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Study of Underground Water Level in Lakhamapur Village (Dindori Tahsil)

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Abstract-

Groundwater is considered to be dynamic and renewable resource. Ground water is the water that flow through rocks and soil and is accumulate below the ground. It is the vast hidden resource. But due to development of agriculture and industries the use of underground water is highly increased.Worldwide the use of groundwater is at high level which leads to lowering the groundwater level.Overexploitation of groundwater and intensive irrigation has raised serious problems of groundwater in India.Dindori Tahsil is agriculturally developed and irrigation facilities are flourished. Although there are six medium dams in tahsil, bit it is surface water. Pumping of underground water is a continuous process. Day by day the level is at alarming stage. So, this paper tries to assess the underground water level of Lakhamapur Village. This village is ideally developed in agriculture and industries.

Key Words-Spring, Static Level, Tube wells, Underground Water, Wells, Zira.

Objective-

1) To study the status of underground water of various sources at Lakhamapur Village.
2) To investigate the levels of underground water depth and underground water pumped from wells and Tube wells.

Methodology-

Field Work- Researcher obtains information of the wells in the target area. The locations, depth of water, ridigging of wells, amount of water pumped, and types of rocks penetrated by wells provides information of groundwater. Wells are tested to determine the amount of water moving through the aquifer, the volume of water that can enter a well, and the effects of pumping on water levels in the area.

Availability of springs, disappearance of springs and newly invented springs are considered to find out underground water level. Not only had this but the wells with perennial water, seasonal water and their static water level calculated. Tube wells with water and tube

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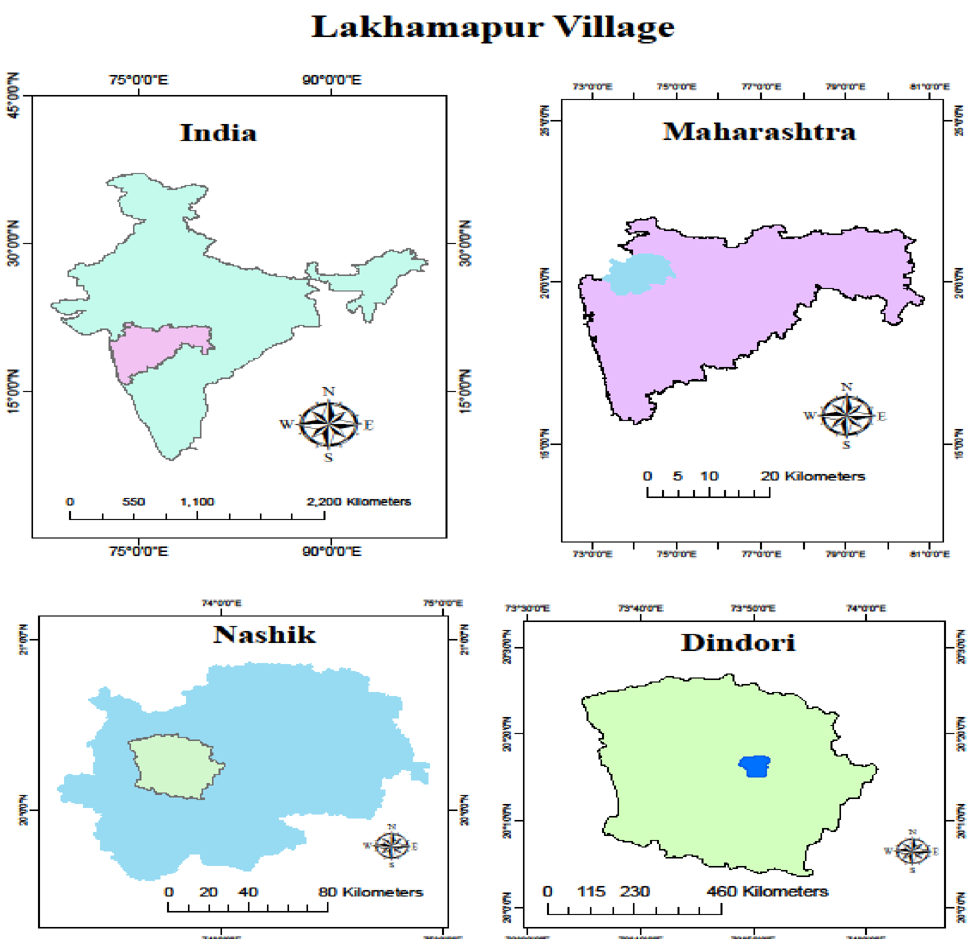
wells without water are also considered.To accomplish above aspects author has used both primary and secondary date. However, availability ofsecondary data was very limited.

