

Impact of Terrain on Surface Water Bodies - A Study of Ranga Reddy District Using Dem

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Abstract: *In today's world, water is a main source. Because of varying climatic and physical circumstances, it is not evenly distributed in all places of the earth. Because of the scarcity of resources and widespread use, it is in high demand. It is a necessary instrument for maintaining ecological balance and controlling nature on the planet's surface. Surface water bodies will be affected by elevation or terrain. The major goal is to utilise DEM to discover or locate water resources based on the slope and elevation of the research region, and the influence of slope on ground water.*

Keywords: DEM, Terrain, Surface water Bodies, slope, aspect

1. Introduction

The need of recognising ground and surface water as a single resource has become increasingly apparent as the nation's worries about water supplies and the environment have grown. Water is a natural resource that helps to maintain the ecological and socioeconomic balance of the environment. In developing countries like India, water is a valuable resource. It is a developing country with 70% of the population dependent on agriculture and 30% of the population in urban areas relying on water for residential and industrial purposes. In India, there is an urgent need for water identification and water sustainable development due to the country's fast population growth. Hyderabad is also one of India's emerging cities, evolving in a multifaceted manner as a result of the physical and socioeconomic factors that are conducive to growth in Hyderabad and the adjacent Rangareddy area. Terrain is one of the most important factors in the development of a region; it determines human activity, transportation, and the degree of development. Rangareddy is one of the fertile agricultural areas that is being converted into a city. Because of its geographical location, Hyderabad and Rangareddy are located on a

Deccan plateau with granitic structure and typical landscape leading to lakes and water bodies. Terrain or elevation and slope is one of the major factor which are indirectly depends on formation of water bodies. In Rangareddy it is quite different in elevation; it is elevated in centre of the Rangareddy and sloping towards south and west. It is one of the factors that the drainage pattern also following same kind of slope pattern.

2. Study Area

Rangareddy is a growing Telangana district having three revenue divisions, 37 mandals, and 870 revenue villages. In 1901, there were 54 people per square kilometre, but in 2011, there were 707 people per square kilometre. Paddy, groundnut, jawar, and maize are some of the crops used in agriculture. The main river Musifowing flows from west to east, separating Hyderabad and Secunderabad. The Musi River is used to create the Osmansagar and Himayatsagar reservoirs. These are the important water sources that provide Hyderabad with drinking water. The district's average elevation is 469 metres.

