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Identification of Groundwater Potential Zones of Catchment Using Geospatial Technology

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Abstract:- The most vital resource for life is freshwater. The importance of water for drinking, sanitation, agriculture, industry or other purposes. Water is not uniformly distributed all around the watershed. In contrast to the diminishing resource, global demand for water is rising. Consumable water is the driving require of human civilization nowadays. Groundwater is recharged by constructing various soil and water conservation structures in watershed is possible if one can identify ground water potential zones by using state of art technology.

Groundwater pulled back for rural, metropolitan and mechanical utilize by developing and working extraction wells. The review related to Identification of Groundwater Potential Zones of Watershed Using Remote Sensing and Geo-informatics is discussed in this paper.

Keyword:- *Watershed, Remote Sensing, Geo-informatics, Potential zones, Irrigation planning*

I. INTRODUCTION

The most vital resource for life is freshwater. The importance of water for drinking, sanitation, agriculture, industry or other purposes. Water is not uniformly distributed all around the watershed. In contrast to the diminishing resource, global demand for water is rising. Consumable water is the driving require of human civilization nowadays. Groundwater is recharged by constructing various soil and water conservation structures in watershed is possible if one can identify ground water potential zones by using state of art technology.

Surface water being easy, direct and therefore less expensive to exploit, in comparison to groundwater or desalinated seawater. In recent years more emphasis is placed on the utilization of groundwater. Since there is no cap on how much ground water can be extracted, it is necessary to use remote sensing and geo information to identify viable ground water potential zones.

II. REVIEW OF LITERATURE

Krishnamurthy *et al*. (1996) Utilizing remotely detected information as well as drainage density and incline classes from Overview of India geological sheets, different topical maps such as lithology, landforms, lineaments, and surface water bodies at a 1: 50000 scale were arranged to outline the groundwater potential zones of the Marudaiyar bowl. Additionally, the Soil Survey and Landuse Organization's 1: 250 000 scale soil map was used to construct a soil map at 1: 50000 scale spanning the research area by grouping the different soil types according to their hydrological properties. Using a model created in the geographic information system with logical conditions, all the theme layers were combined and analyses (GIS).

S. Shahid *et al.* (2000) Considered by Topographical Data Framework integration device to outline the groundwater potential zone in a delicate shake range utilizing seven hydrogeological topics: lithology, geomorphology, soil, net revive, seepage thickness, incline as well as surface water bodies . The other themes, with the exception of net recharge and slope, are taken from remote sensing data. In the Indian state of West Bengal's Midnapur District, 631 km2 of IRS-1B LISS-II data were used. Topographic sheets were used to compute slope, and data on annual water table fluctuation was used to calculate net recharge. Each element of all thematic maps was rated based on how significant it was in predicting groundwater potential.

R. K. Jaiswal *et al.* (2003) Proposed by the Son watershed's Gorna sub basin in Madhya Pradesh, India. The results of this study could be effectively used to determine the best places to obtain drinkable water for rural communities. The regular planning of groundwater exploitation employing contemporary technology is crucial for the proper use of this priceless resource in order to fulfill these responsibilities. On the basis of this, we used conventional techniques to extract data on lithology, geological structures, landforms, land use/land cover, drainage networks, soil characteristics, and terrain slope before integrating it in a Geographical Information System environment to represent village-wise groundwater prospect zones. In order to map groundwater prospects, a GIS-based model that accounts for local conditions as variances has been created.

Khodaei K. and Nassery H. R., (2011) The research studied area is one of the semi-arid locations in northwest Iran between N 37°00′ and 37°15′ latitude and E 45°05′ and 45°30′ longitude. It is developed up of Permian dolomitic limestone, limestone, and post-Jurassic stone with exceptionally destitute essential porosity or permeability features. The majority of arid and semi-arid areas, there is a severe shortage of water needed for drinking and agricultural purposes. The think about concentrated on distinguishing auxiliary porosity/permeability markers such as lineaments, vegetation cover, lithology, waste design, waste thickness, etc. in arrange to portray groundwater potential zones in this locale. An approach based on inaccessible detecting and geographic data frameworks was chosen in this respect. To attain the objectives, Landsat ETM, IRS (container), SPOT information, computerized rise show, and sifting, untrue color composite, foremost component investigation, band proportioning, and classification strategies for advanced picture preparing have been utilized.

