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APPLICATION OF GIS IN STUDY OF GROUNDWATER BALANCE IN TANDULA-JULHARA SUB-WATERSHED AREA, DURG DISTRICT, CHHATTISGARH

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ABSTRACT

The demand of groundwater is increasing in Tandula Julhara sub watershed area of Durg District. This increment is proportional to the population growth of the area, which is reflected by the Government of India census records 2001 and 2011. For the sustainable development of ground water, estimation of groundwater balance is needed. Groundwater balance estimated using "ground water level fluctuation and specific yield method" as introduced by Groundwater Estimation Committee-1997 (GEC-97) for the Tandula Julhara sub-watershed area of Durg district, Chhattisgarh. The study area is a part of Mahanadi basin and Seonath catchment. ArcGIS software 10.3 was used for processing on several digital layers such as Cartosat-1 Digital Elevation Model (DEM), Groundwater contour, Groundwater fluctuation, Specific yield and Annual Groundwater resource layers. The Geographical Information System (GIS) and Remote Sensing (RS) Data based calculations revealed that total net annual groundwater draft from study area was about 38.50 (MCM), Net Annual Groundwater Resource (recharge from monsoon season) was 45.212 (MCM) and Net Groundwater Balance available was approximately 6.71 Million Cubic Meter (MCM) for future development of groundwater. The GIS and Remote Sensing (RS) Data were found to be useful in the hydrogeological study. GIS software provides efficient tools as per quality and speed for the processing data in field of geo-sciences.

KEYWORDS: Hydrogeology, Groundwater Balance, Remote Sensing, GIS, ArcGIS

The study area is a sub-watershed of Tandula Julhara watershed, which falls in administrative blocks of Durg, Patan and Gundardehi. The entire study area falls in toposheet no 64G/4, 64G/7, 64G/8 and 64H/5. The study area is a sub-watershed which is the part of Seonath Catchment of Mahanadi basin. This sub-watershed has covered an area of 479.9 square kilometer. This is situated in the northern part of the Tandula Julhara watershed. The code of this sub-watershed is 4G3D2D as per of the government records.

Geographical information system (GIS) can be used in evaluation of relief, linear and areal aspects of morphometric parameters (Pareta and Pareta, 2011).

The knowledge of spatial-temporal distribution of groundwater in subsurface region has significant importance for its sustainable management. The measured ground water levels are generally required to be interpolated at the point for groundwater modelling. (Nayak et al., 2015).

Groundwater levels have been prepared using Krigging technique to interpolate in Tandula- Julhara Sub-watershed of Durg District, Chhattisgarh in ground water balance study.

In hydrological cycle, groundwater recharge is generally the most difficult term to evaluate. This is positively true for urban areas. (Vázquez-Suñé et al., 2010).

Groundwater level fluctuation and their causes can be inferred from groundwater models. in general groundwater model has the capacity to evaluate and predict its spatial-temporal groundwater head in a fine resolution.(Sutanudjaja et al., 2011)

The complexity of the water system in the region can be understood by calculating the regional water balance in a distributed scale considering the factors that affect it. Water balance can be defined as the net change in water volume, taking into account all the inflows and outflows from a hydrologic system. The main source of water is Rainfall which is generally unevenly distributed temporally and spatially. Extraordinary increase in population, agricultural expansion, urbanization and industrialization leads to higher levels of anthropogenic. As water demand increases, water availability related issues and demand become critical.(Latha et al., 2010).

The exchange flow direction depends upon the hydraulic head. In gaining reaches, the value of height of the groundwater contour is higher than the height of the stream stage.(Kalbus et al., 2006) .

Ministry of water resource Government of India has prepared a Groundwater resource Estimation committee (GEC) in year 1984. GEC recommended two approaches for ground water resource assessment, namely (1) ground water level fluctuation and specific yield method and (2) rainfall infiltration method. The ground water level fluctuation method requires the specific yield value as a key input for assessment of ground water recharge. Ground water draft refers to the quantity of ground water that is being withdrawn from

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the aquifer. Ground water draft is a key input in ground water resource estimation. Hence, accurate estimation of ground water draft is essential to calculate available ground water balance. (as reported in GEC-97) and (kumar, 2009).

The following three methods are normally used in the country for ground water draft estimation. (a) Based on well census data : In this method, the ground water draft is estimated by multiplying the number of wells of different types available in the area with the unit draft fixed for each type of well in that area. This method is being widely practiced in the country. (b) Based on electrical power consumed: In this method, the ground water draft estimation is done by multiplying the number of units of power consumed for agricultural pump sets with that of the quantity of water pumped for unit power. (c) Based on the ground water irrigated area statistics: In this method, the ground water draft is estimated by multiplying the acreage of different irrigated crops (cultivated using ground water) with that of the crop water requirement for each crop. (as reported in GEC-97 report by kumar, (2009)

The ground water level fluctuation method as per the GEC - 1984 does not account for ground water inflow/outflow from the region and also base flow from the region, as part of the water balance. This means that the recharge estimate obtained provides an assessment of net ground water availability in the unit, subject to the natural loss or gain of water in the monsoon season due to base flow and inflow/outflow. (as reported in GEC-97) (kumar, 2009).

