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Udaipur Mineral Basin: A Museum of Minerals and their Environment

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Abstract - Economy of Udaipur is recognized as a developing economy. Infrastructure development is essential to overall Development of economy of the state. At present minerals is most important component of infrastructure.

A mineral is a naturally occurring, inorganic substance with a definite chemical composition and a crystalline structure. The state is proud to possess huge reserves of Lignite, Crude Oil and High Quality Gas. It is also renowned for its deposits of Marble. Mining is not only a major source of employment in the rural and tribal area of the city.

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INTRODUCTION

Location, Shape and Size

Udaipur Mineral Basin is a part and parcel of the Udaipur district of Udaipur. Udaipur district takes its name after Rana Udai Singh who founded Udaipur city in 1559 A.D. Since then the city had been the capital of the erstwhile state of Mewar till its merger into the present state and at present is the headquarters of the district administration. The territory occupied by the present district of Udaipur formerly formed a part of the districts of Girwa, Khamnor, Rajnagar, Bhim, Magra, Kherwara and Khumbhalgarh and the •ThikanaS of Nathadvvara, Kankroli, Salumbar, Bhinder, Kanor, Bansi, Bari Sadri, Amet, Sardargarh, Deogarh and Gogunda. They were all clubbed together to form the present district, after the formation of Udaipur state. But in the year 1991, 7 tehsils were separated from the former Udaipur district to form the new Rajsamand district.

Udaipur Mineral Basin covers an area of 1064 km and has the maximum length of 51 km from north to south and width of 38 km from E to W, lying in the Sn pan of Udaipur and central part of Udaipur district. It is located between 7303315" and 73056130" E. longitudes and 24021 '45" and 24055' N. latitudes. The basin is surrounded by Rajsamand district in the north, Mavli tehsil in NE, Sarada tehsil in the S, Jhadol tehsil in SW and Girwa tehsil in the W.

The mineral basin is the part of Girwa, Mavli, Gogunda, Vallabhanagar and Sarada tehsils of Udaipur district.The Udaipur Mineral Basin consists of 153 villages and one urban centre of Udaipur city. The breakup of villages numbering 117, 14, 14, 6 and 2 respectively belong to Girwa, Mavli, Vallabhnagar, Sarada and Gogunda tehsils of Udaipur district.

DELIMITATION OF THE BOUNDARY OF UDAIPUR MINERAL BASIN

The Udaipur region is well endowed with numerous minerals. Many economic minerals mined out in the area.

The idea of Udaipur Mineral Basin has been, derived from the existing Udaipur basin, based on the limit of surface water regime of this area. However, the final boundary of Udaipur Mineral Basin has been set as under

1. It abounds in minerals and as such the mines have been the major determinant. The mines send more than 50 per cent of their product to Udaipur city and as such have been included within its limits.

2. While considering the location of mines, the boundary of its revenue yielding villages has been considered as an important constituent and element of the boundary.

3. In the study, all the open cast mines of non-

metallic major and minor minerals have been included. However, the underground mines of Zawar Mala i.e. Zawar mining area located at the extreme limit have not been included in the study.

In view of the above considerations, the following changes have been made in the boundary of Udaipur basin to give final shape to the Udaipur Mineral Basin.

North- The area has been extended upto Modi village where green marble mining is taking place. It ishardly 1 km from the boundary of Udaipur basin in the north.

East- The Eastern part of the area is an extension of Udaipur basin because the outlet Of Udaisagar flows through the area. The limit has been extended upto Daroll Limestone mining area and Jaspura marble mining area in the E.

West - The Western part of the Udaipur basin does not have any important mining area hence the Western part of the Udaipur basin has been excluded and the boundary of Udapur Mineral Basm has been delimited to include Madar, Hawala, Bujra, Nai and Naya Khera villages, wherein quarrying activity is going on.

