



INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK



SPECIAL ISSUE FOR NATIONAL LEVEL CONFERENCE "SUSTAINABLE TECHNOLOGIES IN CIVIL ENGINEERING"



GROUND WATER INFORMATION OF AKOLA DISTRICT- STATE OF ART

DR. P. V. DURGE, MR. AJINKYA P. BAND

Department of Civil Engineering, COET, Akola

Accepted Date: 13/03/2015; Published Date: 01/04/2015

Abstract – In this paper the study is done for collecting all information regarding ground water. All the information in this paper are gathered by using the “GOVT OF INDIA, MINISTRY OF WATER RESOURCES, CENTRAL GROUND WATER BOARD”. Ground water is the water located beneath Earth surface in soil pore spaces and in the fractures of rock formations. The level of ground water is maximum is most important for all the requirements of water. In this paper Akola district is selected with all the talukas including in it.

Keywords- Ground Water, Akola District



PAPER-QR CODE

Corresponding Author: DR. P. V. DURGE

Co Author: MR. AJINKYA P. BAND

Access Online On:

www.ijpret.com

How to Cite This Article:

P. V. Durge, IJPRET, 2015; Volume 3 (8): 249-256

INTRODUCTION

Akola district is one of the eleven districts of Vidarbha region of Maharashtra. It is situated in the northern part of the State abutting Madhya Pradesh and lies between north latitudes 20°16' and 21°17' and east longitudes 76°38' and 77°38'. The total area of the district is 5417 sq.km and falls in parts of Survey of India degree sheets 55 C, 55 D, 55 G and 55 H. The district is bounded on the north by Madhya Pradesh State, on the east by Amravati, on the west by Buldhana district and on the south and south east by Washim district. The district headquarters is located at Akola Town. For administrative convenience, the district is divided in 7 talukas viz., Akola, Barshi Takli, Murtijapur, Akot, Telhara, Balapur and Patur. It has a total population of 16,30,239 as per 2001 census. The district has 7 towns and 1009 villages. The major part of the district comes under Purna-Tapi basin. Purna is the main river flowing through the district. Central Ground Water Board has taken up several studies in the district. In Basalt 21 exploratory wells and 05 observation wells were drilled and their depth ranged from 20.00 to 200.00 metres below ground level (m bgl). The discharge from these wells varied from traces to 15.00 litres per second (lps), for a drawdown of 2.78 to 31.7 m. Static water levels ranged from 2.42 to 16.85 m bgl. The potential aquifer zones have been encountered up to 70 -80 m depth, whereas deeper zones do not form potential aquifer in the district. In Purna Alluvium, 71 exploratory wells, 24 observation wells and 11 Piezometers were constructed. The alluvial area has been divided into fresh ground water belt in the north and saline area in the south, based on the ground water exploration findings. The depth of the wells ranged from 27.00 to 428.50 m bgl. Static water levels vary from 4.21 to 26.49 m bgl. Discharge from exploratory wells ranged from 1.31 to 30.00 lps for draw downs ranging from 0.67 to 44.90 m. Granular zones have been encountered and screened at various depths. However, it is found that zones down to the depth of 80 m falling in younger alluvium have better yields and the water is less saline. This zone can be used for agricultural purposes by means of shallow tube wells constructed down to the depth of 70 m and yielding up to 10 lps for 30 m lift.

II. Climate And Rainfall

The climate of the district is characterized by a hot summer and general dryness throughout the year except during the south-west monsoon season, i.e., June to September. The mean minimum temperature is 12.6°C and mean maximum temperature is 42.4°C. The normal annual rainfall over the district varies from about 740 mm to 860 mm. The average annual rainfall for the last ten years 1996-2005 ranges from 637.8 mm (Murtizapur) to 871.3 mm (Patur) and the same is presented. Akola district mainly consist of seven talukas as shown in **Figure – 1** below.