GEOLOGY OF THE STUDY AREA

The study area is comprises of Neo to meso Proterozoic age rock formations of Chhattisgarh supergroup. The study area is mainly shows Raipur group of rock of Chhattisgarh super group. The chandi formation and the gundardehi formation are existed in this area. These formations have been discussed below:

Chandi Formation

Chandi Formation is a stromatolitic limestone sequence. The Newari member is existed in bottom part of stromatolitic limestone. The pink to light grey dolomite followed by dark grey flaggy limestone with intercalations of calcareous shale of Pendri member and Deodongar sandstone of lensoid shape are present in this area. The Nipania member is in the uppermost unit shows pink to purple dolomitic limestone. Towards upper division it changes into bedded limestone and purple shale and doesn't show stromatolitic structure. This formation has very good groundwater potential due to occurrence of caverns.

Gundardehi Formation

This Formation represents mainly a calcareous-argillaceous facies and the purple coloured shale with intercalated limestone dominates throughout the succession. The ferruginous arenite and buff coloured shale occurs in the middle part of this formation. This is generally a low yielding formation due to presence of shale. (As reported by CGWB in January 2011 report).

METHODOLOGY

In the present study "Ground water level fluctuation and specific yield method" was used as per introduced by Groundwater estimation committee for preparation of groundwater resource map and estimation of groundwater balance. The ground water resource map generation and Groundwater balance study have been completed in following steps.

- Field work for data collection of well inventory from the study area with their GPS co-ordinate.
- Monitoring of dug-wells for duration of pre-monsoon to post monsoon season in year 2015.
- Collection of Geological information from field and literatures.
- Download of Cartosat-1 DEM (Digital Elevation Model) of 30m horizontal-resolution from Bhuvan portal (web site: www.bhuvan.nrsc.gov.in) of ISRO (Indian Space Research Organization).
- Preparation of Groundwater contour for Pre-monsoon and post-monsoon seasons in ArcGIS 10.3 software in Geo-spatial (Geo-referenced) environment, using surface elevation information from Cartosat-1 DEM to the well points by each well's latitude and longitudes.
- Preparation of Water table fluctuation contour map.
- Preparation of Lithology map.
- Assigning lithology wise specific yield values to each Lithological formation based on empirical values. These empirical values collected from Report of Ground water Estimation Committee 1997 (GEC-97) of ministry of water resource , Government of India, New Delhi (kumar, 2009).
- Preparation of Annual Groundwater Resource Map of year 2015 of the study area by simple multiplication of "Groundwater fluctuation spatial layer" and "Specific Yield spatial layer" in ArcGIS 10.3 using "Raster Calculator" . The output of this process gives Annual Groundwater Resource (Recharge) Map 2015 of study area. (Fig. 7).

- The calculation for volume of water (in million cubic meter) was done in the excel table based on Annual Groundwater resource map.(Table 2)
- The net annual Groundwater draft from study area was calculated. (Table-3).
- Calculation of net annual groundwater availability, annual groundwater draft and total groundwater potential were done in MS Excel sheet.

Annual Groundwater Resource Estimation

The water level fluctuation method is adopted for estimation of the groundwater resource with taking consideration of well inventory data in account. The well inventory data was collected from the field. For preparation of groundwater contour surface height of wells were taken from the Cartosat-1 DEM instead of contour of toposheet of 1:50000 scale, as DEM has elevation information in each 30 meter grid interval. To use groundwater fluctuation method in the study area, the water table contour map of pre-monsoon (Fig. 2) and post-monsoon (Fig. 3) were prepared.. Groundwater contour height of pre-monsoon was subtracted from post-monsoon groundwater contour height to calculate the difference (fluctuation) of water table height in meters which was shown as pre-monsoon to post-monsoon fluctuation map in Fig. 4.

The krigging method was used for generation of interpolated pre-monsoon (Fig. 2) and post-monsoon (Fig. 3) groundwater contour using Depth to Water table (DTW) values for entire study area. Krigging is an interpolation technique which calculated the values in between known points for preparation of continuous series of values. The krigging method is also used for generation of groundwater fluctuation contour map for study area (Fig. 4).

The Yield map (Fig. 6) of the study area was prepared by manual digitization of lithology map with taking reference of "District Resource map of Durg district of Geological Survey of India (GSI)" and then every lithology has been assigned with their yield value as mentioned in the GEC-97 report.

The Net annual Groundwater resource (Recharge) is described as follows:

Net Annual groundwater resource = (volume of saturated material in Cubic meter) X (Specific Yield of material in percentage).

The multi-parameter analysis like universal soil loss equation (USLE) can be performed using Geographical information system in ArcGIS software; likewise method can be applied in the hydrogeological analysis in present study for yield and fluctuation calculation. (Dewangan, 2016).