Kumar B. and Kumar U., (2011) Considered the potential destinations for the development of water gathering structures within the Lower Sanjai Watershed of the Kolhan Division of Jharkhand that has been recognized utilizing inaccessible detecting and Topographical Data Framework strategies. The consider region comprises the difficult rough cellar of Precambrian/Archaeans, Groundwater revive, and collection courses can be distinguished at the crossing point zones of lineaments. It has become easier to set up the standard information on groundwater planned zones through the utilize of farther detecting information, GIS, geological maps, collateral data, and restricted field checks. A few variables, counting topography, geomorphology, lineaments, land-use/landcover, penetrability, soil profundity, seepage escalated, soil surface, water holding capacity, and physiography, impact the depiction of potential destinations for fake artificial recharge. Using on-screen visual interpretation techniques, a variety of thematic maps, such as for landuse/landcover, geomorphology, and lineaments, etc., were created. Using GIS tools, these layers were combined with the geology and drainage to determine the best zones for the development of ground water harvesting/recharge sites. Each topic was allotted a weightage depending on its impact on groundwater energize. Each course or unit within the outline was doled out a knowledge-based positioning depending on its transmittance of groundwater and centrality in capacity, and these values were duplicated with layer weightage. The another step bargains with the classification of all these parameters into ‘suitable’ classes and task of ‘suitable’ positions to these classes, and at long last, integration of all the positioned and weighed parameters in a Geological Data Framework environment. The area is divided into different sites for the rainwater harvesting and the final map shows various categories of suitability sites for construction of various ground water harvesting/recharge structures.

Nag S.K. and Anindita Lahiri (2011) Studied For the purpose of identifying groundwater potential zones in the Dwarakeswar watershed, Bankura district, West Bengal, with an integrated approach employing Remote Sensing and GIS techniques used to. The smallest area that functions as a whole unit in the hydrological environment is the micro watershed. The quartz, schist, and slate geological formations exhibit a fine texture and drainage pattern that point to a high likelihood of groundwater presence. The slope is typically greater than 300, which means there will be more runoff and less infiltration. The three main factors influencing the presence of groundwater in the Dwarakeswar watershed are lines, hydro geomorphology, and slope. The lineaments are seen from satellite pictures cut between litho units and slope categories, suggesting the potential for serving as significant conduits for subsurface transportation and linear aquifers for water storage. Groundwater prospects are strong in the watershed's central and southern regions. The softer slope offers more potential for groundwater, according to field observations and the groundwater potential map. Drainage surface, Lineament density/ lithology acts as complementary conditions for gentler inclines.

Preeja K.R. *et al.* (2011) studied the value of groundwater research using remote sensing and geographic information system applications, particularly in identifying groundwater potential zones in Kerala, India's Ithikkara River Basin. The data on geography, geomorphology, lineaments, slant, and arrival use/land cover was assembled from Landsat ETM + information and Study of India toposheets of scale 1:50,000 in expansion, the GIS stage was utilized for the integration of distinctive subjects. The composite outline produced was encouraged and classified concurring to the spatial variation of the groundwater potential they are four categories of groundwater potential Hydro-geomorphological units such as alluvial fields and valley fills are appropriate zones for groundwater investigation and improvement, whereas valley fills associated with lineaments are the profoundly promising locale for groundwater extraction. The regional fluctuation of the potential suggests that the geology, structures, slope, and landforms are what regulate the occurrence of groundwater. Zones specifically destitute, direct, great as well as exceptionally great were distinguished and depicted.

Sitender and Rajeshwari (2011) studied depicting groundwater potential zones in a southern area of Haryana, named Mewat. For the generation of topical layers such as topography, geomorphology, percent incline, waste thickness, lineament thickness, and arrival use/land cover of the inquiry about the region, Study of India toposheets, obsequious imageries, and a few other collateral information are utilized. Integrating all the thematic levels is done using a multi-criteria evaluation technique. The knowledge base ranks each theme and its accompanying categories from 1 to 6 according to how well they can hold groundwater and how much weight they should receive. All thematic maps are combined using the rater calculation feature in Arc GIS software to create a composite groundwater potential map of the research region. Paleochannels and alluvial plains, followed by the Aeolian plain, are the geomorphological characteristics with the most potential for groundwater occurrence, according to the study. Due to the steep slope and lack of primary porosity, residual hills, structural hills, and linear ridges are located in very poor to low potential zones.

M.P. Sharma and Anukaran Kujur (2012) considered the crossing point zones of lineaments that give the potential for groundwater aggregation and groundwater energize. The zone comprises a difficult shake of Archaean /Precambrian and a few portions of sedimentary stores. The only places where groundwater can be found in such rocks are the fractured and worn regions. With the assistance of different topical maps, counting those of geography, geomorphology, seepage design, seepage thickness, lineaments, arrival utilize, and landcover, etc. have been made utilizing visual translation strategies utilizing further detecting information with the help of GIS techniques and topographic data together with auxiliary data, the current paper points to set up principal data for location determination of water harvesting/artificial energize structures to the aquifer frameworks. It is an attempt to make suggestions for preserving the right balance between the quantity of groundwater and its exploitation.

N. S. Magesh *et al.* (2012) presented the various groundwater potential zones for the evaluation of the Theni district's groundwater availability using remote sensing and GIS methods. Lithology, slant, arrive utilize, lineament, waste, soil, and precipitation were changed over to raster information utilizing ArcGIS's feature-to-raster converter apparatus from Study of India toposheets and IRS-1C toady imageries. The multi-influence factor technique is used to compute a fixed score and weight for the raster maps of these components. Additionally, each weighted thematic layer's groundwater potential zones are statistically calculated. The resulting groundwater potential zones were separated into four groups: impoverished, poor, good, and very good zones. The outcome shows the research area's prospective groundwater zones, which is useful for improved planning and management of groundwater resources.

