The river bed is about 100 to 130 m wide and mostly rocky.

The Som river flows south-east from the hills near Bichhabhera in the Udaipur district till it meets the Mahi at the border of Dungarpur district. Moran, a seasonal river emerges in the heart of the district and flows in a south-eastern direction to find its way into the Mahi. There are various streams which are dried up during summer. The seasonal nallahs are - Nagdari, Kakeri, Dlarata, Gangri, Godavri and Kadoa Bagaria etc.

The drainage pattern of the region is, by and large, to the south-west. Most of the rivers have cut their courses by eroding the ancient crystalline rocks of the Deccan Plateau and the Aravalli mountains. They have a steep gradient and rocky, gravelly river-bed which does not permit a large permeability of water. The underground aquifers are therefore not recharged and with rain water the exploitation of subterranean water beyond beyond the limits of replenishment may be non-profitable. However, some rivers have now been bunded. Mahi-Bajaj Sagar dam across the river Mahi, 20 km away from Banswara town and the Jakham dam across the river Jakham near Partabgarh (Chittorgarh district) are the two main multipurpose projects which have now been completed for the benefit of these tribal areas. Nonetheless, the scarcity of surface water for domestic use is on a large scale and is on a large scale and most of the tribal population has to depend upon the tank water. A large number of step-wells (baoris) and open tanks have been built in these areas to store the rain water for domestic use throughout the year. But these wells and tanks have now become polluted with cyclops of guinea-worm disease and hence their use has been prohibited.

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