Then, Lithology based yield map (Fig. 6) and fluctuation map (Fig. 4) were multiplied using raster calculator toolset of ArcGIS 10.3 software in geo-spatial environment for generation of Annual Groundwater resource map (Fig. 7). This gives the volumetric information of the water which is occurring in between Pre-monsoon groundwater contour to Post-monsoon groundwater contour. Then Net Annual Groundwater Resource study was done in excel sheet which is mentioned in the Table-2.

The Net annual water draft of the study area was done with taking the reference of CGWB reports of the three blocks (Durg, Patan and Gunderdehi block). The percent area of each administrative block coming under study area was calculated. Then this "percentages of each block" is used for the calculation of water drafted in study area as mentioned in the Table-3.

Total rainfall occurred in the year 2015 is 917 mm which is comparatively low rainfall in comparison to previous five years rainfall data (As shown in Fig. 8). The study reveals that 917 mm rainfall is capable to develop 45.212 (MCM) groundwater resources (by recharging the aquifer).

RESULTS AND DISCUSSION

The well inventory data collected from field is shown in Table 1. The Net Annual Groundwater Resource through the water level fluctuation method is 45.212 Million Cubic meter. The calculation of the ground water resource as shown in Table 2. The groundwater balance can be expressed as:

Ground water balance = (Net Annual Groundwater Resource) – (Net Annual Groundwater Draft)

Calculations revealed that total net annual groundwater draft from study area was about 38.50 (MCM), Net Annual Groundwater Resource was 45.212 (MCM) and total groundwater balance available is approximately 6.71 Million Cubic Meter (MCM) in the Tandula-Julhara Sub-watershed area of Seonath Catchment of Mahanadi basin.

This calculation shows that only 14.8 % of groundwater balance was available for future development. And net annual GW draft was about 85.154 % of water volume in study area of 45.212 (MCM) Net Annual GW resources.

This research also reveals that groundwater fluctuation is little more in the central part of the study

area which is majorly dominated by urban population. It is significance that higher volume of groundwater might be drawn from this area which was refilled in monsoon season.

The use of Geographical Information system (GIS) and software were found to be very useful in the hydrogeological studies. Calculation related to area and volume was done in the geo-referenced environment presents a very interactive output of the studied area.

It was also observed from the study that GIS based techniques and geospatial data can be applied for similar studies in the field of geology and hydrogeology.

