

Literature Review on investigation of Ground water by using GIS and VES

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ABSTRACT: As per the previous research works it is proved that GIS and VES are very effective for groundwater development studies, by adopting these methods in the investigation of groundwater will minimize time consumption in practices. The present paper gives an overview of different research works related to groundwater development. This paper provides information regarding the geophysical study, well inventory studies, GIS mapping and also provide knowledge about the integrated study of GIS and VES to suggest the suitable location for artificial recharge structures in the study area.

Keywords: GIS, Vertical electrical sounding (VES), Ground Water Studies.

1. Introduction:

Water is important for all dimensions of life. Water resources of the country constitute of its essential assets and over the past few decades use of water have increased and in many districts, water availability is falling to crisis level. More than 80 countries with 40 % of the population are already facing the deficiency of water. India is the largest user of groundwater resources in the world. The state of Maharashtra is facing the water scarcity problem and frequent drought can be traced way back to historical times from 1801 years. The state had already faced 44 episodes of droughts in the span of last 192 years.

Geologically major part of the state is covered by the Deccan basaltic flow. Water and land are the basic things for the development of Agriculture, industries and drinking water. The water table is decreases due to increase in population and industrialization. A scarcity of water is due to higher yielding of water from the earth. soil erosion and low water table are crying evils crises to the study area.

The project has briefly discussed the concept of "Ground Water Development By Using VES and GIS" a part of Groundwater conservation which is exclusively adopted by developed and developing countries.

Ground water

Sub surface water, or groundwater, is fresh water located in pore space of soil and rocks. It is also water that is flowing within aquifer below the water table.

2. Research Work of Different Literatures:

Ashok Tejankar & Irshad Kureshi.[1]- The present study were done at the Aurangabad district, which lies in the central part of Maharashtra and is located in the survey of India toposheet no.47/5. In investigation of this area RS and GIS techniques were used.

Geological, geohydrological and water table survey of village pachod in GP-10 watershed. The methods GIS & RS where used to prepare the thematic maps of study area. From this map lithologies where prepared to know the geological as well as geo hydrological condition of the study area. By integrating the data collected by RS and GIS with the data of well inventory survey, they find out the depth of water table below the ground surface and suggested the suitable watershed development structure or artificial recharge structure on study area.

Karunanidhi et al. [2] - In present investigation so (VES) survey were carried out in the study area the integration map gives 62 combinations or different lithology with weathered zone resistivity & thickness after the investigation field validation was done it's in this area this area proves with good groundwater zone. This combination is noticed in the foot hill areas & river course & is recommended for the construction of dug well & tube wells.

V.K.Srivastva et al. [3]- In view the upcoming industrialization in the region there is need to exploit groundwater resource which is limited & confined to fractured & weathered rock on the basis of integrated & weighted analysis of various thematic map the present integrating study has brought out the following conclusion. Geologically it is observed that the groundwater is mainly to secondary porosity. It is observed from field survey & also from various wells located in the region. Based on resistivity variation with depth it is possible to estimate the depth & distribution of groundwater.

Ruby D' Chitra et al. [4] - Vertical electrical sounding (VES) Together lithologs forms the database in the determination of depth, thickness & optional distribution of overburden weathered rock fractured rock & bed rock. Various methodologies are used for the analysis or geophysical data of ponnoviyar river basin. It can be concluded that the possibility of tapping groundwater resources in this basis even through some addition

exercise pertaining to integrated analysis in lacking strong correlation exists between the layers determine from this analysis & various other theres of this basin viz drainage ,geomorphology &satellite imagery which suggest the reliability of the result brought out through this analysis.

G. Adytalkar et al. [5]- In this paper study of India gives the information that it is having a large extent of the Deccan peninsula over an area about 0.5 million sq.km in various states. In Maharashtra it occupies the longest grcal extent of about 0.24 million sq.km. constituting about 82 percent of the total area of the report the result of their aquifer performance test on select open well in Bhīma, Godavari and wardha basin of Maharashtra periling the water table zone to depth of 10to15m in an area covering 1300sq.km. This has been proved by the application of statistical method of analysis of the parameter data in the principal water table aquifer of basaltic lava flow in three different river in this state.

O.M. Alile et al. [6]- In this paper studied that the geoelectric investigation for underground water in abaertinlyanomon and its environ was done by using the VES. The investigation of the soil exploration of the resistivity of rock, it occurs the geology of the study area there are sedimentary rocks are present with the help of VES different curves are drawn. This curves studied for finding of the different geological situation in the sub-surface. This curve lithology is drawn and thickness of different layers is known. Finally this experiment conducted over the area showed a total depth of 85.80 meter and 89.36 meter .The experiment conducted over the area showed that the water table is draw down up to depth of 85.80 and 89.36m.

