Identify the Stratigraphic Sequence of Herle Village with the Help of Vertical Electrical Sounding

Mr. A. A. Lole[1] Mr. A. S. Khot[2] Mr. O. A. Musale[3] Mr. S. J. Chindge[4]
[1,2,3,4]Sanjay Ghodawat Group of Institutes, Atigire-416118, Maharashtra, India

Abstract— Electrical resistivity survey is best tool to understand the subsurface geology. Direct current resistivity survey of Herle village, Kolhapur district of Maharashtra, was conducted using the Wenner electrode configuration at 5 stations. The present studies are an attempt to delineate he stratigraphy of the study area. The resistivity data in the study region shows the contrast in ground strata. The VES data should be used for groundwater exploration in different geological terrains where there is a severe scarcity of groundwater. This will further enhance the accuracy of location of groundwater potential zones in the study area.

Key words: Vertical Electrical Sounding, stratification, Herle Village

I. INTRODUCTION

In areas where limited surface water is available, groundwater constitutes significant part of water resources. In developing country like India, the minimum daily water requirement of a person is 200 liters for domestic use, while an equal or large amount will be needed for other purposes. Groundwater is naturally replenished by surface water form precipitation. Various geophysical techniques are available for subsurface investigation, but the most commonly used is the Electrical Resistivity Method.

Hydrogeological and geophysical investigations in the Deccan trap region (Bose and Ramakrishna, [1], Singhal, [6], Pawar et al. [2], Rai et al., [3], Ratnakumari et al., [5]) were carried out to demarcate aquifers and study the occurrence and movement of groundwater in the intertrappeans /vesicular and fractured zones within the trap sequence and sedimentary formations below the traps, which are considered to be a potential source of groundwater. Rai et al. [4] further suggested the following probable resistivity ranges for different litho units in the Deccan basalts: 5-10 Ω-m - black cotton soil, bole beds, clay; 10-20 Ω-m-sand with clay; 20-40 Ω-m - weathered/fractured vesicular basalt saturated with water; 40-70 Ω-m - moderately weathered/fractured basalt/ vesicular basalt saturated with water; > 70 Ω-m - hard and massive basalts

These ranges may slightly differ on either side from place to place depending on the percentage of clay, joints/fractures.

The present study attempts to decipher the existing stratification in the Herle village, Kolhapur district using Vertical Electrical Sounding (VES) technique. Wenner arrangement was carried out at 5 selective stations in the study area using Aquameter CRM-20 resistivity meter.

II. STUDY AREA

The Herle village of Kolhapur District in Maharashtra State is bounded between latitude N 16.7409 to N 16.7688 and longitude E 74.3112 to E 74.3452 (Fig. 1). The study area is covered by Deccan trap of Upper Cretaceous to Lower Eocene in age. Groundwater is the main source used for drinking, irrigation and industrial purposes.

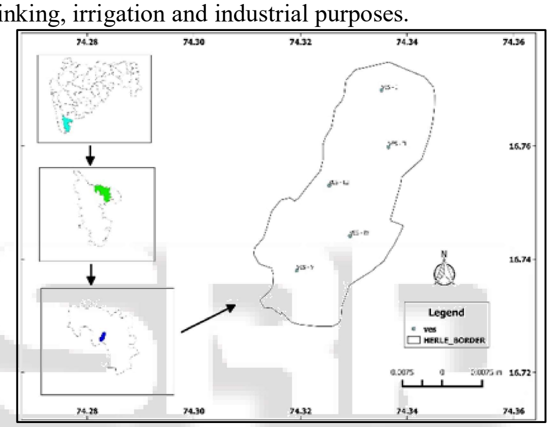

Fig. 1: Map of Herle village with VES locations.

III. METHODOLOGY

For identifying stratigraphy, 5 Vertical Resistivity Sounding (VES) were taken from different parts of the study area. The data obtained from VES was interpreted and finding out resistivity (Table No. 1).

IV. RESULT AND DISCUSSION

The development of surface water, groundwater and planning for any civil engineering projects ground strata is important. The geophysical method like vertical electrical sounding (VES) is helpful to demarket the stratigraphy of the study area. 5 stations were selected for VES to demarket the ground strata.

Sr. No.	Depth of Penetration	Resistivity in Ωm				
		VES - I	VES - II	VES – III	VES - IV	VES - V
1	1	4.289	71.718	64.200	54.448	5.903
2	2	5.451	89.050	105.077	67.824	11.631
3	3	5.558	110.214	121.631	81.200	16.994
4	4	6.933	120.576	133.789	90.181	22.256
5	5	7.128	136.590	121.361	97.968	26.973
6	6	8.327	119.446	80.108	100.982	30.596
7	7	9.671	132.320	90.382	101.668	31.300
8	8	10.701	143.184	81.640	103.997	35.268