Research Article Impact Factor: 4.226 ISSN: 2319-507X
Khadri S. F. R., IJPRET, 2016; Volume 5 (2): 228-235 IJPRET

INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK

SPECIAL ISSUE FOR
INTERNATIONAL CONFERENCE ON
"INNOVATIONS IN SCIENCE & TECHNOLOGY: OPPORTUNITIES & CHALLENGES"

GROUNDWATER LEVEL FLUCTUATION MAPPING IN BASALTIC LAVA FLOWS OF MAHESH RIVER BASIN, AKOLA AND BULDHANA DISTRICTS, MAHARASHTRA, INDIA

KHADRI S. F. R, CHAITANYA PANDE

Department of Geology, Sant Gadge Baba Amravati University, Amravati

Accepted Date: 07/09/2016; Published Date: 24/09/2016

Abstract: *Ground water level fluctuation space to space (spatial) and time to time (temporal) is a major problem in India and the assessment of spatiotemporal characteristics water level fluctuation trend is very important in the point of view of future development. The Remote Sensing and GIS technique can properly enhance hydrogeological surveys. Moreover, to have an intimate understanding of the changes in water level fluctuations, it is also important to relate them to the surrounding geomorphic, structural, climatic and geologic factors. This research serves two fold. The first one is to operationalize the use of RS and Geographic Information Systems (GIS) techniques to assess the change of water surface area in Man River Basin in Akola and Buldhana Districts. The second is to present and interpret the available statistical data on water level fluctuations. The normal rainfall for study area is 600 – 1000 mm. (source IMD). The seasonal fluctuation shows a rise in water level, which ranges from 6 to 9.5m. The water level is deeper in topographically elevated regions and shallower in plain surface terrain. The depth of water table ranges from 6.8 to 9.5 m for pre monsoon period for June 2013.*

Keywords: *Ground water level, Mahesh River Basin, GPS, Hydrogeology.*

PAPER-QR CODE

Corresponding Author: DR. KHADRI S. F. R

Co Author: PROF. R. M. PHUKE

Access Online On:

www.ijpret.com

How to Cite This Article:

Khadri S. F. R., IJPRET, 2016; Volume 5 (2): 228-235

INTRODUCTION

Groundwater is an important source of water for drinking, cultivation, irrigation etc. the groundwater behavior in the Deccan Basaltic province is highly complicated due to occurrence of the diversified geological formations with considerable lithological and structural variations, climatological lithological and structural variations, hydro-chemical conditions. During last two decades, in the absence of regulatory guidelines, uncontrolled and inconsistent exploitation of groundwater had adversely affected its potentiality unevenly. The reserves of water on Earth are immense, but this is mostly salt water which is unsuitable for drinking and irrigation purpose. The amount of fresh water is huge as well. But its distribution over the globe is uneven. The demand for drinking water and other domestic need is a modern town varies from 100 to 500 liters a day per person. As man uses water, be pollutes it inevitably and when the water is returned to open bodies it contaminates the natural water. Water is one of main resources essential for the overall socio-economic development of any region and it requires careful planning and appreciates exploration. In this study area of the data gathered from GPS surveys and from environmental remote sensing systems can be fused within a GIS for a successful characterization and assessment of watershed functions and conditions (Khadri and Kanak 2015). The hydrogeological investigations are important facets of any groundwater management strategy. The groundwater potential of an area depends on the geological and geomorphologic setup, rainfall pattern, aquifer type, groundwater flow pattern, boundary conditions, aquifer properties, etc. (Selvam et. al. 2012, Rangarajan 2009). Thus, scientific understanding about the occurrence, distribution, movement and sustainability of this dynamic natural resource becomes important. Hydrological characters of basalt flows have indicated that the two distinct types of lava flows have distinct qualities as far as their porosity and permeability are concerned. These are amygdaloidal basalt flow and simple basalt flow and the hydro-geological characteristics are described below.