Study Area-Lakhamapur Village is selected for the analysis of Underground water level. LULC of this village shows clearly that 75% of land is under agriculture. Out of this 80% of land is under sugarcane crop. So this village is purposively selected. It is located in Dindori Tahsil towards North. The geographical area of this village is 1561 Ha. There are wells, springs and tube wells are the sources of underground water. Out of these water is pumped more through wells. The wells, springs and tube wells are shown in the map. The latitudinal and longitudinal extension of Lakhamapur village is as follow.

Latitudinal Extension-20^0 24^I N to 20^0 29^IN

Longitudinal Extension—$73^0 81^I$ E to $73^0 85^I$E

Figure No. 1: Location Map of Study Area-



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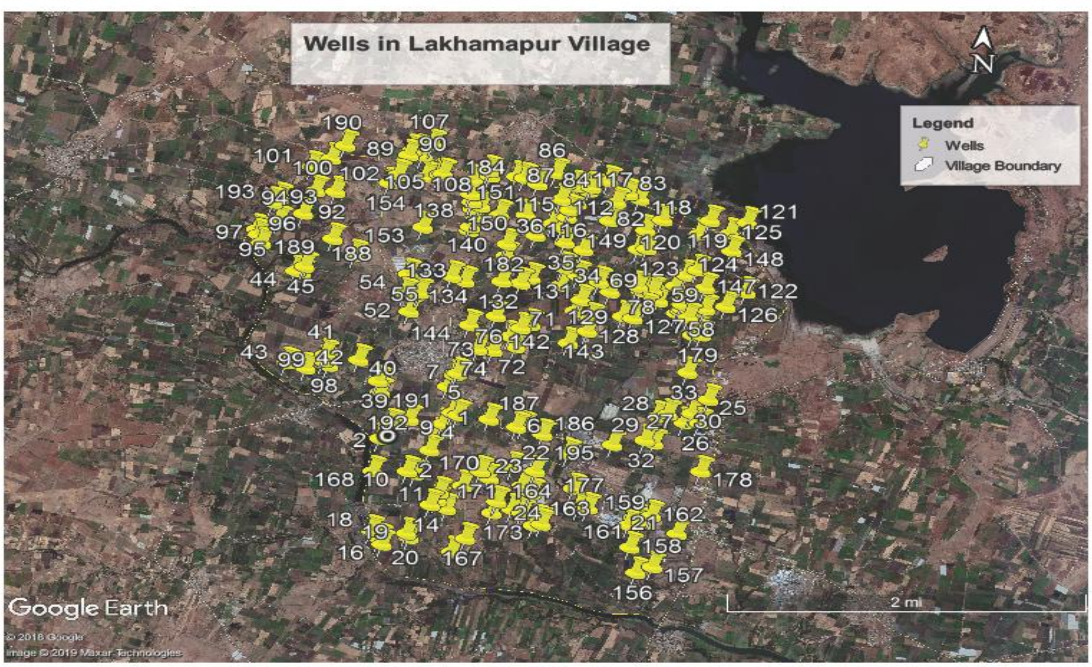
Introduction-

Groundwater is hidden natural resource which plays a crucial role in all the environmental and biological process. The nature of groundwater is dynamic and highly variable from place to place and time to time.

Ground water is the water that flow through rocks and soil and is accumulate below the ground. It is the vast hidden resource. The rocks in which ground water is stored are called aquifers. Aquifers are typically made up of gravel, sand, sandstone or limestone. Water moves through these rocks because they have large connected spaces that make them permeable. The area where water fills the aquifer is called the saturated zone. The depth from the surface at which ground water is found is called the water table. The water table can be as shallow as a foot below the ground or it can be a few hundred meters deep.

As of April 2015, the water resource potential or annual water availability of India in terms of natural runoff (flow) in rivers is about 1,869 Billion Cubic Meter (BCM)/year. However, the usable water resources of the country have been estimated as 1,123 BCM/year. This is due to constraints of topography and uneven distribution of the resource in various river basins, which makes it difficult to extract the entire available 1,869 BCM/year.

