I. INTRODUCTION

"WATER" is one of the nature's priceless bounties. The water is one of the most precious commodities throughout man's recorded history, without it life and civilisation at least we know, cannot survive.

A large part of Indian subcontinent is occupied by hard rocks, which are diverse in their nature, composition, geological structures, morphological characters and hydrometeorological conditions. (Fig. 1). These conditions have given rise to widely varying groundwater situations in different parts of the country. The heterogeneous nature of aquifers given rise to multivariate groundwater conditions in hard rocks. This heterogeneity is due to the composition and compaction of litho units, density of fracturing and degree of weathering.

Exploration of groundwater in hard rock is still a matter of uncertainty. Water resources of any basin remains constant, but demand for water is increasing. The utility of surface water is insufficient, the drafting of groundwater has increased indiscriminately. Hence skilled planning and careful management are essential to achieve the level of efficiency in water use which will be required in future and direct the forces of nature for the benefit of the mankind.

The author in the present study has chosen a basin in the hard rocks of Peninsular India for the detailed investigations of hydrogeological characters.

1. PURPOSE AND AIM

The basin taken up for the present study is HOSUR HALLA BASIN (HHB), one of the basins existing in hard and crystalline rocks of Karnataka. The HHB is found in Squandatti Taluka of Belgaum district. The HHB experiences semi-arid climatic conditions, there is a scarcity of groundwater as well as surface water. Most of the open wells and bore wells go dry in summer seasons. There is a need for detailed study of hydrogeological conditions of the basin. The purpose and aim of present study is to evaluate hydrogeological conditions and other
related characters of the basin, and to give suitable suggestions to solve the existing problems as well as the possible problems which may encounter in future.

2. LOCATION AND ACCESSIBILITY

The Hosur Halla is a tributary of Malaprabha river. The HHB is located between longitudes 74° 48' 50" - 70° 57' 43" east and latitudes 15° 47' 11" - 15° 55' 03" north. The HHB is found in the Survey of India toposheet number 48-I/13. The HHB flows from northwest to southeast and its length is about 21 kms and width is about 12 kms, and it covers an area of approximately 150 sq.kms. Geographically HHB lies in the west and south western part of Saundatti Taluk of Belgaum District (Fig 2). HHB starts just half a kilometer to the north of Bailhongal town. All season motorable roads are available throughout the basin. A walk of 4 to 6 kms is inevitable to reach the wells in the fields and out crops (Fig.3).

3. PREVIOUS WORK

Neither the Department of Mines and Geology, (DMG) Karnataka, nor Central Ground Water Board (C.G.W.B) has any published record on the geology or geohydrology of HHB. The DMG has fixed a few observation wells in the basin. The recording of the static water levels is not made regularly and systematically. The DMG and some private agencies have conducted several vertical electrical soundings for exploration of groundwater in this area, but this data is also not systematic.

Abbi (1991) has described in length the Hydrogeological characters of Tupari Halla basin, which is an adjacent basin. No other information is available on this area.

4. PRESENT WORK

In endeavour to come up with some results, the author has studied the geology, geomorphology, hydrometeorology and hydrogeology of the HHB. The geological study
comprises the study of litho units and soil characters. The geomorphological study includes the study of land forms, land cover/use, lineament and morphological characters. The hydrometeorological study includes the study of temperature, wind velocity, relative humidity, precipitation, sunshine, evaporation and evapotranspiration. The hydrogeological study includes the study of subsurface lithology, depth and yield of bore wells, aquifer characters, groundwater level fluctuations, hydrochemistry of groundwaters, effect of irrigation on soils and groundwater, management and development of groundwater etc etc.

The litho units are studied by field traversing, the soil characteristics are explained from results of laboratory experiments. With the help of toposheets, satellite imageries and field checks the land forms and morphometric characters are developed and studied. The hydrometeorological informations are obtained from Natural Resources Development & Management System (NRDMS), metrological station of Sambra Air-port District Statistical Office, Belgaum and Navilutirth Dam site, Munoli.

The vertical electrical soundings are carried out with the help of Terrameter (ABEM-SWISS). The bore well data is used to describe the optimum yield and depth of bore wells. The aquifer characters are determined with the help of pumping tests. The monitoring static water levels of four seasons are recorded to study their fluctuations. Bore well water samples are collected and analysed to know their characters and are classified depending on their constituents. The suitability of groundwater is described by analysing 44 samples. The Principle Component Analysis (PCA) is used to distinguish the chemistry of groundwater of the three litho units in the basin. The relation between the litho units and groundwater is drawn, change in the hydrochemical facies with groundwater movement is also studied. The mineral phases and mineral species are identified in the groundwater samples. The relation between groundwater yield and lineaments/geomorphic units, the possible location for future development and management of available sources of water are also explained.