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Hydro-geomorphological mapping of Mothkuri watershed using remote sensing and GIS techniques in Nalgonda district, Telangana state

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Abstract
The average annual rainfall of the Nalgonda district is 751 mm, which ranges from 2.0mm in February to 171 mm in July. July is the wettest months of the year contributing about 23% of annual rainfall. The mean seasonal rainfall is 562 mm in southwest monsoon(June-September), 139 mm in northeast monsoon(Oct-Dec), 7 mm rainfall in Winter (Jan-Feb) and 43 mm in summer (March – May). The percentage distribution of rainfall, season-wise, is 74.8% in southwest monsoon, 18.5% in northeast monsoon, 0.93% in winter and 5.73% in summer. Groundwater is one among the most precious natural resources. The occurrence and movement of groundwater is directly controlled by the local geological formations. Major volume of water is located in oceans, glaciers and in deeper subsurface openings (Ralph, 1983). Optimal management of natural resources has become a critical requirement in these days of increased industrial development and growing population natural resource management therefore has to be the key pin for an effective strategy for rural development. Where, Water is the prime natural resource for human beings and hence precious natural asset. The easy and cheaply available ground water is the most important resource for domestic, industrial and agricultural uses. However, rapid growth of Population, vagaries in monsoon, expansion in irrigation, increased industrialization etc. have resulted into enhanced demand for ground water in various parts of the country. As a result, the ground water prospecting, exploration and management have become a big task in India in general, and certain drought prone areas in particular. Hence, in the current scenario, it has become crucial not only to find ground water potential zones, but also to monitor and conserve this important natural resource. Hydro-geomorphological mapping is carried out at Mothkuri Mandal in Nalgonda District, Telangana State using integrated remote sensing and GIS based techniques. The study is to assess the natural resource potential and their spatial variability of geology, hydro-geomorphology, surface water resources, ground water resources, at study area using high resolution satellite data (IRS-P6-LISS-III) generation of natural resource information on 1:50,000 scale. Data is analyzed using GIS and preparation of action plans were suggested based on the geo-hydrological characteristics and agricultural needs.

Keywords: Hydro geo-morphology, geology, remote sensing, GIS, Dyke, Inselberg, Pediment

Introduction
The information on availability of surface and ground water helps in the process of planning and development. The surface water resources are inadequate to full fill the water demand for agriculture and other purpose. Productivity of ground water can be increased through proper development and exploitation in the study area. Keeping this in view, there is a requirement to select suitable sites for ground water exploration in hard rock areas using an integrated approach of remote sensing, GIS and hydro geological characteristics and to evaluate the ground water potential of Mothkuri Mandal located in part of the Nalgonda District, Telangana State, India. Remote sensing provides multi-spectral, multi-temporal and multi-sensor data of the earth's surface. One of the greatest advantage of using remote sensing data for hydrological investigations and monitoring is its ability to generate information in spatial and temporal domain, which is very crucial for successful analysis, prediction and validation. Satellite data provides, quick and useful baseline information on the parameters controlling the occurrence and movement of ground water like geology, structure, geomorphology, soil, land use / land cover.

Objectives

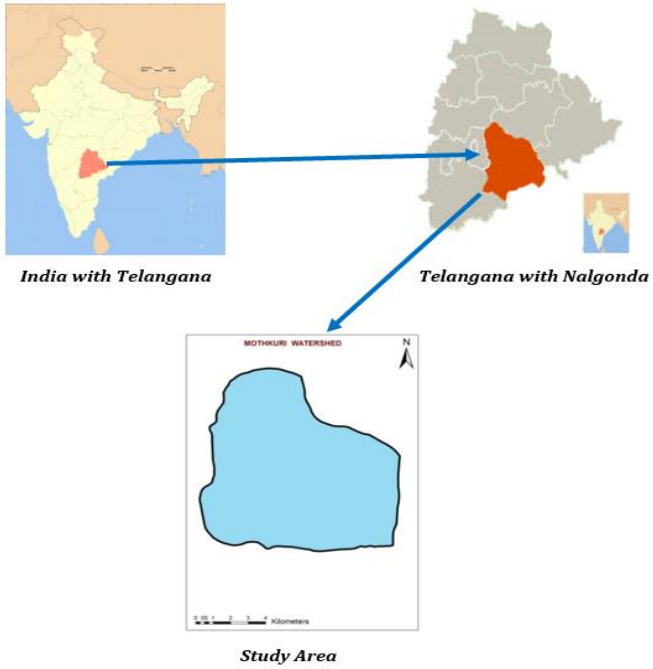
The term Hydro-geomorphology deals mainly with the groundwater prospects of various geomorphic units. Structure and lithology are the two parameters that control the evolution of land forms. In other words, lithology and structure control the groundwater prospects of any region.