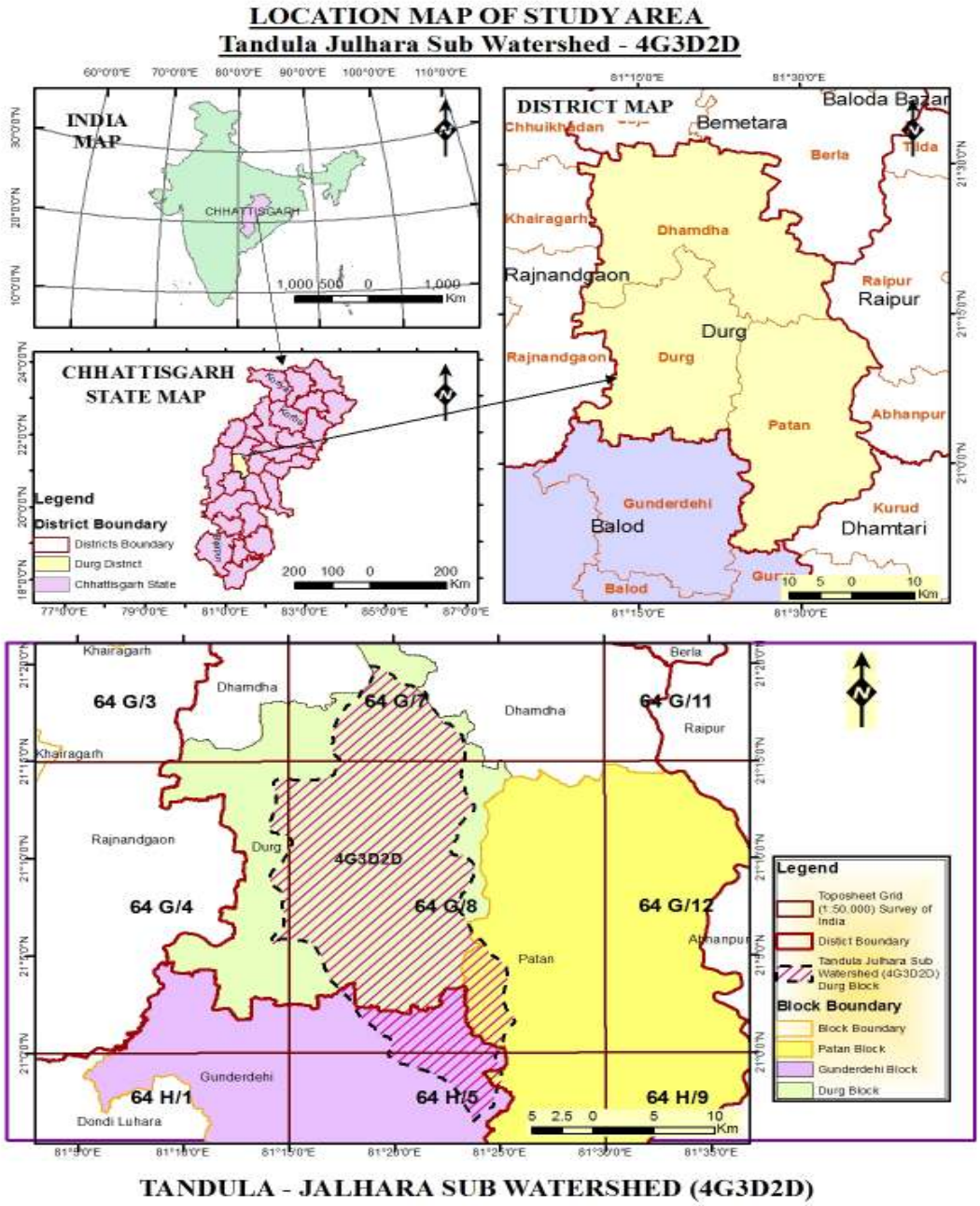

Figure 1: Location map of the study area

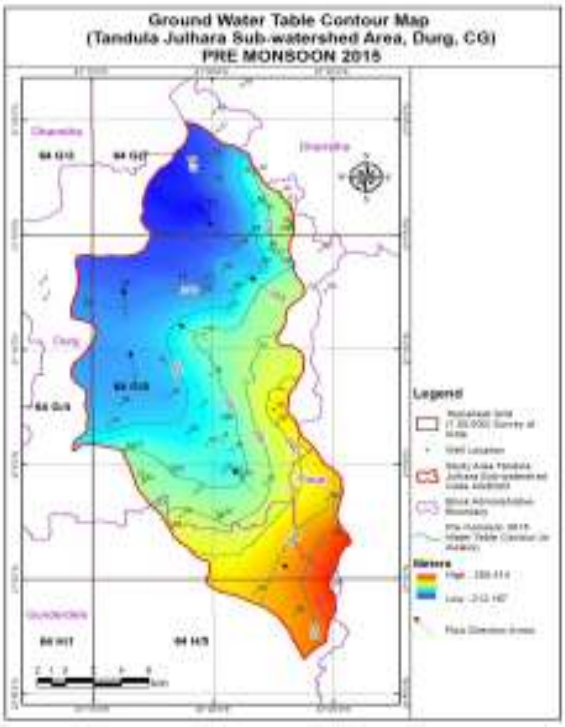

Figure 2: Groundwater table contour map of Pre-monsoon 2015

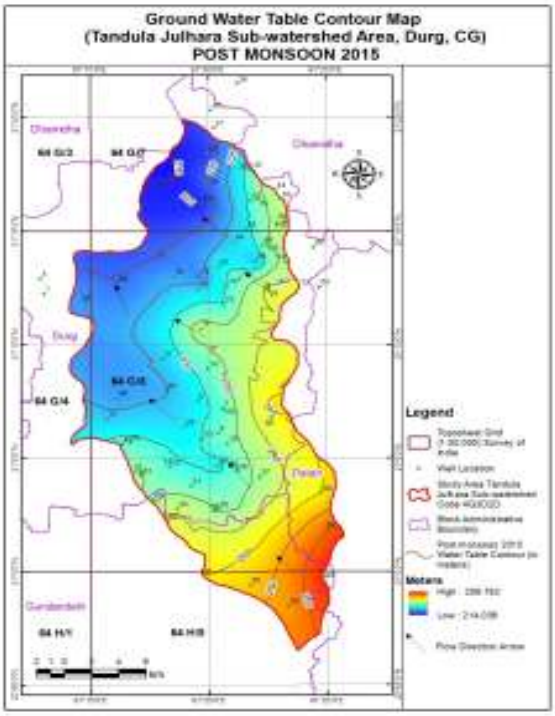

Figure 3: Groundwater table contour map of post monsoon 2015

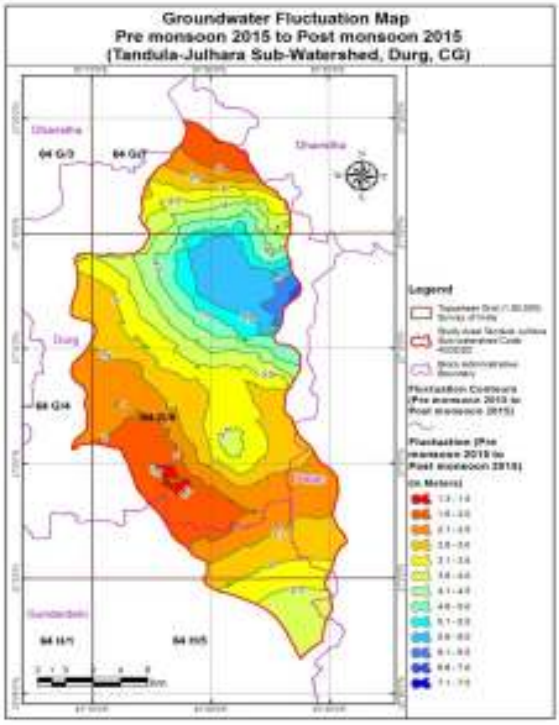

Figure 4: Groundwater fluctuation map of Pre-monsoon 2015 to Post monsoon 2015