Heajun suk et al.[7]- In this paper a groundwater dam is I design and constructed at sites were alluvial aquifer is widely formed to store ground water for the supply drinking water or agricultural use. A groundwater dam planed to be constructed at sanding-Myeon Namonin in Korea. The location of the dam, thickness of dam, cut off wall properties of construction material an the depth of wall in addition ,sensitivity ,analysis,the optimum instauration location, hydraulic conductivity of the cut-off wall, wall thickness, depth of wall were suggested for the groundwater dam. Site was chosen as the optimum location for the dam it had the largest alluvial zone among the three sites. In addition, it was found that geological condition such as the location and depth of an alluvial zone were more important factors for effective groundwater dam construction than the thickness or hydraulic conductivity of the cut-off wall.

The observation data analyses have been performed to investigate the thickness of the alluvial layer affects the storage capacity to greater extent than the thickness of the weathered layer therefore, it can be concluded that

it is not feasible, economically and practically to place the cut-off wall and to construct the groundwater dam only within the alluvial zone.

Moradeya olabisi cdunlami, member, IACSIT [8]- Groundwater contamination due to municipal landfill site (MLS) is a serious threat to groundwater integrity. this current research characterized leachate from solos landfill site and assessed the ground water quality at different distance from the landfill site.to analyse the basic features if the results. the mean variance and standard deviation in this work were found reading the concentration levels of contaminates examined in groundwater samples fall within the maximum acceptable concentration stipulated by world health organization (WHO) it is necessary to upgrade the landfill site to prevent future contamination of groundwater. They studied that sample and the find out the contaminants concentration is expected to decrease as the distance from the landfill increases.

Heejun Suk et al. [9]- In this study, numerical modelling was performed to investigate the effects of the following factors on the groundwater storage capacity: (1) location of the dam, (2) thickness of the cut-off wall, (3) properties of construction materials, and (4) depth of the wall. In addition, sensitivity analyses were carried out to investigate the parameters that influence the results of modelling. Based on the results of the sensitivity analysis, the optimum installation location, hydraulic conductivity of the cut- off wall, wall thickness, and depth of the wall were suggested for the groundwater dam. Site 3 was chosen as the optimum location for the dam because it had the largest alluvial zone among the three sites. In addition, it was found that geological conditions such as the location and depth of an alluvial zone were more important factors for effective groundwater dam construction than the thickness or hydraulic conductivity of the cut-off wall. Numerical simulations were performed for three candidate sites to quantitatively compare the storage capacity of each site and to suggest a suitable location for the groundwater dam. Based on the simulation results, Site 3 is seen to be the best place for the groundwater dam because it has a larger alluvial area and storage capacity than the other candidate sites. However, it should be noted that additional examination would be required in terms of the construction cost and environmental effects before a final decision on the location of the groundwater dam is made. 4. Finally, it was concluded that geological conditions such as the distribution and thickness of the alluvial zone were more important factors for an efficient groundwater dam construction in this area than the thickness and hydraulic conductivity of the cut-off wall.

Van-Dycke Sarpong Asare et al. [10]- In this paper the research covered four small communities namely, zannte, kanshequ, nyengvalo and zei. The

schlumberger electrode was first use in the line profiling. The geo electric section provide no evidence of a decent into the fresh bed rock. The geo-physical target is a reasonably thick and extensive zone of saturated weathered rock beneath the over burden. Ground water developed by the setting of productive bore wholes could be successfully accomplished by using electrical resistivity method complimented with the reason of geological and hydrological site investigation.

Golam Shabbier Sattar et al. [11]- Determine the transmissivity and hydraulic conductivity of the aquifer by help of pumping data of nearby available production well. The present soil is type of alluvium at the depth of 150 to 200m. The VES is used the located to the lithology of different level and find the ground water level. The hydraulic conductivity of that area between 31 and 85 meter per day and transmissivity to vary between 448 and 1955 m sq. per day.

The experiment conducted over the area showed that the hydraulic conductivity of that area is between 31 and 85m per day and transmissivity to vary between 448 and 1995m sq. Per day.

C.T. Ibronke et al. [12]- To determine the groundwater potential and aquifer parameters with the help of VES and omega resistivity meter. They observed that in that area there are five geoelectrical layers are present showing various ranges of resistivity on resistivity meter with varying depths.

From results VES 5 is best and most probable yield point as it is having high storability with 17m depth within the weathered layer.

The adopted geophysical technique provides the information related to suitability of the surveyed area for ground water department

Sandow Mark Yidana and Duke Ophori [13]- A Groundwater flow simulation model was developed using available hydrogeological data to describe groundwater flow in the afram plains area . The objective was to maximize groundwater extraction from the shallow aquifers of the southern voltain sedimentary basin that underlay the area, for irrigation activities. The profit obtained per unit cubic meter of water used also improved over the same management period.

