CHAPTER-II
GEOLOGY OF THE AREA

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PHYSIOGRAPHY :

A major portion of the study area is a flat terrain with an average elevation of 250 at M.S.L. Physiographically, the area is bounded in the North and Northwest by Bundi hill ranges trending in ENE-WSW direction. The Chambal command area is exceptionally flat plain which exhibits rolling topography with gentle to moderate slope in the north-easterly direction.

DRAINAGE PATTERN :

There are eight rivers draining the study area, out of which Chambal and Kali-Sindh rivers are the major and perennial rivers. The other perennial small tributaries are Parwati, Alma, Thalera, Mangli, Ghora-Pichar and Maj rivers. The river Chambal which has the largest catchment area flows towards north-east from about 7 km south of Kutch and takes bending before maintaining a north-easterly flow in the down streams. Along the course of this river, the land is dissected by deep ravines and gullies which are U-shaped because of typical nature of the soil. Kali-Sindh river enters the area at about 3 kms east of Devli village
and joins Chambal on its eastern bank at Kharwan village. The river has a comparatively straight course and flows roughly towards northerly direction.

Besides the Gandhi Sagar and Rana Pratap Sagar, Jawahar Sagar dams and last structure on Chambal river is Kota barrage from which the water take off for irrigation use.

**STRATIGRAPHY:**

Systematic geological mapping in the Kota district was carried out by Heron (1936). Lithostratigraphic sequences of various formations was given by Krishnan (1968). As part of the field season programmes, systematic and appraisal studies for ground water potential were carried out by Central Ground Water Board officers. They delineated the various hydrological units and their characters. Bhola, et al. (1969) classified the Kota soil based on the chemical composition and physical characters. State government agencies also assessed the ground water resources and potentials. Karanth and Bhusan (1980) carried out the hydrological studies and scope of ground water development in the Chambal command area.
Table-1 : Showing Stratigraphic Sequence of Kota district, Rajasthan.

<table>
<thead>
<tr>
<th>Age</th>
<th>Lithounits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quaternary</td>
<td>Recent to sub-Recent Alluvium-Gravel, sand, silt and clay</td>
</tr>
<tr>
<td></td>
<td>Unconformity</td>
</tr>
<tr>
<td>Mesozoic</td>
<td>Upper Cretaceous to Palaeocene Deccan Basalt</td>
</tr>
<tr>
<td></td>
<td>Non-conformity</td>
</tr>
<tr>
<td>Palaeozoic</td>
<td>Vindhyan Supergroup</td>
</tr>
<tr>
<td></td>
<td>Bhandar Group Sandstone, limestone</td>
</tr>
<tr>
<td></td>
<td>Rewa Group Shale, sandstone</td>
</tr>
<tr>
<td></td>
<td>Kaimur Group Sandstone, shale, Conglomerate</td>
</tr>
<tr>
<td></td>
<td>Semri Group Sandstone, shale, limestone</td>
</tr>
</tbody>
</table>

Major portion of the study area, i.e. Chambal command area is underlain by the formations of Upper Bhandar of Vindhyan Supergroup which is generally overlain by alluvial soil cover. Eastern and southeastern portion of the Kota
district is covered by the Deccan basalt which require no special description during the present studies (Fig. 2).

Heron (1936) mentioned that Vindhyans are the oldest rocks in Kota area, which is considered to be of Palaeozoic age.

**VINDHYAN SUPERGROUP :**

The Vindhyan of the study area forms part of the great Vindhyan basin extending from Rohtas in Bihar to Chittorgarh area of Rajasthan. Small area in the eastern and south-western part of the district is covered by rocks of Rewa and Semri groups respectively, otherwise major portion is covered by Bhander Group.

Krishnan (1968) mentioned that the age of these rocks is about 900 million years and reported thickness of about 300 meters.

**Sandstone :**

Vindhyan sandstones are grey to buff in colour with reddish and purple ferruginous bands, fine to medium grained, hard and compact. In general, it is laminated to thick bedded, flatly dipping and well jointed formation. The sandstones are sometimes found to be moderately weathered. Cross-bedding and ripple marks are frequently observed.
Shale:

The exposures of shale are not common in the area. It is observed only in the nala cuttings and in unlined well sections. They are grey to greyish purple in colour and highly jointed and weathered in nature.

Limestone:

Limestone is fine to medium grained, steel grey, yellowish, buff and reddish in colour. At some places, it is siliceous in nature and inter-bedded with shales. It is of variable quality ranging from calcareous to argillaceous in nature, generally earthy and compact. They contain prominent sets of vertical joints. The limestones show very pronounced effect of chemical weathering due to the presence of cavities and fractures in them. Within the command area the scattered limestones are found at Ballop, Bargaon and Dayalpur. Exposures of limestones around Anta, Bamaliya and Baldara show beautiful development of stromatolites.

Quaternary Alluvium:

Inter-stream area of rivers Chambal and Kali-Sindh is covered by quaternary alluvium overlying the Vindhyan formation.
The thickness of alluvium varies from less than a meter to 35 meters. In general, alluvium comprises medium to fine sand, silt, clay and kankar and is brownish yellow to brownish black in colour.

Thickness of the alluvium is quite high in the northern part of the area, whereas it is quite shallow in the southern portion.