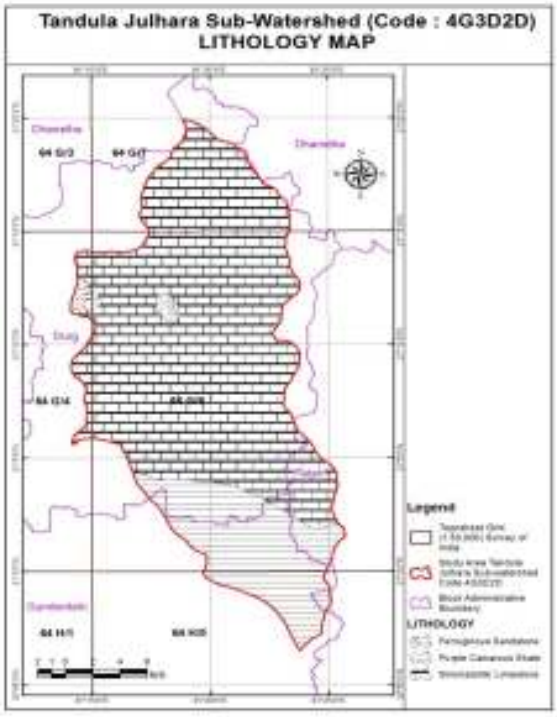

Figure 5: Lithology map of Tandula Julhara Sub-watershed, Durg, CG.

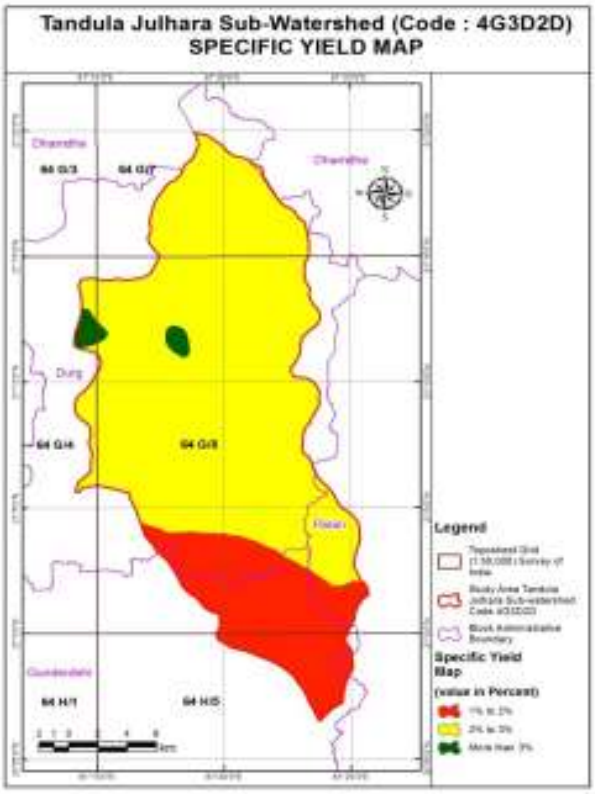

Figure 6. Specific yield map of Tandula Julhara Sub-watershed, Durg, CG

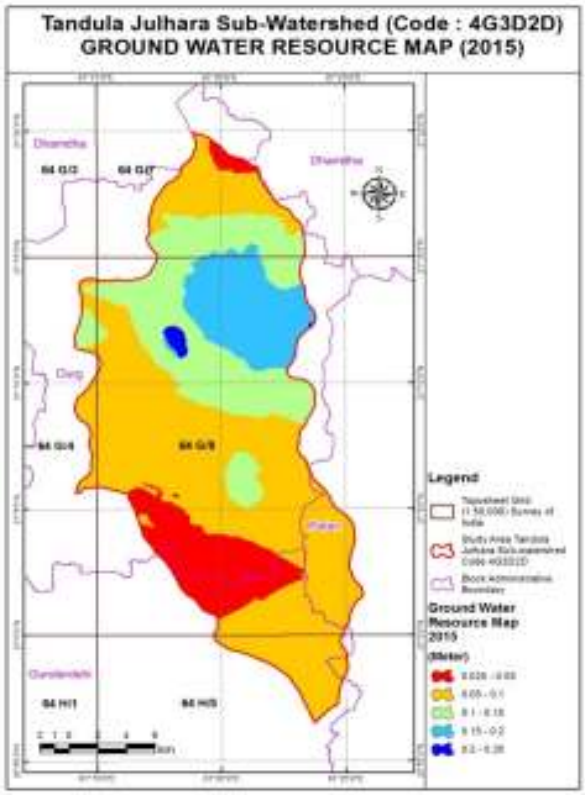

Figure 7: Annual Groundwater resource (recharge) map of Tandula-Julhara sub-watershed area for year 2015.

