ISSN 2231-5063
Volume-3, Issue-1, July-2013

Ground Water Fluctuations In The Kanola Watershed Basin Of Karmala Tahsil, Solapur District, Maharashtra

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Abstract: Water level fluctuations and depletion of the groundwater are the major problem in the drought prone area. Just deepening of well with heavy capital investment is not a proper solution. The problem is aggravated especially in the summer season. It has direct bearing on food security and poverty. The present study has attempted to understand fluctuations in the ground water levels in a Kanola watershed basin in the drought affected areas of Maharashtra state. The study concludes that it is necessary to undertake watershed development programmes in the basin taking into account specific site factors to ensure groundwater availability for longer period in a year.

Keyword: Well water depletion, groundwater fluctuation, watershed management.

INTRODUCTION

National water policy states that "water is a precious natural asset; planning, development and management of water resources need to be governed by national perspectives" (NWP 2002). The use of groundwater was insignificant in the State. Maharashtra is considered as one of the most well favoured states in the country in respect of rainfall, but it may soon become a state where large parts of it face perennial water shortage. El-Hames (2005) has pointed out that for the specific locations with high ground water potential and determining a maximum pumping rates that can maintain the depth of groundwater table at a sustainable level are very important factor in groundwater management. H. M. Raghunath (2007) has opined that increased water requirement for agriculture, municipal and industrial need is far more than the annual recharge. This may lead to depletion of ground water.

Freshwater is a vital resource for which there is no substitute. Compared to surface water bodies, groundwater is relatively protected from contamination by overlying soils and sediments. The Central Groundwater Board has identified that increasing population; deficient monsoons, unregulated wells, and dependency on loans for costly agricultural inputs have created stress on ground water (CGWB, 2006). As groundwater levels are depleted the source is converged and rich peasantry slowly dominate and poor population suffer from deprivation. Postel (1999) has observed this kind of stress and urged the need of technological intervention. Walden (2004) and (DTE 2004) has opined that water stress has close association with an epidemic of farmer suicides in Andhra Pradesh. Yanni Gunnell and Anupama Krishnamurthy (2003) opined that uneven distribution of socioeconomic power and water causes threat to tank system in south India. Ground water is an important resource in Maharashtra, also the demand of ground water is increasing day by day among the various users (GSDA and CGWB 2011). Application of GIS may be useful for the development of rural sector (Saptarshi, P.G. and Kale V.S. 2000). Excess concentration of the sulphates, nitrates and some heavy metals in the underground water may be harmful to human being. (Donald. L. Sparks 2003).

Furthermore, it is necessary that institutional, policy and technological initiatives should be taken to address both the quantity and the quality issues of groundwater. The present paper attempts to understand these issues by selecting a small watershed viz. Kanola basin in the drought prone zone of Maharashtra state.

2.0 THE STUDY AREA:

Watershed basins named Kanola in Karmala tahsil has been selected for proposed study. The absolute location of study area can be expressed as from 180 23' 29" to 180 31' 32" N Latitude and from 750 00' 75" to 750 15' 04" E Longitude, falling in the part of Survey of India (S.O.I) Toposheet No: 47 N / 03. The basin covers an area of 146.84 km2 within the Karmala tahsil. The study area lies in the rain shadow zone of western ghat in the middle Bhima basin. The study area receives rainfall during South-West monsoon from June to September. The distribution of rainfall is variable. The southern part of area of the basin in village Roshivad receives 590 mm while northern part of the basin receives 580 mm rainfall. However, the northern part of the basin receives average rainfall of about 580 mm. Also the rainfall in the middle part of the basin is about 585 mm.

ISSN 2231-5063
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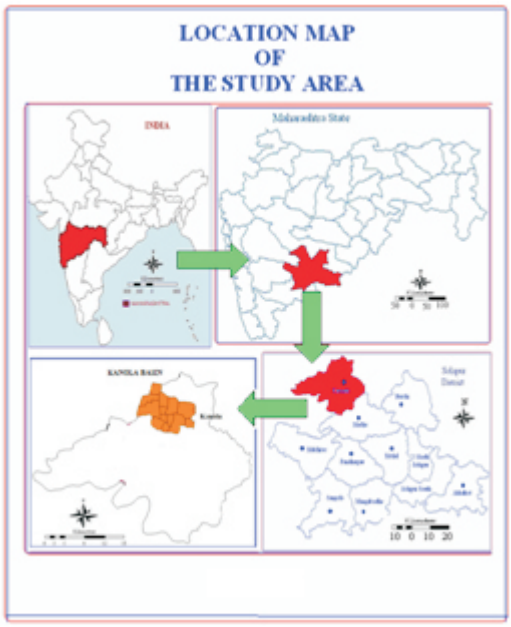
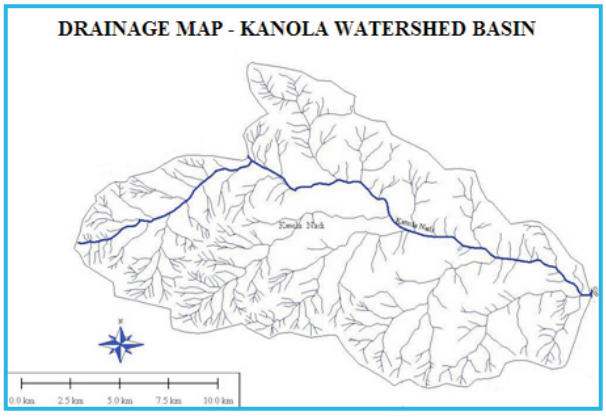


(Fig No:01 Location Map: Study Area- Kanola Basin)

3.0 Geological Setting:

The study area, as a part of Maharashtra plateau, is covered by Deccan Trap i.e. basic lava flow. Uniformity of lava flows continued by differential weathering and erosional processes leading to undulating surface. The study area exhibits such kind of undulation from the source region to the confluence. The climate and structure favours formation of medium to thick cotton soil along the streams which thin cover of sandy to pebbly soils along the plateaus and flat toped hills.