- Acquisition of satellite and collateral data
- Preparation of pre-field interpretation maps
- Limited field checks in the doubtful areas and
- Preparation of hydro-geomorphological map

Study Area

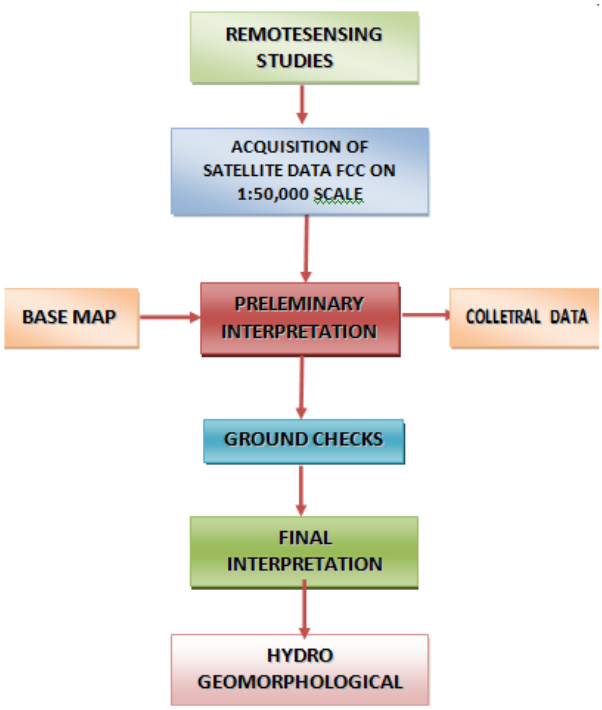
Mothkuri is located in Nalgonda District of Telanagan. The Mothkuri watershed is situated between 17°28'51.14° and 17°25'58.53°N latitude and 79°17'3.63° and 79°14'2.69°E longitude and the total area is 5541.82 ha. It is located on the banks of Bikkeru a tributary of Musi River which itself is a tributary of river Krishna. Paladugu cheruvu is a big tank at Mothkuri Mandal. Mothkuri is a Mandal in Nalgonda District of Telangana State, In India. Mothkur Mandal Head Quarters is Mothkuri town. It belongs to Telangana region. It is located 47 KMs towards North from District head quarters Nalgonda. Mothkur Mandal is bounded by by Gundala Mandal towards North, Shali Gouraram Mandal towards South, Atmakur(M) Mandal towards west, Devaruppula Mandal towards North Jangaon City, Suryapet City, Bhongir City, Miryalaguda City are the nearby Cities to Mothkuri. This Place is in the border of the Nalgonda District and Warangal District. Warangal District Devaruppula is north towards this place. Warangal (Orugallu), Hyderabad, Khammam, Nagarjunsagar, Nagarjunakonda (Nagarjuna Sagar Dam) are the nearby Important tourist destinations.

Location Map of Study Area

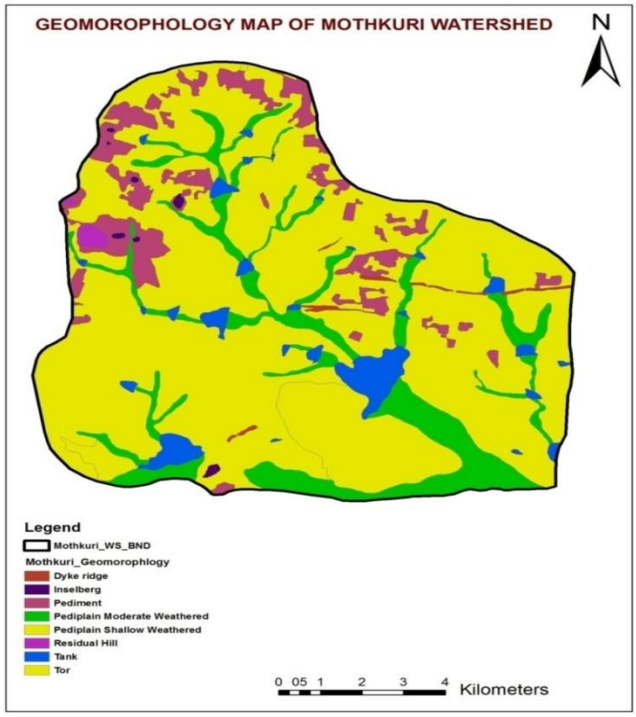


Data and Methodology

The study involves preparation of various thematic layers on 1:50,000 scale using SOI toposheets, IRS P6 LISS-III data, for the year 2011-12. The base map is prepared from SOI toposheets and updated on Satellite Image. The various GIS software are used such as ERDAS 9.2, Arc GIS 10.2.2 in the preparation of digital layers of various thematic maps.