Study Area

The Mahesh River basin is situated in Akola and Buldhana Districts of Maharashtra which is located between 76°46’11’’E and longitude 20°40’ 36” N latitude covered by survey of India toposheets no. 55 D/9, 55 D/7, 55D/11,55D/13,55D/14 and 55 D/15on 1:50,000 scale(Fig.1). It can be approached from Amravati by road transport which is about 120 Km. The Mahesh River basin which is a major tributary of Mun River lies towards the western and southern part of Akola and Buldhana district. The total area covered by Mahesh River Basin is 328.25 Sq. Kms. the study area is occupied by alluvium and Deccan basalts which are horizontally disposed and is traversed by well-developed sets of joints. The Ajanta hill ranges are bordering the district in the southern with their slope towards western. The starting part of Akola district is plain

whereas the western part is again elevated with its general slope towards southern. The Mahesh River Basin flows in the southern to western direction having western slope and meets the Mun River near Balapur village in Akola district. Purna is the major river of the Akola and Buldhana district. The important tributaries of Purna River are Katepurna, Morna, Man, Vidrupa, Shahanur, Van and Nirguna. Most of the watershed area was covered by unconsolidated sediments, black cotton soil, Red soils and basaltic rocks of Deccan Traps. The study area was drained by Mahesh River flowing south to western with almost dendritic to sub-dendritic drainage pattern.