M. Bagyaraj *et al.* (2013) Studied geographic information systems and remote sensing technology, the probable groundwater zones. The rocks in the research region are predominantly charnockite and are of Archaean age. The parameters considered for recognizing the groundwater potential zone of geography incline, waste thickness, geomorphic units, or lineament thickness were created utilizing the asset sat information and study of India toposheets of scale 1:50000 and coordinates them with a converse separate weighted show based on geographic data framework information to distinguish the groundwater potential of the think about the region. A suitable weighting factor was chosen for each of these metrics' categories. Based on each geomorphic unit's capacity to store groundwater, weighting factors were applied.

Diabene P.Y. and Gyamfi C., (2014) have a reviewed of the possibilities for groundwater in Ghana's Upper East's Bawku West District. They are determining whether or not the district's boreholes are sustainable, the pumping test data collected from 74 boreholes have been analyzed. Aquifer characteristics counting transmissivity and economical surrender have been surveyed utilizing the Cooper-Jacobs strategy. The ponder comes about demonstrating the least and most extreme transmissivity values like 0.95 m2/d or 195.70 m2/d individually with a cruel of 40.39 m2/d and a standard deviation of 38.48 m2/d. Discoveries from the ponder show tall groundwater maintainability with yields extending from 0.36 m3/h to 103.15 m3/h with a cruel of 13.36 m3/h.

S. Kaliraj *et al.* (2014) Proposed on the morphology of the earth's surface highlights like topography, geomorphology, soil sorts, arrival utilize and arrival cover, seepage, lineament, and aquifers impact the groundwater energize in either coordinate or roundabout ways. These topical layers are extricated from Landsat ETM+ pictures, geographical maps, and other collateral information sources. The utilization of geospatial examination and expository progressive approach to recognize conceivable regions for fake groundwater energize along the Vaigai upper bowl within the Theni area of Tamil Nadu, India.

S.Selvam *et al.* (2014) carried out thinking about translating the groundwater potential zones within the coastal territory of Tuticorin utilizing Indian farther detecting lackey LlSS-III, IRS-1C information on a 1:50,000 scale, and Study of India toposheets. The topical layers such as lithology, slant, lineament, waste, soil, precipitation, and arrive utilize were created and coordinated to get ready the groundwater prospect and energize the outline of the ponder range. These layers were changed to raster information utilizing the highlight to-raster converter instrument in the Circular segment GIS 9.2 computer program.

Ghosh *et al.* (2016) examined the Distinguishing proof of groundwater potential zones within the Mandavi Waterway bowl, Andhra Pradesh, India. In terms of geology, the region is composed of the Chotanagpur granite gneiss complex, and in terms of physiography, it is a severely dissected pedimental terrain with lateritic upland and skeletal soil. Due to the area's predominately mono-cropped cultivation, it produces less per hectare of land than other parts of West Bengal. If there were an adequate supply of water resources in this area, rain-fed subsistence gardening might provide a more secure source of food. Zones within the Kumari watershed within the Purulia area, the current ponder coupled inaccessible detecting information with Study of India geological sheets and field confirmation.

Siddi R. Raju *et al.* (2019) studied the Identification of groundwater potential zones in the Mandavi River basin, Andhra Pradesh, India. Analysis, conservation, and monitoring of various groundwater-related development initiatives are all greatly aided by remote sensing and geographic information systems. In order to assess ground water potential zones in the Mandavi River basin, the current work blends RS, GIS, and multi-influence factor methodologies. In this respect, topical maps for waste thickness, lineament thickness, topography, soil, geomorphology, incline, precipitation, soil surface, arrive use/land cover, and groundwater levels have been made utilizing IRS-R2 LISS IV fawning symbolism, the Study of India (SOI) toposheets, and different assistant information sets from distinctive sources. At that point, within the Bend GIS 10.4 environment, the topical layers were changed over to raster organize. The Raster maps have been statistically given weights and ratings based on the multi-influence factor

methodology. The GWPZ was at last recognized as falling into four categories, specifically amazingly destitute, destitute, great, and exceptionally great, with comparing spatial degrees of 533 sq. km (36%), 510 sq. km (35%), 319 sq. km (21%), and 103 sq. km (7%) The perception of great information was utilized to affirm the ultimate comes about. These discoveries will bolster better groundwater asset arranging within the Mandavi Stream Bowl by hydro-geologists, decision-makers, organizers, and nearby specialists.

III. CONCLUSION

The above studies demonstrate the importance of remote sensing and GIS technologies in the identification of groundwater potential zones of watersheds. Using remote sensing and GIS tool various thematic mapping is done. Groundwater potential zone mapping will be helpful to planners for irrigation management and planning.

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