The soil consists of layers of calcareous material. The kankar deposits are visible in the field study. This may be attributed to basic lava and dry climate. The fertility status is good in the narrow belts along the streams. Furthermore, the aquifers are limited and shallow. The ground water is confined to cracks and crevices of compact basalt. Water table in this area varies from 6 to10 meter below ground level (mbgl).



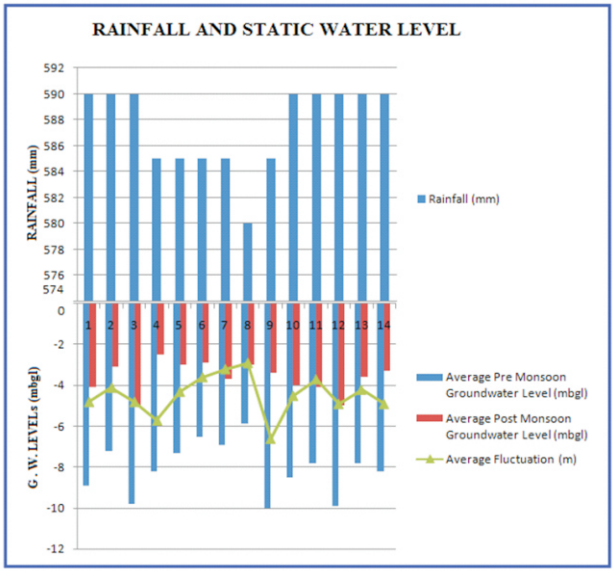
(Fig No:2 Drainage Map Of Kanola Basin)

4.0 Methodology For Ground Water Study:

To study the ground water of the Kanola basin, water levels in different wells located in the basin have been observed for pre and post- monsoon period for this 14 wells have been selected. These pre and post- monsoon water levels are plotted and are compared with the overall fluctuation of average rainfall. The village Bhose and Vadgaon (North) are situated at the central part of the basin. However, the village Roshivad is at south and Punwar is at North. The basin boundary marked on the map (Fig No: 02). The Table which includes the 14 well locations serially shown in the Table No: 1, similarly graph for the same has been shown in Fig No: 03.

5.0 Graphical Analysis:

The out-put of study is summarized in terms of graph. This graph includes the Water levels measured with respect to ground at pre and post -monsoon period and average Rainfall.



(Fig No: 03: Rainfall And Static Ground water Level Fluctuations)

6.0 RESULTS AND DISCUSSION:

The pre monsoon water level in the village Roshivad is 9.9 mbgl and post- monsoon water level is 05 mbgl. The water level in the village Roshivad is quite higher side as compared to other villages. In contrary to that the village Punwar is to the North side of the basin and the water level in the pre and post-monsoon season are 9.8 mbgl to 5.00 mbgl. This is mainly because of the village Roshivad and Punwar are situated near to the water divide. However, the average pre-monsoon water level in the Kanola basin is 8.06 mbgl and the average post- monsoon groundwater level in the basin is 3.6 mbgl. Also the average fluctuation in the basin is found to be 4.42 mbgl. It is observed that in general the depth of water levels follows the surface topography and the drainage pattern in the study area. The wells situated near water divide show high fluctuation while those near the

stream show low fluctuation in well water depth. This means that groundwater storage in the upper part of the basin easily transgressed to lower parts. This can be checked by constructing continuous contour trenching (CCT), gulley plugging and restoration of flora. The site suitability for the different watershed management programmes may useful in this regard.

Table No : 1 Average Pre And Post Monsoon Groundwater Levels, Average Rainfall And Average Fluctuation In The Ground Water Level.

Sr.No	Name of village	Average Pre Monsoon Groundwater Level (mbgl)	Average Post Monsoon Groundwater Level (mbgl)	Rainfall (mm)	Average Fluctuation (m)
1	Limbewadi	8.9	4.1	590	4.8
2	Ravgaon	7.2	3.1	590	4.1
3	Punwar	9.8	5	590	4.8
4	Wadgaon (N)	8.2	2.5	585	5.7
5	Wadgaon (s)	7.3	3	585	4.3
6	Mangi	6.5	2.9	585	3.6
7	Pothare	6.9	3.7	585	3.2
8	Nilaj	5.9	3	580	2.9
9	Hiwarwadi	10	3.4	585	6.6
10	Bhose	8.5	4	590	4.5
11	Pimpalwadi	7.8	4.1	590	3.7
12	Roshewadi	9.9	5	590	4.9
13	Karmala	7.8	3.6	590	4.2
14	Dhaykhindi	8.2	3.3	590	4.9
	Average	8.06	3.6	587.5	4.42

7.0 CONCLUSIONS:

The pre- monsoon groundwater level in the Kanola basin is ranging from 5.9 mbgl to 10 mbgl and the post-monsoon groundwater level ranging from 2.5 mbgl to 5 mbgl. However, the average pre- monsoon, post-monsoon ground water level and average fluctuation in the basin is 8.06 mbgl, 3.6 mbgl and 4.42 m respectively. The average rainfall in the basin is 587.5 mm. Rainfall from the basin directly converts to overland flow due to lack of tree cover, water harvesting structures and flows out of the basin.

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