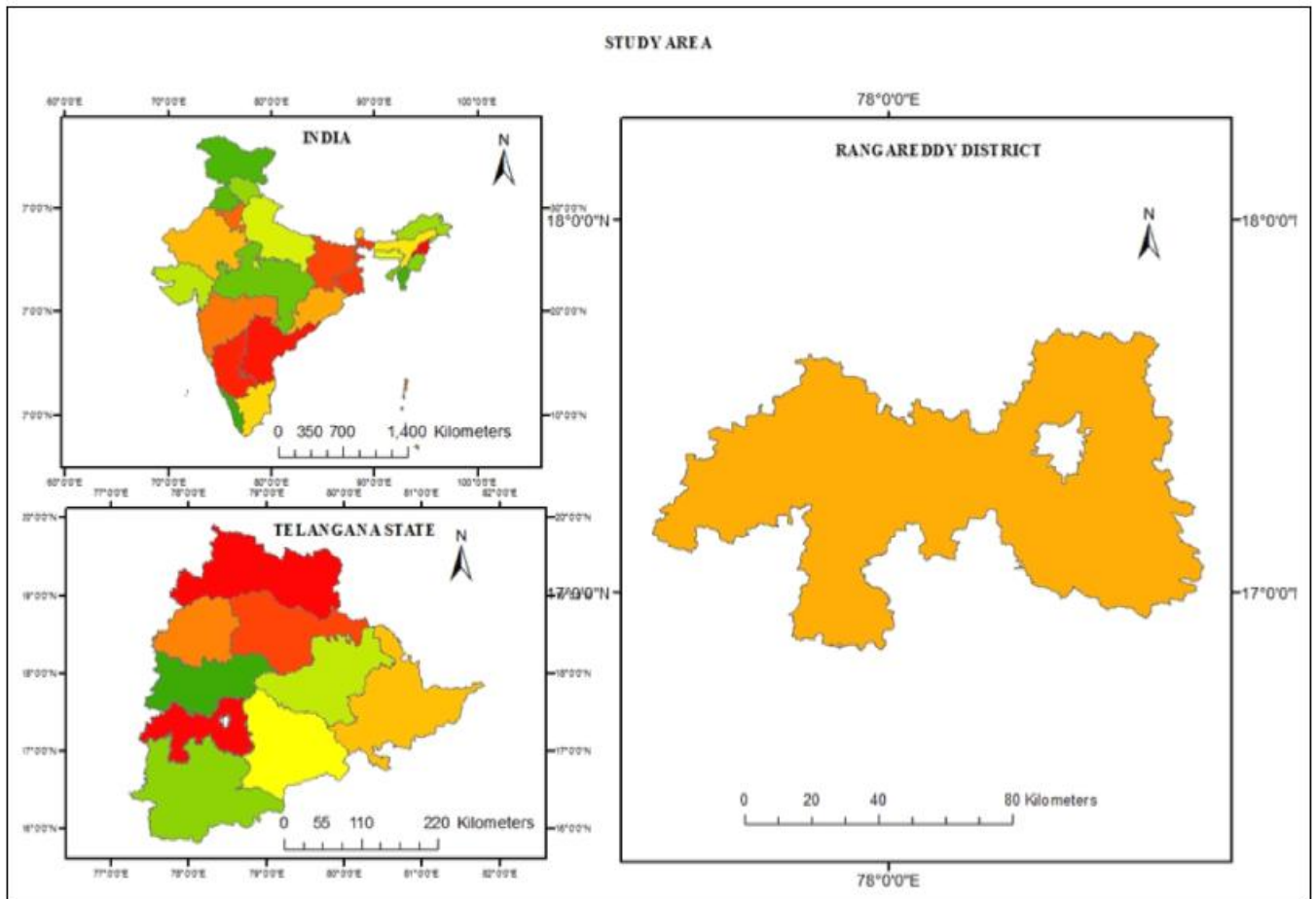


Figure 1: Study Area

Source: Primary data

Aims and Objectives

- 1) Preparing surface water resources and Ground water resources maps.
- 2) Identification of water bodies depending on elevation

3. Review of Literature

S. S. Asadi, B. V. T. Vasantha Rao, S. K. Sekar (2012) in this paper it is explained how natural resources may be used to improve agriculture, forestry, mining, and human habitation. Seasonal mapping and monitoring of natural water resources are critical for future planning in agriculture and other water-dependent industries. The major goal of this research is to develop physical features of the research area and effective management for future research. Creating a geographic digital data base, adding attribute information, and forecasting appropriate conservation and land use management strategies in the future. In conclusion, it is claimed that by embracing crops such as pulses and vegetables, the consumption of will be reduced. Irrigation, caching, and drainage basin management are three important factors to consider.

Cheng Qiuming (2002) The geographical analysis of ground water and surface water systems has been investigated in this research utilising DEM data with a high resolution of 30 metres. Understanding water shortage in today's world requires the use of models. GIS spatial models are one of the

most important and powerful instruments for resolving water and irrigation development issues. The use of GIS in this article was indicated as a benefit in knowing water resources and prospective areas, as well as in maintaining the balanced development that models must follow for water development. The amount of precipitation and surface runoff water varies with elevation and is influenced by the settlement pattern. One of the most important factors is the drainage pattern and river flow.

