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Study and Analysis of Water Resources in Indapur Taluka (Pune District)

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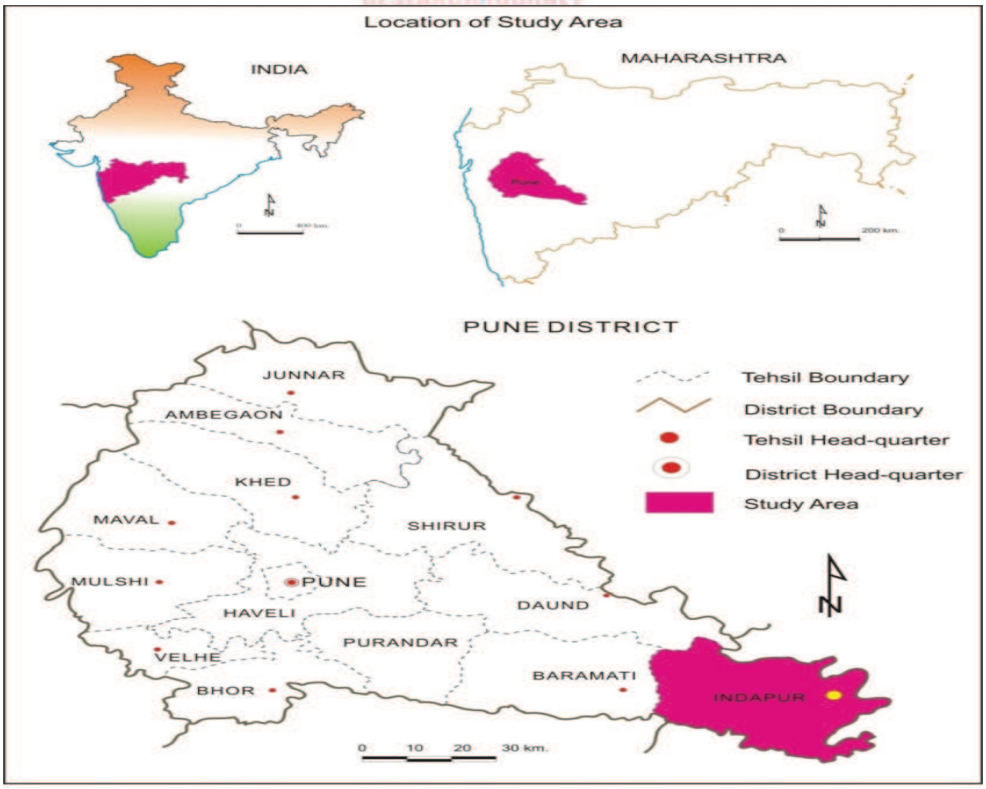
1. Introduction

Water is vital to life, without which no living body can survive. Water is considered as prime natural resource, a basic human need and a valuable national asset. Water is core component of environment. There is vast disparity in the distribution and utilization of water resource at the global, regional and local levels. Water scarcity due to depletion of surface as well as ground water following fast population growth, urbanization, rising incomes, industrial development etc. For water management, we need to assess the water resources.

The main problem is that water source is abundant in the part of east and south of Indapur taluka, whereas water sources is scanty in west and north side of Indapur taluka. So we have studied the water resources in Indapur taluka.

2. Study Area

Indapur tahsil is situated in Pune district. The northern and eastern border is demarcated by Bhima river in Pune and Solapur districts while southern boundary is confined by NiraRiver in Pune and Satara and Solapur districts. The west boundary is confined by Baramati and north boundary is delimited by Daundtahsil of Pune district. The region extends between 17° 53´ to 18° 15´ north latitudes and 74° 35´ to 75° 8´east longitudes. The total geographical area of this tahsil is 1552.93 square kilometres having 3, 83,183 population (2011). This tahsil consists of 142 settlements and three urban settlements.