This study that groundwater is capable of supplying the total water needs for all sectors including maize irrigation between 2007&2013 with less than 10% drawdown in hydraulic heads at all the wells sited in this study.

Iiugbo. S.O. et al.[14]- In this paper, investigation area of TboDi, in their research they found out the groundwater potential and environs of that research area. By using satellite remote sensed and aeromagnetic datasheet. They find the large amount of extraction of linemates in the NW-SW direction. The high linement intersectional density zones and the localities like oloromba iiwra-odo are medium. The results from the VES shoes area having intents intersections has high ground water prospect and it is good for groundwater development and the liniments is find out in the GIS environment hence GIS is suitable for the liniments study on the area.

Kehinde Anthony Mogaji and Hwee Sanlim. [15]- In this paper they on a ground water potentiality of the area Perak province, Malaysia by deriving aquifer hydraulic properties with the help of robust analysis on acquired 2D resistivity imaging data and borehole pumping test records and the transverse resistivity data (TR) by Dar-Zorouk equation(DZP) and to estimate these TR values from BPT linear regression and GIS techniques are used based on ATPP (Aquifer transmissivity parameter productivity.) After finding the value of hydraulic parameters of ATPP model. The study gives a good alternative approach to determine aquifer hydraulic parameters even in area where pumping test information is unavailable.

Praveen Raj Saxena. et al. [16]- In this study more than 100 VES data was collected. The resistivity of area is varies between 25 ohm m, it is correlated with bore hole data. By integrating the R.S., geological structure, morphological and geophysical data which is found out on the study area they have located the potential water bearing zones. The major part of laterite. Which vary place to place and the rock is composed of a disconnected vesicles. Hencemulti dimensional features.

M.I.I Mohanmaden. Et al. [17]- :- In this paper study area is located to the at south central part of simai peninsula at EI-Themed area this area is located the nearly to the tectonic region & this region at time to developed the major earthquake so the occurs by left lateral strike slip fault &the subsurface stratigraphic unit described like Quaternary formation, Egma formation , Esna formation , Duwi formation , Galileo formation etc. .the using VES & GIS by sublumberger configuration find out the aharasht &depth of above formation rock. Using GIS &using VES to find out the depth of the ground water level particular area of rock formation is individual &solved the problem that area shortage of water which is essential for agricultural &domestic purpose.

R.N. Athavale et al. [18]- Recharge to phreatic aquifers in the ocean trap basalt formation due to 1980 precipitation was determined in the kukadi &Godavari, purna basin by tritium injection we report in this paper in this estimates of the annual recharge to two

representative basins in the rain shadow zone. We have used the tritium tagging method developed by Zimmermann at its particular suitability for estimating the recharge to particular aquifer from highly seasonal rainfall. The Kukadi basin has an area of about 1153 sq. km & comprises four sub-basins namely BN5, BM14, BM15 & BM16. The Godavari Purna basins namely GP3, GP8, GP9, GP21 & GP24. The main annual incremental to the dynamic reserves of phasatic basalt aquifers located in the rain shadow zone of western India, as determined by the tritium tagging method, was found to be about 40 -60 mm or 7.5 -8.5% of the local rainfall during 1980. The recharge values for individual sites in the Kukadi & correction with water levels change in by dug wells no. of no significant moisture losses due to evaporations take place on deep percolation zone or black cotton soil during the dry period of Jun-May.

Abhay M. Varde. et al. [19]- In view of this and attempt has been made here to analyse the pumping test data of (10) large diameter dug-wells falling under micro watershed of WGKKC-2 of Kamleshwar tehsil, Nagpur district Maharashtra. The overall study indicates the efficiency of Kumar Swamy (1973), method in determining the aquifer parameter of large diameter dug-wells tapping the basaltic aquifer. During the study, it was observed that all the 10 large diameter dug-well of study area shows appreciable storage capacity, low inflows, and absence of cone of depression during pumping. This study will be useful for management of groundwater resources in the basaltic region.

CONCLUSION:

In present study, VES and GIS survey is very effective in ground water development planning. It is observed that both method VES and GIS method are effective tools in the investigation of ground water and suggesting sites for artificial satellite imageries taken by the GIS gives the best result concern with the geological condition of area. With these result thematic maps are prepared. From these map geology of area is found out and which helps in constructing suitable type of artificial recharge structure. Hard rock is not suitable for constructing artificial recharge structure because of their permeability is very low. A geophysical method VES is used to find out the depth of water table below the ground surface.

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