Limological studies are conducted on numerous rivers, streams, ponds, and reservoirs throughout India to quantify their physic-chemical properties and assess their use. There are 18 species of zooplankton in the Kamapur lake, divided into four groups: Rotifera, Cladocera, Copepoda, and Protozoa. In January and February, there was a lot of zooplankton, and in April and May, there was a lot of zooplankton. (Thirupathaiah et al., Thirupathaiah et al., Thirupathaiah e (2011). The Upper Lake of Bhopal, which is part of the Bhoj Wetland, stressed the importance of the ILMV method in connection to the conservation and management of the Bhoj Wetland and proposed viable solutions for conservationists.

R. K. Meentemeyer, G. M. Sanchez, J. W. Smith, A. Terando, G. Sun, and G. M. Sanchez (2018) The degree of management of water resources is reliant on society and human systems, as well as their successful planning across area and time, as detailed in this study. Water demand varies from place to place, depending on how it is used. Water

usage models and a comprehensive technique for the spatial pattern and developmental effect of water resources have yet to be implemented. Long studies have been conducted to better understand the spatial distribution of water in urban environments. It is explained in this work that there must be some form of connection between water usage and growth patterns. The study area includes major developed urban areas in the United States that have seen tremendous expansion in recent years.

4. Methodology

The main causes of groundwater increase are surface water bodies. Water bodies must be preserved in their natural state to support development and urban expansion. These are the primary sources of groundwater uplift. Water bodies density maps are made using secondary data, and we must transform water bodies into point data in order to convert points and build density maps. SRTM DEM is good data for DEM map development. It was downloaded from the USGS, and the files were combined into a single tile, which was then cropped according to the research area boundaries. All DEM categorization, density, and map preparation were done with Arc GIS. Arc GIS is used to verify the comparison of all ground water and water resource data, as well as the identification of water in specific locations. It is simple to determine which water bodies are placed at various elevations, as well as the causes and reasons for their placement.

5. Findings

Water is well acknowledged as a main source for environmental balance and people's socioeconomic growth. It is critical to determine the location of water bodies and the significance of analysing them. Rangareddy is the fastest-growing district in Telangana, with industries and information technology businesses locating around the region due to the abundance of land and main resources. It is generally assumed that ground water is safe for consumption without treatment. Concerns about the quality of ground water from wells near streams, where contaminated surface water might be part of the source of water to the well, have led to increasing interest in identifying when filtration or treatment of ground water is needed.

DEM is a type of surface model that is used to illustrate the elevation of a given region. There is a slope on the eastern and western sides of the research area, as shown in (fig.). The majority of the terrain is sloping east, and the drainage pattern is similarly sloping east. The average elevation of this 469 is 370 metres, with a gradient from 370 to 730 metres in this DEM model. The Musi River is an important waterway that connects large reservoirs such as Osmansagar and Himayathsagar.