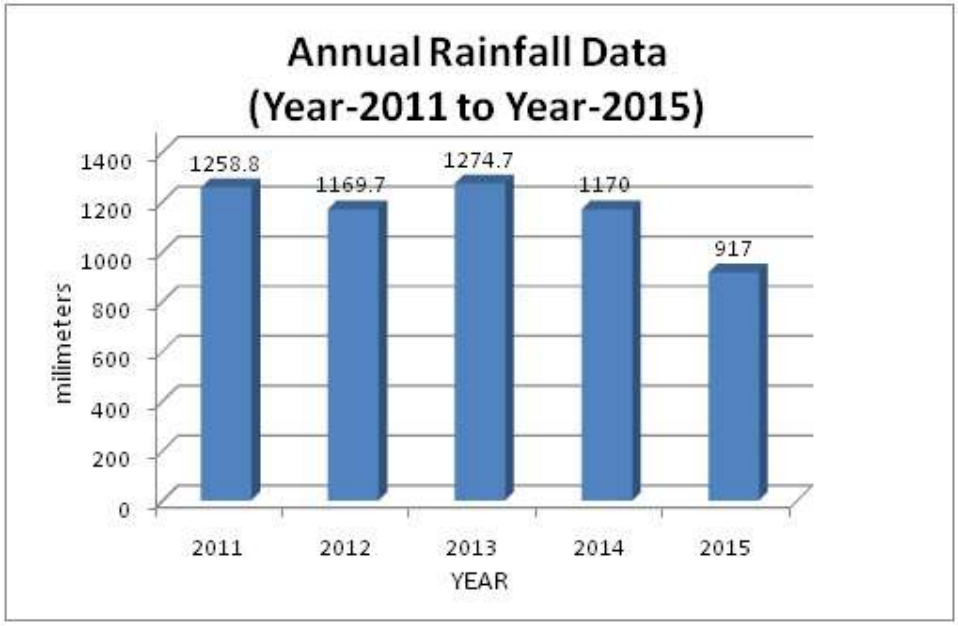

Figure 8: Annual Rainfall data from 2011 to 2015 (Source: Water Resource Department, Chhattisgarh).

Table 1: Well inventory data of Tandula-Julhara Sub-watershed Area (from Pre-monsoon 2015 to Post-monsoon 2015)

