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Terrain Analysis of Alate Nala Basin with the Help of GIS

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Abstract: Alate Nala Basin trending north-east to south-west in the Kolhapur District. The terrain analysis denotes the study area highly elevated to north-east and decrease towards north-west. The analysis is helpful to take some preventive measures like where to build artificial recharge structure to increase groundwater

Keywords: Terrain Analysis, Artificial Recharge Structure, Alate Nala Basin

I. INTRODUCTION

Temperature is continuously increasing now a days due to these arise water scarcity problem everywhere. There need to think about the human beings surveillance. The concept of integrated remote sensing and GIS has proved to be an efficient tool in integrating urban planning and ground water studies (Krishnamurthy et al., 2000; Khan et al., 2006). Hydrogeological and geophysical investigations in the Deccan trap region was carried out by various researchers [Bose R. N. and Ramkrishna T. S. (1978), Singhal B. B. S. (1997), Rai et. al. (2011), Ratnakumari Y. et. al. (2012), Deolankar S. B. (1980) and Devi S. P. et. al. (2001)] 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 a potential source of groundwater. Without any proper understanding of ground nature or topography we can't find solution for selecting any sites for artificial recharge structure. Because, groundwater management and artificial recharge is the key to combat the emerging problem of water scarcity. Hence, an attempt is made to study the terrain analysis of Alate Nala Basin, Kolhapur, Maharashtra.

II. STUDY AREA

The Alate Nala Basin of Kolhapur District in Maharashtra State is bounded between latitude N 16°74' to N 16°80' and longitude E 74°36'to E 74°43' (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.

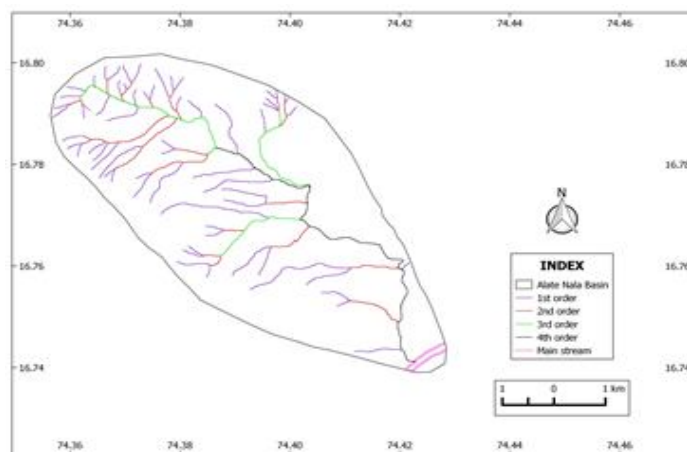


Fig.1: Map of study area

III.METHODOLOGY

A. Software and Data used

- 1) ASTER DEM (USGS/NASA ASTER DEM data), available from <http://www.gdem.aster.ersdac.or.jp>
- 2) Q - GIS 2.6.1 software. For study the terrain analysis of Alate Nala Basin we prepare the study area with the help of QGIS software.

IV.RESULT AND DISCUSSION

The climate of Alate Nala Basin is generally temperate .The area has temperature range from 12 C to 35 C. It is always cooler than the eastern part of the district i.e. the study area is having considerably hot climate. Most of the region has moderate type of climate with very extremes of heat and cold. It receives ample amount of rainfall during the months of June to September. Average rainfall is 875 mm annually.

The study of terrain analysis will use digital elevation model to create several terrain related datasets like slope, aspect and hill shade. These elevation datasets can be important in site selection and other terrain based spatial analysis. Digital elevation model of Alate Nala Basin is shown in Fig. 2.

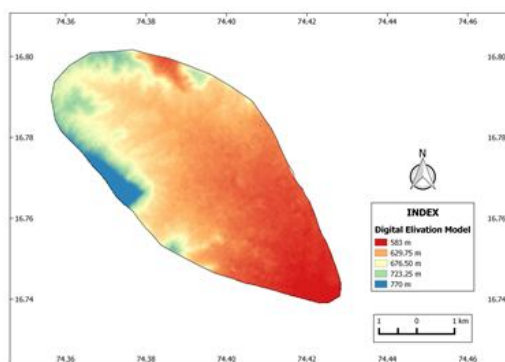


Fig. 2: Digital elevation model of Alate Nala Basin.

North-west side of Alate Nala Basin is strongly to steeply sloping. Central portion of the study area having moderately to gentle slope. The south-east portion have gentle to very gentle slope (Fig. 3). Aspect map shows the cardinal direction of Alate (Fig. 4). Roughness Index is tool useful to calculates and summarize each cell by the elevation changes within a 3 x 3 cell grid. Roughness index of study area is shown in Fig. 5.

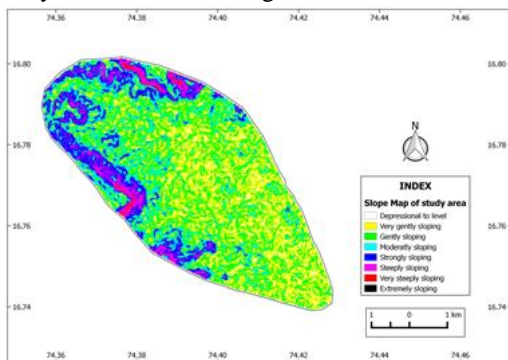


Fig. 3: Slope map of Alate Nala Basin.

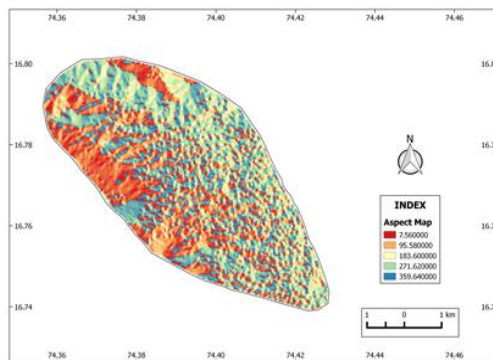


Fig. 4: Aspect map of Alate Nala Basin

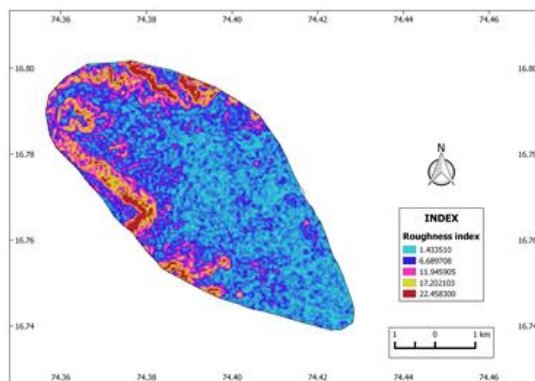


Fig. 5: Roughness index map of Alate Nala Basin

V. CONCLUSION

On the basis of terrain analysis, the Alate Nala Basin having highly elevated to gentle slope. Highly elevated regions present at North-East side and decreases towards South-West. The analysis is helpful to take some preventive measures like where to build artificial recharge structure to increase groundwater.

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