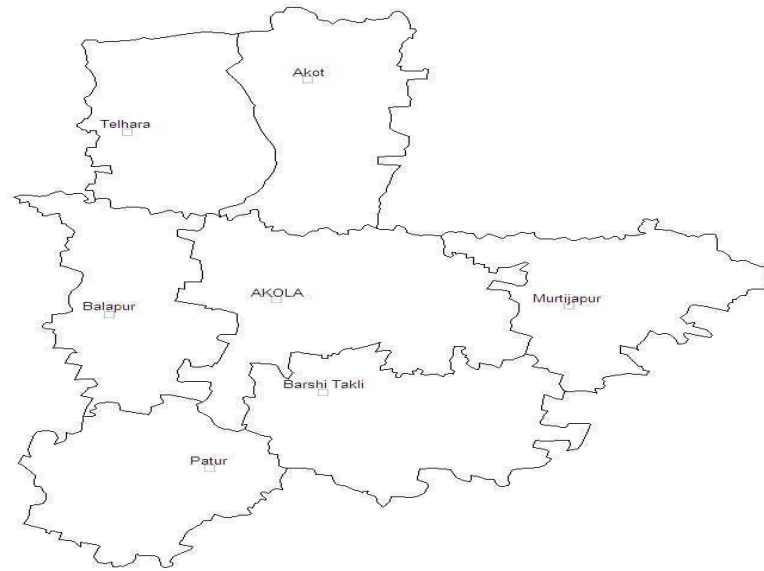


Table 1. Annual Rainfall Data (1996-2005). (mm)

Sr. No	Taluka	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Avg.
1	Akola	696.3	851.3	970.00	1081.7	667.80	934.00	726.20	422.12	460.40	734.88	659.05
2	Akot	498.00	810.00	653.00	653.00	636.00	758.00	698.00	721.30	426.09	726.97	691.02
3	Balapur	848.00	718.00	873.00	921.00	588.00	892.00	794.00	463.30	448.60	535.11	689.38
4	Barshitakli	450.00	342.00	743.00	833.00	453.00	918.20	1047.00	661.50	501.60	766.67	871.34
5	Murtizapur	580.00	819.00	675.00	700.00	621.00	598.00	644.00	515.50	483.10	865.81	749.64
6	Patur	789.00	463.00	787.00	877.00	585.00	1008.00	749.00	1211.00	883.30	870.40	740.50
7	Telhlra	856.00	882.00	882.00	746.00	672.080	592.00	757.00	789.38	329.10	759.90	637.80
Avg.		673.90	697.90	797.57	830.24	603.37	814.31	773.60	683.44	504.60	751.39	719.82

III. Ground Water Exploration

Table No.2 .Salient Features of Ground Water Exploration.

S. No.	Taluka	Forma-Tion	Wells			Depth (mbgl)	SWL (mbgl)	Discharge (lps)	Draw-Down (m)	Zones (mbgl)
			E W	O W	Pz					
1.	Akola	Alluvium	9	1	0	11.30 – 231.00	13.82 – >100	0.14 – 10.00	5.69 – 44.90	28.00 – 231.00
		Basalt	6	3	0	20.00 – 200.00	3.38 – 14.70	0.78 – 15.00	2.78 – 11.37	-
2.	Akot	Alluvium	19	8	7	34.74 – 428.50	4.00 – 19.87	0.80 – 16.15	0.85 – 12.14	7.00 – 421.00
		Basalt	10	3	1	38.66 – 37.99	7.70 – 25.50	0.50 – 20.09	1.00 – 6.97	9.75 – 48.75
3.	Balapur	Alluvium	10	3	1	38.66 – 37.99	7.70 – 25.50	0.50 – 20.09	1.00 – 6.97	9.75 – 48.75
		Basalt	4	0	0	200.00 – 300.25	5.50 – 13.75	0.38 – 1.37	6.50 – 22.80	-
4.	Barshi-Takli	Basalt	3	0	0	177.50 – 200.00	3.65 – 8.35	0.38 – 0.78	11.85 – 17.68	-
		Alluvium	8	1	0	16.69 – 56.73	10.50 – 19.20	1.00 – 3.76	1.5	11.50 – 13.00
5.	Murtija-Pur	Basalt	4	2	0	24.70 – 200.00	2.42 – 16.85	0.78 – 12.18	10.52 – 25.00	-
		Basalt	4	0	0	104.95 – 200.00	3.50 – 5.00	1.37 – 1.73	11.90 – 31.70	-
6.	Patur	Basalt	4	0	0	104.95 – 200.00	3.50 – 5.00	1.37 – 1.73	11.90 – 31.70	-
		Alluvium	25	11	3	27.00 – 326.69	4.21 – 26.49	1.36 – 30.00	0.67 – 34.83	7.00 – 317.00
7.	Telhara	Alluvium	25	11	3	27.00 – 326.69	4.21 – 26.49	1.36 – 30.00	0.67 – 34.83	7.00 – 317.00
		Total	92	29	11	11.30 – 428.50	2.42 – >100	0.14 – 30.00	0.85 – 44.90	7.00 – 317.00