Uniqe Well ID	Location	Latitude (Degree Decimal)	Longitude (Degree Decimal)	CARTOSAT-1 DEM Height (m)	Pre-monsoon 2015 DTW (m)	Post-monsoon 2015 DTW (m)	Water Table Contour Pre-monsoon 2015 (m)	Water Table Contour Post-monsoon 2015 (m)	Pre-monsoon 2015 to Post-monsoon 2015 Fluctuation in Groundwater (m)
1	Rasmada	21.2038400	81.2171600	227.63	4.63	1.41	223.00	226.22	3.22
4	Ganiyari well	21.2149100	81.2148800	223.80	4.30	2.55	219.50	221.25	1.75
6	khamharia	21.1248070	81.3258500	230.18	2.40	1.40	227.78	228.78	1.00
7	Purai	21.1192610	81.3435940	233.43	6.10	1.90	227.33	231.53	4.20
8	Pauwara	21.1011540	81.3403610	235.66	6.67	2.27	228.99	233.39	4.40
10	Katro	21.0756800	81.3532250	234.64	5.25	1.25	229.39	233.39	4.00
11	Rawa	21.1779760	81.3277260	241.56	5.10	2.00	236.46	239.56	3.10
12	Konari	21.1117280	81.2614000	227.44	5.15	1.45	222.29	225.99	3.70
13	Janjgiri	21.0767620	81.3062550	232.16	2.75	1.55	229.41	230.61	1.20
14	Dhanora	21.1485700	81.3328200	234.20	5.70	2.00	228.50	232.20	3.70
16	Purai	21.1173500	81.3455400	235.00	8.70	4.50	226.30	230.50	4.20
18	Utai	21.1228600	81.3756400	248.72	2.90	1.90	245.82	246.82	1.00
19	Borigarka	21.0936300	81.3467300	234.38	8.00	1.75	226.38	232.63	6.25
20	Matrodih	21.0776700	81.3403100	230.87	5.10	3.20	225.77	227.67	1.90
21	Risama	21.0624500	81.3209500	233.86	2.35	1.45	231.51	232.41	0.90
22	Anda	21.0728900	81.2852400	236.74	2.50	1.50	234.24	235.24	1.00
23	Dowkidih	21.0521500	81.2937000	240.64	10.40	7.60	230.24	233.04	2.80
24	Matwari	21.0458300	81.3112600	241.34	3.20	1.50	238.14	239.84	1.70
25	Chirpoti	21.0439200	81.3376100	237.52	1.60	0.50	235.92	237.02	1.10
26	Chirpoti	21.0453700	81.3398600	234.47	2.45	1.35	232.02	233.12	1.10
27	Ghugsidih	21.0691300	81.3692800	237.38	2.55	1.65	234.83	235.73	0.90
28	Katro	21.0732000	81.3533800	234.38	5.60	1.60	228.78	232.78	4.00
29	Kodiya	21.1059700	81.3164400	228.03	4.40	0.70	223.63	227.33	3.70
30	Hanoda	21.1324900	81.3033300	225.91	4.55	1.75	221.36	224.16	2.80
31	Potiakalan	21.1559850	81.3010200	227.13	4.75	1.65	222.38	225.48	3.10
33	Jamul-ghasidas ngr	21.2386600	81.3760300	239.38	2.60	1.50	236.78	237.88	1.10
34	Jamul-laxmipara	21.2566800	81.3871500	240.16	4.05	2.85	236.11	237.31	1.20
35	Dhour	21.2729500	81.3684500	235.22	8.40	2.40	226.82	232.82	6.00
36	Karanja-bhilai	21.2877500	81.3335300	223.83	3.70	2.90	220.13	220.93	0.80
37	Ravelidih	21.3255000	81.3371300	220.91	2.80	1.40	218.11	219.51	1.40
38	Basing	21.2948900	81.3627200	233.16	1.60	0.80	231.56	232.36	0.80
39	Kodiya	21.3584720	81.3539170	225.10	4.70	3.80	220.40	221.30	0.90
40	Nankatthi	21.3384440	81.3346390	219.97	3.90	3.00	216.07	216.97	0.90
42	Basing private	21.2952500	81.3644720	234.12	2.20	1.30	231.92	232.82	0.90
44	Khedemara	21.2799720	81.3809720	239.93	1.20	0.50	238.73	239.43	0.70
45	Jamul private	21.2540280	81.3873890	241.19	3.65	2.75	237.54	238.44	0.90
48	Chandkhuri	21.1269800	81.2691600	229.21	7.10	6.20	222.11	223.01	0.90
49	Kuthrel govt	21.0930900	81.2725200	233.98	2.80	1.90	231.18	232.08	0.90
50	Kuthrel (basti)	21.0944000	81.2779700	233.51	2.85	1.95	230.66	231.56	0.90
52	Janjgiri	21.0766700	81.3062300	232.21	2.55	1.65	229.66	230.56	0.90
53	Pauwara	21.0973200	81.3293200	232.04	2.75	1.85	229.29	230.19	0.90
54	Kechandur	21.2704410	81.3289640	217.05	7.80	3.10	209.25	213.95	4.70
55	Arasnare	21.3069650	81.3327950	218.25	2.80	2.10	215.45	216.15	0.70
58	Urla	21.2112390	81.2693090	222.34	4.60	2.60	217.74	219.74	2.00
59	Mohlai	21.1972180	81.2459590	224.40	3.40	0.90	221.00	223.50	2.50
62	Dhour	21.2722780	81.3633610	235.58	10.20	4.20	225.38	231.38	6.00
63	Khedamara-rupdas	21.2731390	81.3849720	242.01	7.30	2.65	234.71	239.36	4.65
64	Kurud	21.2415830	81.3516390	229.56	10.80	1.90	218.76	227.66	8.90
65	Kohka	21.2236670	81.3407220	232.52	6.70	2.35	225.82	230.17	4.35
66	Jamul_school	21.2568330	81.3883890	241.44	6.40	2.50	235.04	238.94	3.90
68	Hathakhoj	21.2378890	81.4078330	234.41	10.70	2.70	223.71	231.71	8.00
69	Bhilai-3	21.2086940	81.4118610	240.58	11.60	2.90	228.98	237.68	8.70
70	Power house	21.2077220	81.3756940	245.89	10.30	4.20	235.59	241.69	6.10