3. Objectives :

1. To identify various sources of water in Indapur Taluka.
2. To understand the water availability in study area.

4. Methodology :

1. For the study of the analysis of water resources in Indapur taluka it is necessary to study the water availability and the distribution of water resources.
2. The data regarding relief, drainage, location of water resources and location of study area etc. is prepared with the help of Survey Of India(S.O.I.) toposheets with the scale 1:50000 and geological maps.
3. The survey is carried out to investigate the ground water level for the ground water potential and fluctuation of ground water level.

5. Availability of Water Resources

A small amount of water penetrate into ground is known as ground water. The rainfall regimes, geological structure, terrain and soil determine its availability of local supply. There are four sources of water – surface water, ground water, atmospheric water and ocean water. The water on the earth surface derived from precipitation. All of it is not available for use because much of it is lost by evaporation; a good deal of it goes as run-off to rivers, lakes and ponds. It is called surface water and small amounts penetrate the soil to form 'ground water.'

5.1 Surface water sources

Surface water is found in ponds, tanks, rivers, streams and reservoirs. Rivers are major sources of surface water in India. According to K. L. Rao, there are 10360 rivers and their tributaries longer than 1.6 km, spread over the whole country. However, because of the topographical, hydrological and other constrains, only about 690 billion cub m (32 %) of the available surface water can be utilized.

All water reaching the stream is potentially available as surface water supply. The quantity of water flowing through rivers can be estimated by the discharge data. The main source of water on the earth is rainfall. There is a variation in the rainfall year. Discharge has also some variation because when annual rainfall is more than discharge increases.

Although surface water is less available on the surface of the study area but it is essential because when infiltration is more than surface water helps to recharge ground water level. But evaporation also affects negatively on the surface water. Runoff is the one aspect of surface water, which occurs after rainfall. For study area sources of water is open wells, tubewell, canals, river and reservoir.

Sr. No.	Months	Average Rainfall (mm)		
		2011	2012	2013
1	May	0	13.7	0
2	June	36.05	11.9	68.7
3	July	100.7	53.2	83.2
4	August	100.9	44.2	43.7
5	September	39.3	94.6	234.4
6	October	44.35	63.4	18
	Total	**321.3**	**281**	**448**

Table 2.1 :Rainfall of Indapur Tahsil

Sr. No.	Year	Annual Rainfall (mm)
1	2011	321.3
2	2012	281
3	2013	448
	Mean	**350.1**

Table 2.2 :Average Annual Rainfall of Indapur Tahsil

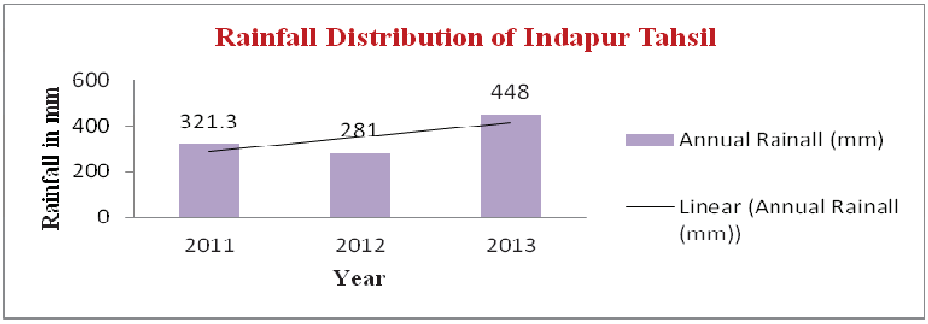


Fig 2.2:Average Annual Rainfall of Indapur Tahsil

In study area, annual average rainfall is around 350.1 mm (35.01 cm) and study area is 15529300 sq. m (1552.93 sq. km.) So the potential availability of surface water is 5436808 cub m (5436808000 liters) per year without losses and after losses it is 4077606 cub m. (4077606000 liters) per year. The average annual losses due evaporation are 25 % (Jog S. R. 2003)

5.2 Ground Water Sources

Ground water is commonly understood to mean water occupying all voids within a geological stratum and visible and inaccessible even though it is an important source of water throughout the world. The distribution of water such that more than 80 % of it occurs as ground water and the share streams, lakes and reservoirs is very limited.