Water Level Scenario

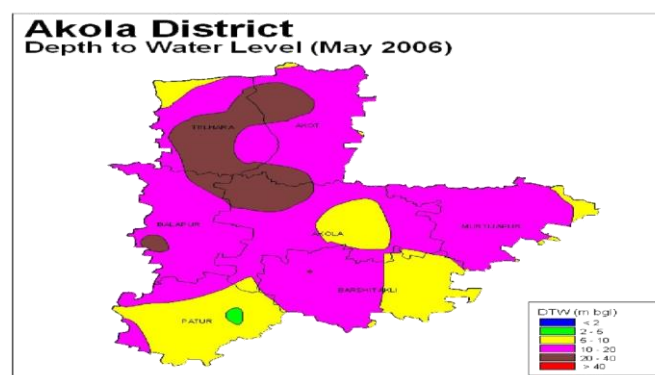
Central Ground Water Board periodically monitors 26 National Hydrograph Network Stations (NHNS) stations in the Akola district, four times a year i.e. in January, May (Pre-monsoon), August and November (Post-monsoon). The data on pre-monsoon and post-monsoon water levels along with fluctuation during 2006 and long term water level trends (1997-06) is given in **Table - 3**

Table 3: Water Level Data (2006) with Long Term Trend (1997-06).

Sr. No.	Location	Pre-monsoon	Post-monsoon	Fluctuations	Pre-monsoon Trend		Post-monsoon Trend	
		WL	WL		Rise	Fall	Rise	Fall
		(m bgl)	(m bgl)					
1	Akola	16.75	14.95	1.80		0.17		0.25
2	Akot	23.40	13.82	9.58		1.42		1.96
3	Andura	20.90	19.78	1.12		0.16		0.16
4	Babulkhed	21.77	8.38	13.39		0.08	0.04	
5	Barshi Takli	20.25	7.53	12.72	0.02			0.13
6	Borgaon	4.95	2.65	2.30		0.12		0.08
7	Manju							
8	Chani	9.35	4.98	4.37		0.17		0.01

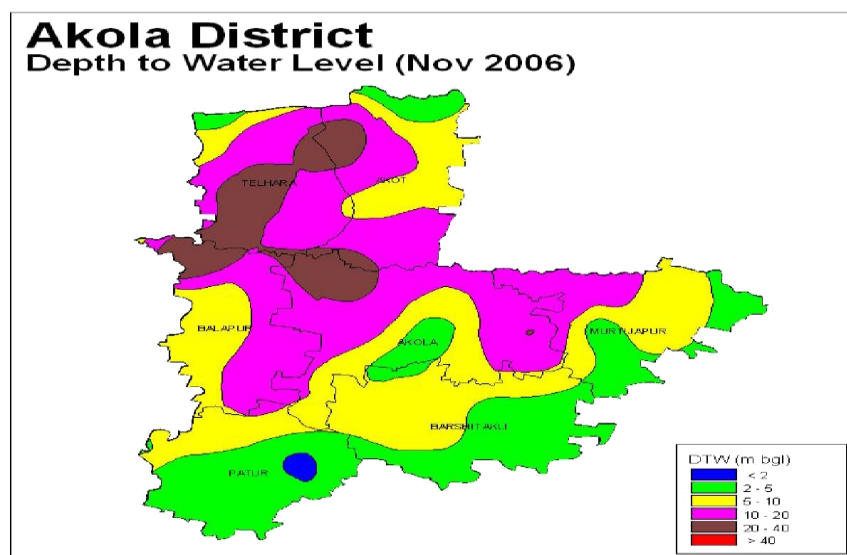
Depth to Water Level – Pre-monsoon (May-2006)

The depth to water levels in the district during May 2006 ranges between 4.44 (Patur) and 30.70 (Vallabh Nagar-Akot) m bgl. Depth to water levels during premonsoon (May 2006) has been depicted in **Figure -2**. Shallow water levels, within 10 m bgl are seen in the southern part of the district, i.e., southern part of Patur taluka and eastern part of Barshi Takli taluka. Deeper water levels of more than 20 m bgl are observed in the northwestern part of the district in parts of Telhara, Akot and small western part of Balapur taluka. The water levels in major part of the district covering entire western, central, north eastern and eastern parts is between 10 and 20 m bgl. Figure 2 as shown in below.