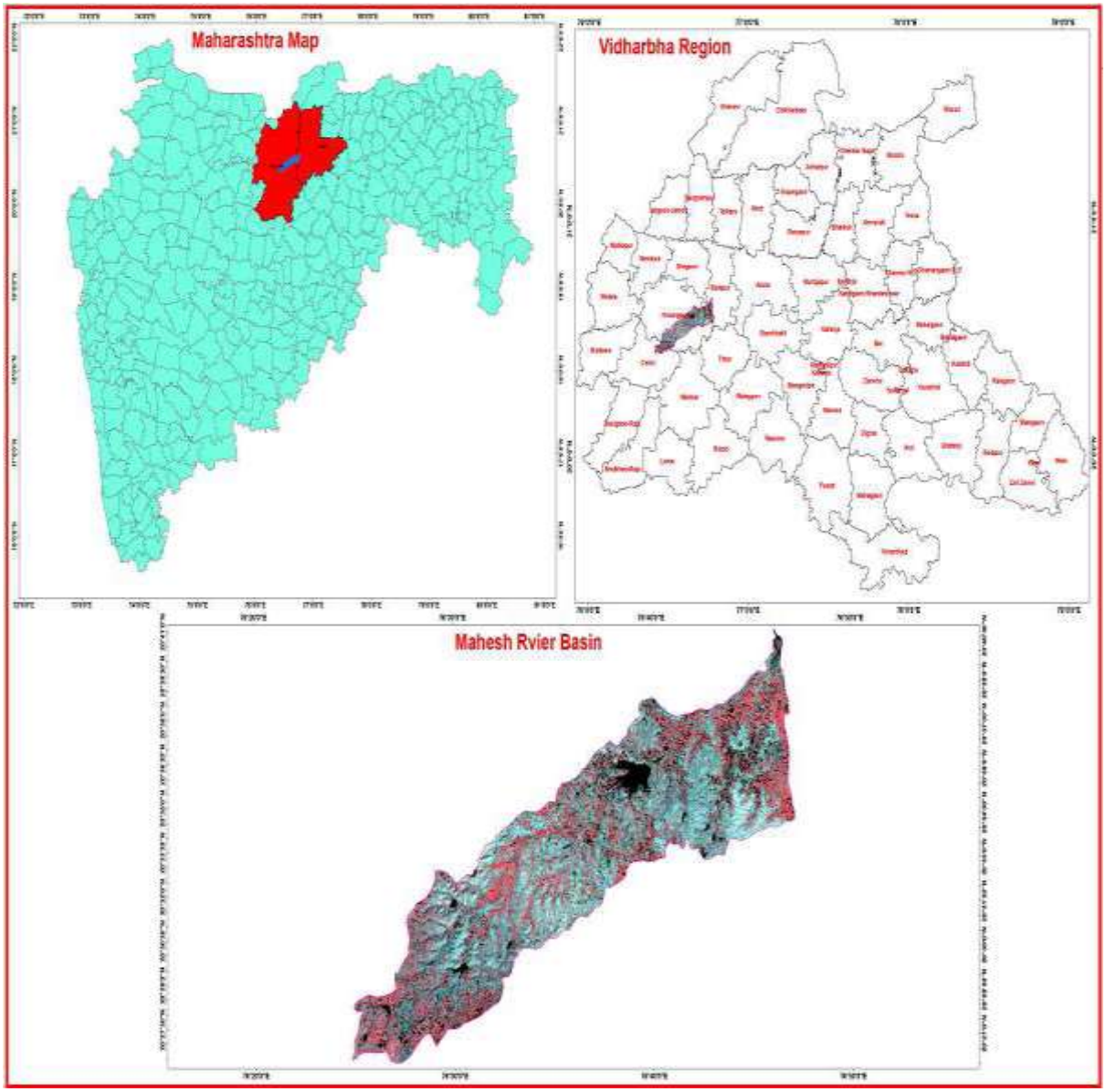

Fig. 1: Location map of Mahesh River Basin

COLLECTION OF HYDROGEOLOGY DATA

The Survey of India topographic maps, geology map published by GSI groundwater quality data and World Health Organization (WHO-2011) water quality standards were utilized in the present study. The Arc GIS 10.1 software is used for data generation and spatial integration. Sampling was carried out during pre-monsoon season for the year 2013. The GARMIN GPS was used to locate the exact coordinates of the sample collection to continuous monitoring purposes. In the study area of 45 observation wells were monitor variation in groundwater levels in Basin. The GARMIN GPS was used to coordinates of the sample collection monitoring purposes. The groundwater levels were measured on seasonal basis from 2013 pre and post were monitored for groundwater fluctuation for seasons of the year 2013. The details study regarding the well location. Dimensions, depth to static water level were collected and tabulated for each well. The locations of the observation wells were then transferred on to the base map in a GIS environment. The ground water level well Locations are shown in Fig.2 and Table1.