South - A major change has been made in the Sn boundary of the Udaipur basin where three important minerals are being mined in four mining areas, Viz. Jhamar Kotra (Rockphosphate). Babarmal (Pink marble) Devimata (Pink marble) and Relpatliya (Barytes). The minerals produced in these mining areas are supplied to Udaipur city. Besides, the administrative offices of these mines are also situated in Udaipur city.

GEOLOGY

Major rock types in this area are graywackes, phyllite, schists, limestone, quartzite, granite and gneiss,

Graywackes

Graywackes rocks are found in the heart of (spreading (rom) Udaipur main city up to Pratapnagar in the E. Graywackes mostly occupy the valley portion of Udaipur city. These are comparatively less resistant to weathering being somewhat loose or less hard than the other rocks in general but within these rocks, various geological tracts account for variations in their composition, quartz, structure patterns. Joints, lenses of other rocks etc. which in turn govern or control the flow of water.

Phyllite

Phyllite distribution in the area under study is seen in

(i) The Intercalary bands in greywacke in Udaipur city upto Pratapnagar,

(ii) In Dheenkli area and north of Udaipur,

(iii) Towards Western side of Udaipur city and

(iv) At the junction and in between Debari area and Pratapnagar.

These rocks behave similar to grayv vackes, the major difference being the development of the weak planes along the strike area. These rocks are subjected to similar environmental and geological controls for leached nitrogen.

(i) Schists

Different bands/layers within the Mangalwar complex rock start from Debari and continue upto Daroli. These are loose, more susceptible to weathering and percolation of pollutants. flowing over and through this rock.

(ii) Limestone

The limestone areas lie near Daroli, Jhamar kotra, Matoon, Neemuch mata and in several bands in Udaipur city and Pratapnagar areas. Limestone is hard rock, though more susceptible to weathering, controlled by topography. drainage and structural patterns. These are not porous, but atthe same time are susceptible to weathering, providing permeability for effluents, etc.

(iii) Quartzite

Debari village extends upto Zinc Smelter. Its several bands in the area start from Udapur city and go upto Pratapnagar. Its several bands exist in the phyllite rocks Of. Saijangarh and Machhala Magara areas. Several bands are also found in the area starting from Udaipur city and going upto Pratapnagar.

These are hard, though at the same time, not susceptible to weathering. These are not permeable.

Porosity is also absent in this rock and water cannot pass through it.

(iv) Granite

These are found in the Daroli village, S of Jdaisagar and Sajjangarh areas. Such hard rocksare less susceptible to weathering due to their compactness.

(v) Gneiss

The rocks in the E of Zinc Smelter area up to Daroli are hard and so less susceptibility to weathering due to their compactness. Such a formation of the rock will not allow water and slurry over it, to percolate with any degree of intensity.

SOILS

Variations of soil in terms of color thickness, texture and chemical composition are common in the Udaipur Mineral Basin. Its northern half is largely covered by yellowish brown soil with claycontent, varying from 10 to 20%, whereas the Southern half has heavy textured soil with clay contents rising from 20 to 30%.Texturally, clay or clay-loamy soils are often traceable in the depressions and along small or large water bodies. The accumulated quantity of fine silt due to prolongedsedimentation process has made the water bodies a storehouse of rich fertile soils.

Concrete soil is often found along the foot hills, hill-slopes and rocky pebbles. Variable proportions of sandy soils lie mixed with all types of soilsin different parts of the basin.

The color of soils is the result of their parent rock characteristics, nature of weathering and denudation, mixture of organic matter i.e. humus and the lime involved in their formations. Thus, the red and yellow soil owes their origin to the Delhi system of rocks. Through oxidation process; varying shades in soils are traceable towards E due to the course of transportations and process of deposition.

The brown black soil is rich in organic matter and includes the characteristics •petal 'pana[i] or •roon' soils, which lie submerged under the lake waters for greater part of the year. Different kinds of soils of Udaisagar, Pichhola and Fatehsagar, Lakhawali and numerous other reservoirs are usually black in colour, silty in texture and therefore, are comparatively fertile.