Depth to Water Level – Post monsoon (Nov-2006)

The depth to water levels during post monsoon (Nov. 2006) ranges between 1.43 m bgl (Patur) and 38.00 m bgl (Nimba). Spatial variation in post monsoon depth to water levels is shown in **Figure-3**. Shallow water levels within 5 m bgl are observed in southern part of the district in parts of Patur, Barshi Takli and Murtizapur talukas and as a small patch in central part of Akola taluka. Water levels are between 5 and 10 m bgl in south central parts of the district covering parts of Patur, Barshi Takli, Akola, Murtijapur and north eastern parts of Akot taluka. North central and north eastern parts of the district covering parts of Balapur, Akola, Akot, Telhara and Murtijapur talukas have water levels between 10 and 20 m bgl. Deeper water levels of more than 20 m bgl are observed in north-western part of the district covering most of the Telhara taluka and small areas in adjoining Akot, Akola and Balapur talukas.



Water Level Trend (1997-2006)

Trend of water levels for pre-monsoon and post-monsoon periods for last ten years (1997-2006) have been computed for 24 NHNS and are given in **Table-3**. Analysis of trend indicates that during pre monsoon period, rise in water levels has been recorded at 6 stations and it ranges between 0.02 (Barshi Takli) and 0.29 m/year (Shivani). Fall in water levels has been observed at 18 stations and ranges between 0.08 (Babulkhed) and 1.42 m/year (Akot). During post monsoon period, rise in water levels has been recorded at 4 stations and it ranges from negligible (Patur) to 0.06 m/year (Wyala), whereas at 20 stations, fall in water levels ranging

between 0.02 (Pinjar) and 1.96m/year (Akot) is observed. Thus in major part of the district, both during pre and post monsoon periods declining trends have been observed.

Ground Water Quality

In the district, 13 water samples were collected during May 2006, out of which 8 samples were representing Deccan Trap Basalt and 5 were representing Alluvium. The samples were broadly classified into four classes as given in **Table-4**.

Table-4 Geochemical Classification of Ground Water Samples.

Sr. No.	Classification	Type	No. of Sample	% of Sample
1	Alkaline earths (Ca+Mg > 50%) exceeds alkali metals and weak acids (CO ₃ +HCO ₃ > 50%) exceeds strong acids	Ca-HCO ₃	6	46
2	Alkali metal (Na+K > 50%) exceeds alkaline earths and weak acids (CO ₃ +HCO ₃ > 50%) exceeds strong acids.	Na-HCO ₃	3	23
3	Alkaline earths (Ca+Mg > 50%) exceeds alkali metals and strong acids (Cl+SO ₄ +NO ₃ > 50%) exceeds weak Acids	Ca-Cl	1	8
4	Alkali metal (Na+K > 50%) exceeds alkaline earths and strong acids (Cl+SO ₄ +NO ₃ > 50%) exceeds weak Acids	Na-Cl	3	23
Total			13	100

In majority of samples representing Basaltic aquifer, it was found that the water is of Ca-HCO₃ type while the water in the samples from Alluvium were of Na-HCO₃ and Na-Cl type. The type of water in Alluvium gives an idea about inland salinity problem existing in the Purna Alluvium basin of the district.

IV. CONCLUSION

In this paper, all the information regarding ground water is collected. And for the gathering information dividing the district in into seven talukas with all the villages including in it. The

whole study is done by considering the climatic conditions and geological conditions of the district. In this paper consider the monsoon periods like pre-monsoon and post- monsoon. All the rainfall data collected for the years. And from all collected data it is clear that the quantity of ground water is varying with the years.

V. REFERENCES

1. "GOVT OF INDIA, MINISTRY OF WATER RESOURCES ,CENTRAL GROUND WATER BOARD"