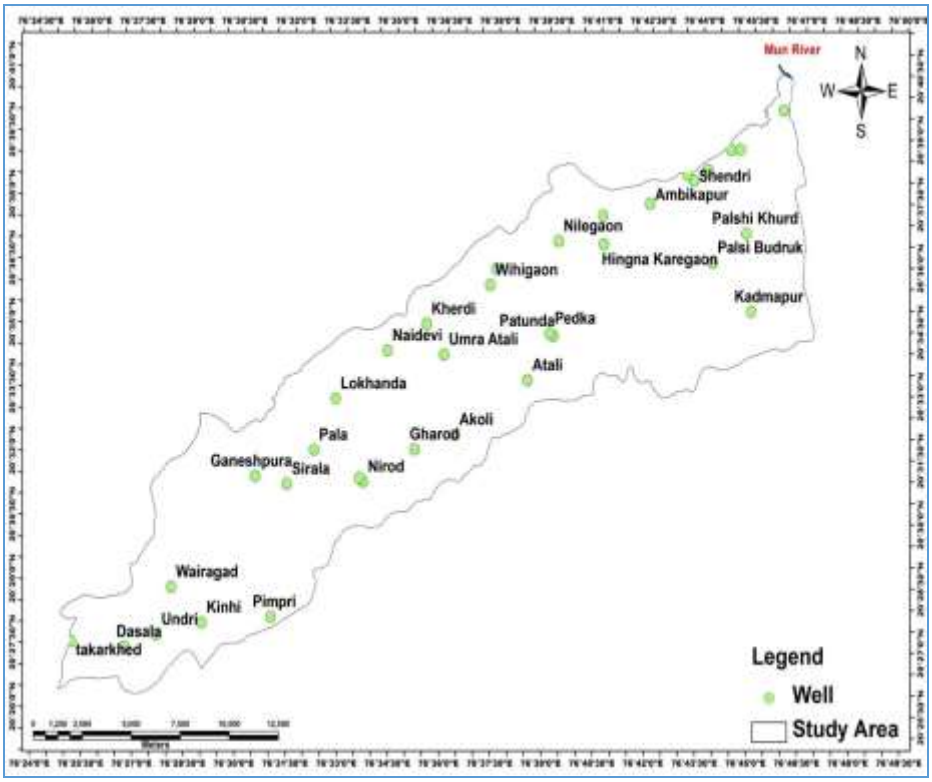

Fig. 2 Well Location map of Mahesh River Basin

RESULTS AND DISCUSSION

The hydrogeology investigation of the Mahesh River Basin has studied on the basis of pre and post monsoon field survey conducted for the year 2013 during first week of June and last week of December, near about 35 wells for each season (Fig.2; Table 1) were analysed to check the water level fluctuations and water bearing formations of the area. Deccan Basalt is the sole water bearing formation of the area followed by alluvium. Almost all wells were tapped in basaltic rock and fewer were in alluvial deposits. However in most of the region the wells in alluvium encountered the basaltic rock at the deeper level of the earth. The mode of groundwater has been studied by well inventory of the existing wells (Fig.3). Ground water level fluctuation is mainly depends on the difference in water level of pre-monsoon and post-monsoon periods, which can be directly related to recharge and discharge of groundwater. The pre and post monsoon water level fluctuation were calculated on the basis of 35 wells in the area. The result indicates four distinct zones viz low water level. There are various methods in use for the quantitative evaluation of groundwater recharge e.g i. Groundwater level fluctuation and specific yield method ii. Soil moisture balance, method iii. Rainfall infiltration method. Measurement of groundwater recharge requires(3 to 5).

Table 1 Water Levels for Year 2013 (Pre-Post)

S. N.	Village Name	June-2013	Dec. 2013	Fluctuation
1	Balapur	9.2	8.2	1
2	Umra Lasura	10.2	9.5	0.7
3	Sambhapur	8.1	7.5	0.6
4	Shendri	8.9	8.1	0.8
5	Hingna Umra	7.5	7.2	0.3
6	Ambikapur	9.1	8.5	0.6
7	Koregaon BK.	7.9	7.1	0.8
8	Hingna	9.8	7.2	2.6
9	Nilegaon	10.6	8.5	2.1
10	Ramnagar	11.6	9.2	2.4
11	Wihigaon	9.2	8.1	1.1
12	Kherdi	9.6	8.4	1.2
13	Umra Atali	8.9	7.9	1
14	Naidevi	8.4	7.1	1.3
15	Lokhanda	8.5	7.4	1.1
16	Pala	9.2	8.2	1

17	Sirala	9.6	8.4	1.2
18	Ganeshpura	7.9	6.8	1.1
19	Wairagad	8.5	7.4	1
20	Undri	8.1	6.9	1.2
21	Dasala	9.3	8.4	0.9
22	Kinhi	9.7	7.5	2.2
23	Pimpri	10.5	9.4	1.1
24	Nirod	10.1	8.9	1.2
25	Gharod	9.2	8.2	1
26	Akoli	9.6	8.5	1.1
27	Atali	8.9	7.1	1.8
28	Patunda	8.8	7.4	1.4
29	Pedka	10.3	8.7	1.6
30	Kadmapur	9.5	8.4	1.1
31	Palshi Kh.	8.4	7.1	1.3
32	Palsi Bk.	10.2	8.4	1.8
33	Umra Lasura	9.4	8.2	1.2
34	Takarkhed-1	8.5	7.1	1.4
35	Takarkhed-2	9.1	8.1	1