The moisture retaining capacity determines the fertility grade of soil. In Similar ways its chemicalcomposition also requires treatment to meet its mineral deficiency in lime. Phosphorus, nitrogen and magnesium content, thus requiring the use of compost, bio and chemical fertilizers. On the basis of suitability of utilization for revenue assessment, availability of facilities for irrigation and accessibility to human habitations, different kinds of soil can be classified as Khakhi; Peewal' Gorma', Rankad', and Magri'. Only a single kharif crop can be raised on khakhi' soil because it lacks irrigation facility.'Peewal' or irrigated variety of soil is used for cropping more than once. The hoof-trailed Gorma' precious and fertile soils are in Inverts of rural landscapes. Often With increasing distance from the human settlement, the fertility of soil decreases which can be recaptured only through the application of manures and other inputs. Towards the peripheries the soil becomes thin and less fertile and in the absence of irrigation and minoring, the long distance from the human habitation make them low yieldareas as well.

PHYSIOGRAPHY

Physiography is an important media which helps in understanding man's relationship with the regionand in no uncertain terms, exerts influence on human actions through elevation, slopes and ruggedness of the topography on the one hand and indirectly by means of climate, drainage vegetation, soils etc., on the other. The complex relief in the basin is the consequence of the varied physiographic forms like hills, valleys, plains and plateau. The surrounded inner plain is not completely level.

The principal physical lineaments of the IJdaipur Mineral Basin are quite complex and consist of almost a continuous girdle of hills having altitudes of 1109 m of Modi Magra in the north, Amia Magra ([1] 013 m), Banki ka magra (839 m) in SW, Kamlod Magra (807 m) and Bhuwana ka Magra (673 m) in the NE, Debari and Udaisagar hills (783 m) in the E, Bari ka Magra (839 m), Neemuch Mata hill (667 rn), Sajjangarh hill (938 m) in the W and Samar hill, Habi hill, Ch0ttiya magra, Babarmal hill and Keora hill in the S. The prominent hills located in the SE of the study area are Jhmeshwar hill, Sameta hill and Mamadeo hill.

The general slope of the basin is from NW to SE as indicated by streams of Ahar and Jhaman artery While Wn hills are conspicuous by their series of rising ridges and seem to provide an abrupt change along these flanking hills, ridges. However there are no less evident in all other directions as well with marked undulating foot-hill zones. Through gaps in between them. Flow the majorstreams such as Ahar. Jhamari. Berach etc. and their numerous tnbutaries. Consequently. The basjn presents varied amalgam of slopes and related gradients. Thus, between Modi Magra and Udajpur city in the Nn pan of the basin, while the gradient is 1/110 over 24 km distance. The same along Ahar River between Udaipur city and Daroli over 25 km in the central part is 1/250.In the Sn

parl of the basin, the gradient along Jhamari River between Udaipur and Relpatliya is 1/110 over 22 km locally. It may indicate steeper gradients over shorter distances.

DRAINAGE

The drainage in the region consists of natural flow of water in the form of system of tributes and its adjustment to the geological structure of the area over a given period of timeunder certain climatic conditions. The Udaipur Mineral Basin is a part of two basins and all India water runs through the basin. Joining the crest points of hills from N to S. The Northern part of the study area falls in Berach basin and Berach River meets Gambhiri River near Chittorgarh, together they flow towards NE and merge in Banas river near Bigod in Bhilwara district Banas river meets ChambaJ at Rameshwar and Chambal merges in the Yamuna. The Sn part of the region is a part of Jaisamand and Daya Dam basin. Outlets from both these waterbodies meet Som River at Toker in Dungarpur distnct. Som River flows towards SE and mergesin Mahi River near Loharia in Banswara distinct Mahl never flows towards SouthWest entering into the state of Gujarat.