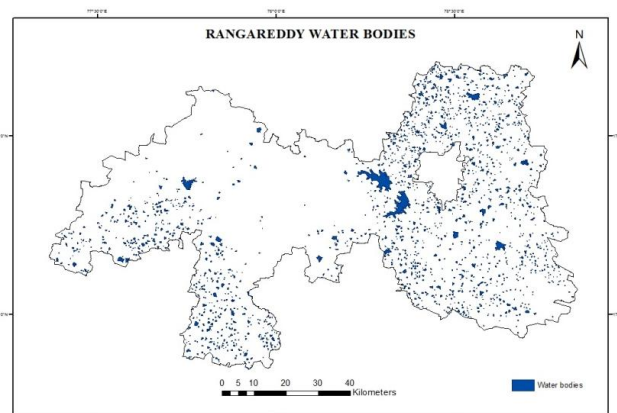


Figure 3: Rangareddy Water Bodies
Source TRAC

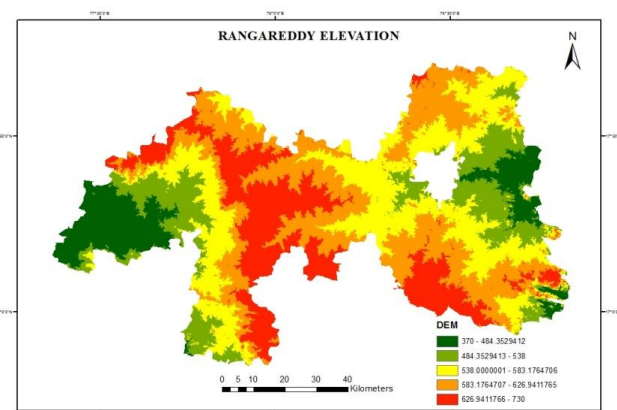


Figure 4: Rangareddy Elevation
Source TRAC

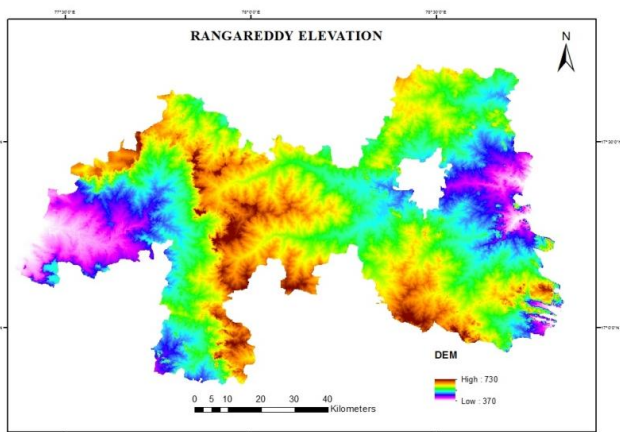


Figure 2: Rangareddy Elevation
Source TRAC

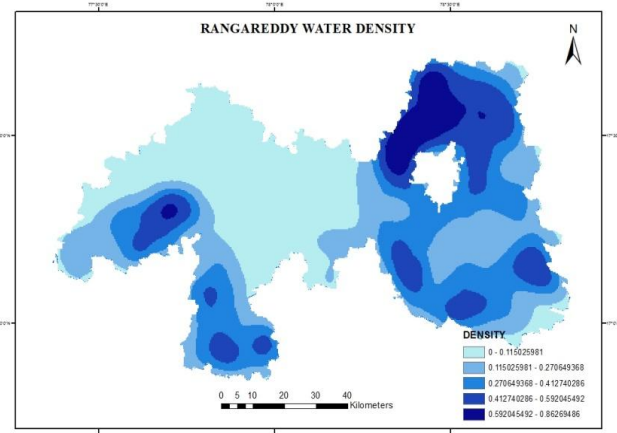


Figure 5: Rangareddy Water Density
Source TRAC

Water density is high in the northwestern region of Ranga Reddy, as well as parts of the west and south west, suggesting a large number of water bodies. The water bodies are most prevalent in high regions 538-583, which have excellent surface water and are closer to the Hyderabad city centre. The water bodies are more concentrated in the eastern portion of Ranga Reddy because to its undulated terrain. Because of the high height and steep slope in the middle half, it is impossible to concentrate water bodies in this area.

6. Conclusion and Recommendations

DEM is one of the surface models in RS that clearly displays the distribution of water bodies or their geographical position. The majority of the water bodies are located between 538 and 583 metres above sea level. The north-eastern section of Hyderabad has a high concentration of water bodies. The terrain slopes down from west to east in the middle section of the Rangareddy district, although it is fairly steep in the central part. In the research region, water bodies may be found everywhere along the streams and drainage patterns. Because other elements such as soil lineaments, geology, and geomorphology are also important for ground water potential zones, the water levels are somewhat different when we compare slope or elevation maps. It is quite comparative but some parts like Kondukur, Medchal, Pargi, Sherlingampally, Shankarpally areas are fluctuated in water depths.

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