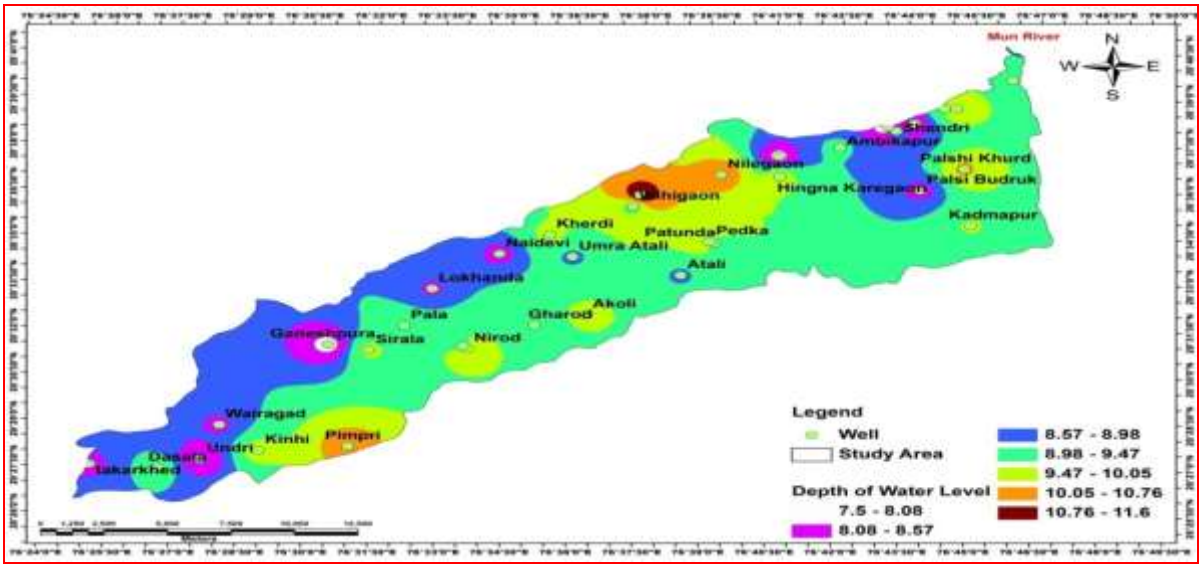

Fig. 3 Water level map of Mahesh River Basin (June 2013)

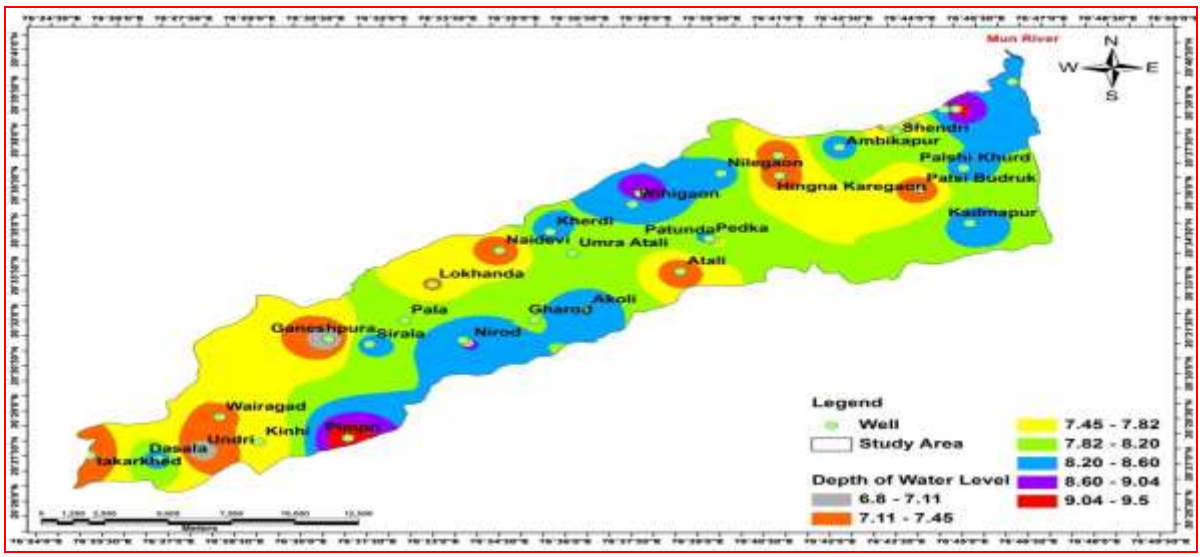

Fig. 4 Water level map of Mahesh River Basin (DEC. 2013)