5.2.1 Ground Water Potentials

It occurrences depend on the climatic conditions, character of soil vegetation cover, landuse and after all geological structure of the area. The precipitation that falls upon land surface is the main sources of ground water recharge. As soon as precipitation falls over the surface; a portion of it is utilized in vegetation growth and other biotic uses.

In the study area the main source of ground water is from wells. Two villages are selected for observation. The total number of wells is 28509. We have taken two sample villages for the observation of the ground water level.

Sr. No.	Year	Jan	May	August	November	Average
1	2005	12.95	13.54	7.8	5.76	10.01
2	2006	8.9	13.54	7.3	8.4	9.54
3	2007	9.8	12.05		8.4	10.08
4	2008	6.75	11.75	9.00	6.7	8.55
5	2009	8.68	11.28	3.7	4.8	7.12
6	2010	7.2	13.54	6.8	6.4	8.48
7	2011	8.56		8.9	9.15	8.87
8	2012	11.9	4.2		4.32	8.11
9	2013	12.1	7.32		9.27	9.56

Table 2.3 :Water Level (mbgl) Data of Nimgaon Ketki (Data for the year 2005-2013)

Sr. No.	Year	Jan	May	August	November	Average
1	2005	8.70	7.8	6.94	7.35	7.7
2	2006	7.1	8.3	6.75	8.25	7.6
3	2007	8.1	8.05	7.95	8.1	8.05
4	2008	6.8	7.5	7.75	7.05	7.28
5	2009	7.2	8.4	8.5	8.2	8.07
6	2010	7.3	12.14	6.9	5.4	7.94
7	2011	5.8	6.65	7.9	6.45	6.69
8	2012	7.95			8.82	8.38
9	2013	8.9	8.22	8.4	7.6	7.66

Table 2.4 :Water Level (mbgl) Data of Kalamb (Data for the year 2005-2013)
Source : National Information Centre

Average ground water level in the study area is 8.32 mbgl. Ground water level is satisfactory because of good ground water level. Number of wells is more in the study area. Total number of wells in the study area is 28509. The major irrigation facility is well irrigation in the study area and most of the ground water is available for the irrigation purpose for different crops in Indapur Taluka.

5.2.2 Characteristic features of Ground Water Table

Water table is physical surface defining the upper limit of the zone of saturation. Its position is indicated by static level of water in wells and it is an indicator of the hydraulic condition prevailing in the zone of saturation. It is fluctuating result from addition or withdrawal from the groundwater reservoir. Thus, rising water table means excess recharge over discharge and vice versa.

Ground water availability in study area is comparatively good and the static level is 8.32 m from the ground surface. With the help of observation fluctuation in ground water is observed. Though the period of observation is not enough the fluctuation shows utilization pattern of ground water.

5.3 Fluctuation of Water Table

The effects of fluctuation of surface relief on water table depth become obvious. The fluctuation of water levels in well is an index to the inflow and outflow of water from the ground water reservoir.

The principle controlling factors in the rise and fall of water table in the study are the amount of rainfall penetration, the recharge from streams crossing the area and the amount withdrawn from the ground water by pumps. In the study area the water table is situated at an average depth 8.32 m from ground surface. Almost half of the study area comes under well irrigation and it causes the fluctuation of water table in the area.

Within the study area, it is observed that surface water bodies are River Bhima and River Nira as well as canal irrigation is in practice. The water level fluctuation zone is studied with the help of observing wells only and availability of ground water is estimated with the help of the observation of wells.

7. Conclusion

1. Surface water is less available on the surface of the study area but it is essential because when infiltration is more than surface water helps to recharge ground water level.
2. Average ground water level in the study area is 8.32 mbgl. Ground water level is satisfactory because of good ground water level.

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