The major streams flowing in the area are Jamburia nallah, Ayad. Kotra, Arnarjok. Bearch, Jhamari rivers etc. The surface water bodies found in the region are Baghola tank. Lakhawali tank.Madar tank, Bari tank, Fatehsagar, Pichhola, Swaroopsagar, Rangsagar. Gordhansagar. Udaisagar. Naua tank, Daroli tank, Dabok tank, Jhamari dam, Daya dam etc.

All these are seasonal streams. After the rainy season the main stream flows intermittentlyand water remains throughout the year only in localized pools and hollows.

The Jambuna nallahoriginates in NW of the basin and meets Ayad river near Thoor ki pal Ahar flows from NW to SE and tre outlets of Fatehsagar arri Pichhola meet the river near Bhupalpura and respectively in the En part Of Udaipur city. An anicut has been constructed on Ayad River near Chikawas to feed Fatehsagar Lake through a feeder canal. Ahar River finally merges inUdaisagar. The outlet of Udaisagar is named as Berach river which flows from SW to NE anddrain into Vallabhnagar tank.

The Northern part of the area is comparatively plain marked with few seasonal invites. These rivulets meet Gadela nallah which merges into Berach River. In the Sn part major fiver Jhamanoriginates from Urnera and flows towards SSE. This river has been dammed near Jharnar Kotra. Several seasonal tributaries meet Jhamari River at different places. The rivulets in the SWn partflow from north to S and merge in the Daya dam. The hilly Sn part of the Basin contains manysmall rivulets, originating from the surrounding hill to form a few major rivulets. The density of the Southern part is quite high.

CLIMATE

The monsoonal climate of Udaipur Mineral Basin is very much characterized by seasonality. Rainfall variability is common and experienced as elsewhere throughout India. The altitude. The orientation of the hills and the presence of the water bodies altogether have influenced the climatic conditions of the basin at micro level. Its typical topographical setting With a sense of rising Wn hills safeguard the area from the vagaries of dust storms and hot anddry winds 01 Wn Udaipur. The tropic of cancer at a short distance in S of the mineral basin, puts the rigor into subtropical monsoon type.

The location of the basin along the En flank of Aravallis and the surrounding hills help in the modification of its climatic conditions to a marked extent and the climatic extremes of Wn Udaipur are a rare phenomenon in this part. While its topography coupled with altitude, checks sudden heating and cooling, experienced in other pans of the district, its numerous lakes and the vegetative cover also exercise an additional moderating effect on its general climatic scenario within its limits. No less however, is the overwhelmingly powerful impact of annual rainfall variations on it's over all conditions. During summers. Except for sporadic ephemeral local storms of short durations, the atmosphere usually remains dust free or clear with moderate or little humidity. Cool breezes from the Wn lake frontage. Provide a soothing effect even during the hot summer days. Frosts are rather rare. Whole mists prevail occasionally in the earlymorning hours. Much of all this is the consequence of the effective hill girdle. Cloudiness is intermittently dense only during the rainy season.

The type of rainfall received in the mineral basin may be attenuated to the orographic and monsoonal cyclonic winds which enter in the basin through gaps and their movement •s restricted by the Wn and Nn moderately high hills. The lakes with their humid influence and the general elevation help in the early condensation and sequence of clouds. Although most ofthe rain is received through Arabian Sea branch of the monsoon, at times even the Gangetic branch penetrates into the area. The rainy season extends from mid-June to early-October annually. The SW summer monsoon which takes almost the whole of India in its grip by July,accounts for rainy season into the basin as well. A major percentage of annual rainfall is received during the monsoon months. While July and August are found to be usual rainier months. In the study area, a remarkable change in the temperature and rainfall conditions has been noticed over the last few years. An increase in temperature variation and overall irregularity and erratic pattern in the rainfall behavior has been marked due to the extensive deforestation of the area, consequently affecting the level water in the water courses.