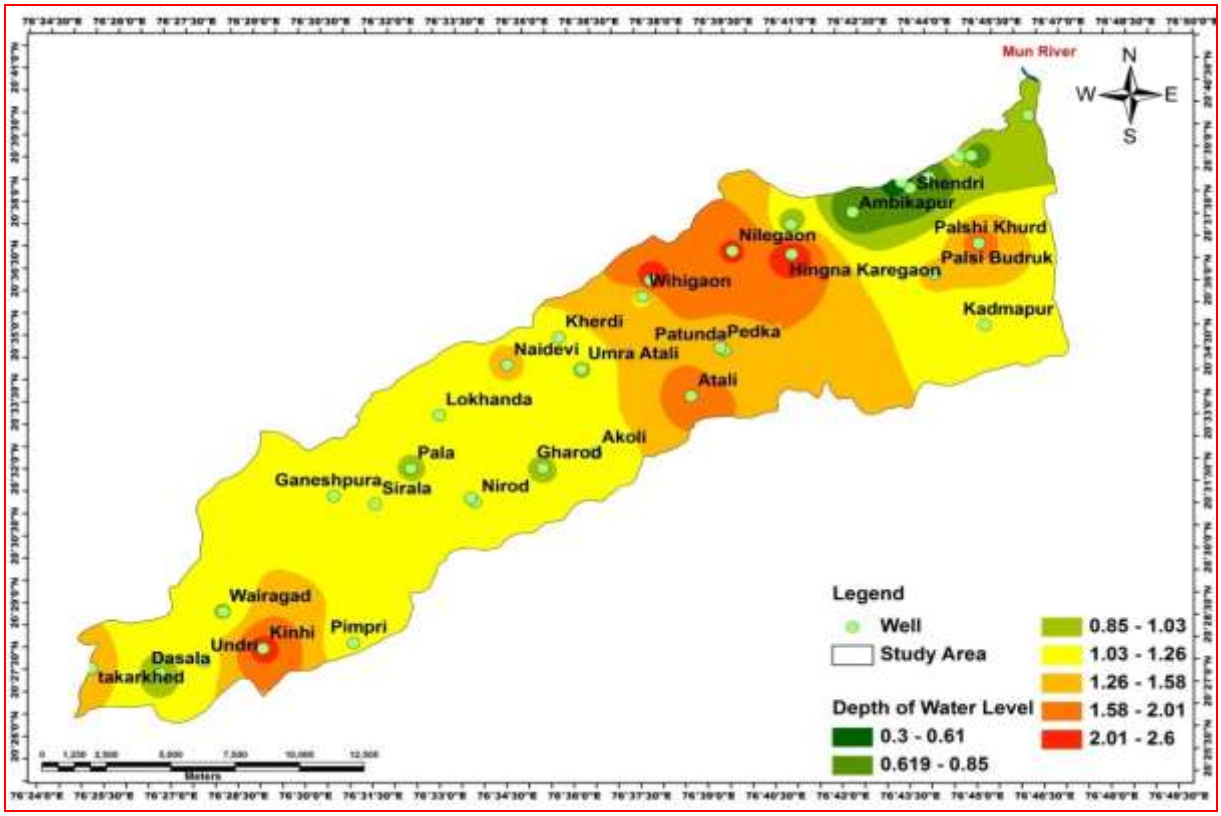

Fig. 5 Water level fluctuation map of Mahesh River Basin (June-Dec. 2013)

CONCLUSIONS

Groundwater is most important precious resource of ecological system. Recently there has been overall development in various fields such as agriculture, industry and urbanization in India. This has lead to increase in dement of water supply which is met mostly from exploitation of groundwater creating a water stress condition. Groundwater identification program needs a large volume of data from various sources. As demonstrated successfully in this study that integrated remote sensing and GIS can provide the appropriate platform for convergent analysis of large volume of multidisciplinary data and decision making for groundwater studies. IRS-1C satellite imageries provide information related to geology, geomorphology, and land use will be helpful in knowing the nature and water potentiality of different geomorphic unit. The following conclusion are drawn from the above study, i. In the present study area an integrated remote sensing and GIS based methodology has been developed and demonstrated for evaluation of groundwater resources. ii. Recently the areas nearer to the place are newly created settlements area and small scale industries. From the current study it has been found that Inverse distance weighted interpolation technique is the best way of determining the water level fluctuation, as in this technique the chances of error are minimized to a great extent and chances of deviation of original value are extremely low.

A procedure that integrates the traditional groundwater sampling analysis methods and GIS capabilities combined with conditional overlaying techniques was adapted in order to locate the suitable areas at the Man River groundwater for drinking purposes.

REFERENCES

1. Khadri, S. F. R. and Kanak N. Moharir (2015) Irrigation mapping of Man River Basin of Akola and Buldhana District, (MH) using Spatial Interpolation techniques. International Journal on Recent and Innovation Trends in Computing and Communication Volume: 3 Issue: 2.

2. Selvam, S. Sivasubramanian, P.(2012) Groundwater potential zone identification using geoelectrical survey: A case study from Medak district, Andhra Pradesh, India, International Journal of Geomatics and Geosciences, 3, 55-62

3. Rangarajan, R. Mondal, N,C, Singh, V.S. Singh, S.V.(2009) Estimation of natural recharge and its relation with aquifer parameters in and around Tuticorin town, Tamil Nadu. India, Curr Sci, 97, 217–226.