Hydrogeomorphological of Mothkuri Study Area



In present Mothkuri watershed study area geo-morphological units are classified on the basis differential processes. In the study area seven types of geomorphology landforms are there. They are:

- Dyke Ridge (Dr)
- Inselberg (I-Gr)
- Pediment (PD-Gr)
- Pediplain Moderate Weathered (PPM - Gr)
- Pediplain Shallow Weathered (PPS -Gr)
- Residual Hill (RH-Gr)
- Tank/Tor (T/TC-Gr)

Dyke Ridge (Dr)
These landforms are generally acted as barriers for ground water movement. 28 Dyke ridges are there in the present study area. Dyke ridges are covered in middle portion of the study area. In northern side of the study area dykes are not there. It covers an area of 1.36% in study area.

Inselberg (I-Gr)
This means small light hilly these landforms are located in the Northeast corner part of the catchment area. Gently sloping rock-cut surface of granites and gneisses with thin veneer of detritus. In general, the ground water prospects in a pediment area poor. These landforms are developed in the north eastern part of the catchment area.

Pediment (PD-Gr)
In the study area, a pediment is gently sloping areas or erosion surface of bed rock. Pediments may or may not be covered by a thin layer of alluvium and are mostly developed at the foot of the hills. Pediment area is covered middle portion of the study area and in the southern portion of the study area. These landforms are fine texture. It covers an area of 8.38% in study area.

Pediplain Moderate Weathered (PPM-Gr)
It is a gently sloping smooth surface of granite gneiss with more than 5m depth of weathered material, generally covered with red soil. In general, the ground water prospects are moderate to good. Good yields can be expected along fractures / lineaments with yields ranging from 2 to 51ps. These landforms are observed only in the granites and gneisses and they occupied major part of the area, and mainly, confined to the major rivers, streams and narrow valley zones. Ground water development is extensive in these areas due to the availability of good ground water potential. These landforms are developed throughout catchment area.

Pediplain Shallow Weathered (PPS-Gr)
It is a gently sloping smooth surface of granite gneiss with less than 5m depth of weathered material, generally covered with red soil. The ground water prospects are poor to moderate. Moderate yields are expected along fractures/lineaments with yields ranging from 1 to 31ps. These land forms developed in the middle and north-western part of the catchment area.

Residual Hill (RH-Gr)
Residual hills are the end products of the process of pediplanation, which reduces the original mountain masses into a series of scattered knolls standing on the pediplains. We can also say that the hard rock's left behind after erosion are then called residual hills residual hills occur as small hills comprise of more resistant formations formed due to differential erosion are found in the western and southern portions of the study area. In the imageries, these features occur as dark greenish brown patches with forest cover. It covers an area of 2.62% in study area. It is an isolated low relief relict hill occupying considerably small area. The ground water prospects are poor. These landforms are seen in the granite terrain of the area. These landforms are located in the North part of catchment area.

Tank/Tor (T/TC-Gr)
These are a group of sporadically weathered boulders with isolated rock outcrops. In general, the ground water prospects are poor. These landforms are observed. In middle and south-western parts of catchment area.

Conclusion
Integrated studies geology, geomorphology, hydrogeology, hydro geomorphology, structure and drainage in preparing the groundwater prospects map of Mothkuri watershed revealed that the remote sensing and GIS are the best tools to assess the groundwater conditions. The categorization of groundwater potential zones in the study area is satisfactory level with the field checks also. The interpretation of this kind of information is much useful in improving the groundwater conditions of the area i.e. like in demarcating the drainage watersheds and planning for the construction of the structures like check dams, percolation tanks etc.

Reference

1. Objective procedure for lineament enhancement and extraction, Photogrammetric Engineering and Remote Sensing, Moore G, Waltz FA. 1986; 49:641-647
2. NRSC. Manual for National Geomorphologic and Lineament Mapping, Hyderabad, 2010.
3. NRSA. Manual of (SIS-DP) Space Based Information Support for Decentralized Planning, 2011.
4. APSRAC (A.P. State Remote Sensing Applications Centre) Integrated Study to Combat Drought, Anantapur District, Andhra Pradesh, Project Report, 1997, 102.
5. Central Research Institute for Dry land Agriculture, Field Manual on Watershed management, CRIDA, Hyderabad, 1990.
6. Central Groundwater Board. Summary of results of Monograph no.1 Central Groundwater Board, Hyderabad, 2013.
7. Department of Space/ ISRO. Manual for Hydro geomorphological mapping for drinking water mission, 1988.