FLORA AND FAUNA

The major portions Of Udaipur Mineral Basin are covered with rock outcrops and hills which are well stocked with forests. It covers 10387 hectares under forest.

The forests which constitute an invaluable source of income, partly sustain the economy of the region, the major and minor forest produce interalia. Includes timber. Firewood. Gum, bamboo, kattha, honey, wax. Gum. Barks and all sort of grasses. The forests of the region fall under the Nn tropical dry deciduous type. According to Champion's classification. The bast' has a large vanety of flora and among the common speaes found here are Aam (Magmtera indica). Babul (Accaoa arabica). Bargad (%cus bengaensjs bnn). Dhoak (Butea monosperma iamk). Gugal (ficus glomerata Roxb.) Khejan (Prosoms spccgera /tnn), Peepal (hcus rehyosa). Neem (Azadlraehta Indtca). Salar (Boswe/ha serrata). Bahera Termnaba balanca). Dhaman (Gremc tilltafaha), Hingota (Balanites egyptyaea). Semal (Saiamalia maiabanca). Tmru (Diospyros melahoxylen).

Bans' or Bamboos (Denorocalamus spctus) etc. The shrubs and herbs observed in the region are Aak (Colotropis procers). Anwala (Cassia aunculata). Thor (Euphorbia mvuha), Karonda (Cantsa spnarum). Etc.

The wild life found in the various areas of the basin includes a large variety of annals, birds and reptiles. Among the principal ones are panther, tiger. Wild bear, wolf, jackal and striped hyena,

DEMOGRAPHIC STRUCTURE

Man is the vital element in any geographical study of a region. Population makes the resources of a region meaningful as it determines. Directs and fulfills all human wants. All problems, be it local. Regional, national or even international are due to man's process of fulfilling his basic needs. Improving his standard of living and in nationalizing his ambitions. The extent and magnitude of these problems cannot be estimated, unless the nature. Number, distribution and density. Quality and trends of population over an area are properly understood. Even in a micro region like that of Udaipur Mineral Basin, such a study as therefore. Full of geographical significance and relevance. There exists a relationship between population and natural resources i.e. water. Minerals, land etc. expressed as an endless chant of cause and effect between environment and man. Man and natural resources and natural resources and human wants. Water being the basic need of man's own survival, the relationship between water. Mineral resources and population behavior to any area are thus fundamentally significant.

At present 5.13 lakh persons inhibit the Udaipur Mineral Basin. Of these, 2.71 lakhs are males and 2.42 lakhs females. The sex ratio is 895 females per thousand mates. The basin has one major urban center of Udaipur city. Its 60.15% population lives in the Udaipur City. And the remaining 39.85% persons live in the 153 rural centers. The urban area has the sex ratio of 875 females per thousand males, but in rural area. It is 924.

The population density in the basin is 482 persons per sq.km (1991). The density the urban center is 4784 persons per sq. km whereas in rural area it is only 205. As the area is surrounded by hilly tracts: maximum population lives within the hill girdle while the surrounding areas are sparsely populated.

Out of the total population of 5.12 lacs, only 5125 persons are engaged in mining activity. The number of persons employed in mining activity from urban areas 3re less than those from rural areas. From urban area 2026 persons are working In mines in comparison to 3099 from rural areas: In other words. 0.6% and 1.51% of the total population of urban and rural areas respectively are engaged in mining activity.

CONCLUSION

Udaipur is a state that is rich in minerals. The Udaipur state is sanctified with 79 mineral varieties out of which 58 minerals are commercially subjugated. Udaipur has effective domination in the manufacturing of major minerals like Lead-Zinc, Wollastonite, Gypsum, Calcite, Silver, Rock-Phosphate and other minerals like Wollastonite, Jasper, Fluorite, Gypsum, Sandstone, Marble etc., that contributes around 90% to 100% of national production. Massive reserve of Crude oil, Heavy oil, Natural gas etc. further add to the states mineral strength.

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