71	Sector-1	21.2061670	81.3759440	245.26	6.60	2.50	238.66	242.76	4.10
72	Khurshipar	21.2082220	81.3978330	246.77	10.80	3.40	235.97	243.37	7.40
73	Sector-6	21.1958060	81.3445280	231.66	9.30	3.00	222.36	228.66	6.30
74	Industrial area	21.2271390	81.3878890	240.19	10.90	3.70	229.29	236.49	7.20
75	Nehru nagar	21.2068610	81.3261390	231.23	8.90	3.00	222.33	228.23	5.90
76	Supela	21.2091940	81.3466110	233.22	10.30	3.30	222.92	229.92	7.00
77	Kutelabhata	21.2164720	81.3269720	221.51	7.50	2.50	214.01	219.01	5.00
78	Faridnagar	21.2145000	81.3552780	238.36	10.20	3.70	228.16	234.66	6.50
79	Junwani	21.2162500	81.3088330	226.69	7.90	2.10	218.79	224.59	5.80
80	Ghashidas nagar	21.2396110	81.3718890	235.63	9.50	3.50	226.13	232.13	6.00
81	Houseingboard	21.2278610	81.3674440	227.02	10.00	5.20	217.02	221.82	4.80
82	Gokul nagar	21.2511670	81.3600000	229.99	6.80	2.50	223.19	227.49	4.30
83	Anda2	21.0699100	81.2855100	237.20	3.50	1.10	233.70	236.10	2.40
84	Sirsida	21.0369300	81.3045700	243.94	2.80	1.10	241.14	242.84	1.70
85	RAHUD	20.9895800	81.3626600	250.28	6.20	2.30	244.08	247.98	3.90
86	PARSAHI	20.9742300	81.3896000	254.36	7.95	3.15	246.41	251.21	4.80
87	PANWARA	20.9957900	81.4161700	262.42	5.70	1.90	256.72	260.52	3.80
88	GADADIH	21.0305900	81.4227500	258.90	3.50	1.50	255.40	257.40	2.00
89	FEKARI	21.0572500	81.4127300	246.37	4.40	2.10	241.97	244.27	2.30
90	UTAI	21.1130900	81.3778200	247.40	6.50	3.30	240.90	244.10	3.20
Minimum Value				**217.05**	**1.20**	**0.50**	**209.25**	**213.95**	**0.70**
Maximum Value				**262.42**	**11.60**	**7.60**	**256.72**	**260.52**	**8.90**
Median Value				**234.38**	**5.10**	**2.10**	**228.98**	**232.20**	**3.10**
Average Value				**234.98**	**5.70**	**2.38**	**229.28**	**232.59**	**3.31**
Standard Deviation Value				**8.91**	**2.89**	**1.23**	**9.10**	**8.97**	**2.26**

Note:
(m) = in meters
DTW = Depth to Water from ground surface (in meters)
DEM = Digital Elevation Model (Source : CARTOSAT-1 satellite imageries, ISRO)

Table 1: Groundwater balance estimate of Tandula-Julhara Sub-watershed of Durg district.

SL	Geological Formation	specific Yield of rocks (in percentage) %	Surface Area of Geological formation (In square Meter)	Average Water level Fluctuation in between Geological formation in Pre-monsoon to Post-monsoon in year 2015 (in meters)	Volume of Material in Geological formation in which fluctuation occurred (in Cubic Meter)	Volume of Saturation zone / Water (in Cubic Meters)	Volume of Saturation zone / water (in Million Cubic Meter)
1	Purple Calcarous Shale	0.02	97982960	2.382	233377595.636	4667551.913	4.668
2	Stromatolitic Limestone	0.03	374864100	3.526	1321872474.661	39656174.240	39.656
3	Ferruginous Sandstone	0.05	7132667	2.490	17760340.830	888017.042	0.888
	total				1573010411.127	45211743.194	**45.212**

Table 2: Net Annual Ground water draft from Tandula-Julhara Sub-watershed of Durg district.

BLOCK	Administrative Block Area in (Hectare)	AREA OF BLOCK comes under STUDY AREA in Hectare)	Block Area comes under STUDY AREA in Percentage of total block area (%)	Existing Gross Groundwater Draft in Administrative Block (in Ham)	Existing Gross Groundwater Draft from **study area** (in Hectare Meter) = (Gross Draft in Ham from block) x (percentage of block area in watershed) / 100	**Net annual ground water draft from study area (In MCM)**
DURG	64236.66	38299.35	**59.62**	5154.20	3073.05	30.73
PATAN	77093.03	3064.99	**3.98**	3954.35	157.21	1.57
GUNDERDEHI	68208.67	6590.99	**9.66**	6414.98	619.88	6.20
total	**209538.35**	**47955.33**		**15523.53**	**3850.14**	**38.50**

Ham = Hectare Meter
MCM = Million Cubic Meter
"Existing Groundwater Draft in Administrative block" as per record mentioned in Central Ground Water Board (CGWB) Groundwater brochure of durg district, Chhattisgarh 2012-13.

CONCLUSION

It can be concluded from this research work that the groundwater fluctuation of the study area gives information of availability of annual groundwater resource. This information can be used with the groundwater draft information to estimate the groundwater balance of the area. This estimation can be used to manage the groundwater resource for its sustainable utilization/development in future.

The Geographical Information system (GIS) and Remote Sensing (RS) were found to be useful in the hydrogeological studies. The implementation of GIS technology can give a detailed outlook of the study area. Multi-variant (i.e. specific yield, Water level fluctuation) analysis for a huge area can be done in shorter time using GIS.

It was observed from the study that the central eastern part of the area (Fig. 4) is showing higher fluctuation, it could be caused by higher utilization of groundwater from this area. The Groundwater contour maps of both the seasons (Pre-monsoon and Post-monsoon) show that the general groundwater flow direction is from south-east to north-west in the Tandula-Julhara Sub-watershed of Durg District.

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