Wells in Study Area-



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There are total **195** wells in the study area. Per Sq. Km. frequency of wells is**20.** Out of these 35 wells are not in use. These wells are digged out, but due to less availability of water, these are not used and pumping of water is not done by farmers. So the Static water level is not available of these wells. Remaining 160 wells are surveyed by the researcher and static level is measured manually. The range of static water level is **1.03 to 3.44 m**. The average static water level of study area is **2.48 m.**Average Depth of well is **6.76 m.**

Table No.1: Static Water Level of Wells (Wells 1 to 50)

No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter
1	NA	11	2.56	21	NA	31	2.12	41	2.78
2	3.00	12	2.34	22	NA	32	2.34	42	2.23
3	2.77	13	2.34	23	2.34	33	2.32	43	3.10
4	2.78	14	2.67	24	2.32	34	2.34	44	3.44
5	2.31	15	2.67	25	1.34	35	1.45	45	2.14
6	2.00	16	3.12	26	NA	36	2.26	46	2.28
7	2.02	17	2.67	27	2.67	37	2.43	47	2.63
8	NA	18	3.24	28	2.78	38	2.64	48	2.73
9	2.67	19	3.18	29	2.54	39	2.57	49	NA
3.19	2.43	20	3.17	30	1.45	40	2.53	50	2.69

Table No.2: Static Water Level of Wells (Wells 51 to 100)

No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter
51	2.27	61	2.84	71	NA	81	2.69	91	2.34
52	2.38	62	2.49	72	1.39	82	2.46	92	1.80
53	NA	63	2.49	73	2.73	83	1.28	93	1.92
54	2.28	64	2.54	74	2.47	84	NA	94	2.56
55	12.63	65	2.37	75	2.37	85	2.67	95	3.50
56	NA	66	NA	76	2.37	86	2.93	96	NA
57	NA	67	2.34	77	2.38	87	NA	97	2.89
58	2.28	68	2.65	78	NA	88	1.25	98	NA
59	2.64	69	2.48	79	NA	89	2.56	99	3.11
60	2.59	70	2.45	80	2.98	90	2.93	100	3.00

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Table No.3: Static Water Level of Wells (Wells 101 to 150)

No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter
101	2.13	111	2.43	121	2.38	131	NA	141	1.89
102	2.23	112	2.87	122	2.76	132	2.38	142	NA
103	NA	113	2.56	123	1.86	133	2.56	143	2.83
104	1.34	114	2.87	124	NA	134	2.39	144	2.01
105	2.56	115	NA	125	2.57	135	2.50	145	2.80
106	2.43	116	2.56	126	2.87	136	2.06	146	2.79
107	2.78	117	2.34	127	2.58	137	NA	147	2.25
108	NA	118	2.87	128	NA	138	NA	148	2.54
109	2.98	119	2.98	129	2.89	139	2.12	149	2.57
110	2.34	120	2.38	130	NA	140	2.09	150	2.60

Table No.4: Static Water Level of Wells (Wells 151 to 195)

No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter	No. of Well	Static Water Level in meter
151	2.20	161	2.87	171	NA	181	NA	191	2.00
152	2.33	162	NA	172	2.43	182	2.43	192	2.01
153	1.47	163	NA	173	1.68	183	2.54	193	2.52
154	2.44	164	2.98	174	2.82	184	2.68	194	NA
155	NA	165	2.00	175	2.44	185	2.70	195	2.45
156	2.60	166	NA	176	2.25	186	2.47		
157	1.67	167	1.92	177	1.40	187	2.33		
158	2.72	168	NA	178	NA	188	2.55		
159	2.98	169	2.07	179	2.72	189	1.67		
160	2.29	170	2.89	180	2.45	190	NA		

Out of 160 wells 77 wells completely dried in survey period (May 2019). Remaining 83 wells pumped water countineously. Out of these 83 only 13 wells have a set of 3 HP motor and 70 wells have s set of 5 HP motor.

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Per Year Data of Water Pumped from wells-

5 HP Pump-

Water Pumped by 5 HP motor Per Day	**Water pumped per minute**	**Water pumped per Hour**	**Water pumped per Day (8 Hour limited by Load shading)**
By 1 motor	450 L	27000L	21600L
By 70 motors	31500L	1890000L	15120000L

3HP Pump-

Water Pumped by 3 HP motor Per Day	**Water pumped per minute**	**Water pumped per Hour**	**Water pumped per Day (8 Hour limited by Load shading)**
By 1 motor	300L	18000L	144000L
By 13 motors	3900L	234000L	1872000L

Total water pumped by 3 and 5 HP motors is 16992000L Per Day. If we consider crop wise requirement of water, then it will show variation. Study area is countineously producing sugarcane, which requires high amount of water.

Previous Area under Sugarcane and Vegetable-

Year	Area under Sugarcane	Area under Vegetable
2016-17	375 Ha.	250 Ha.
2017-18	425 Ha.	310 Ha.
2018-19	367 Ha.	273 Ha.

Not only sugarcane but the vegetables and other cash crops are also grown in the study area, which require high amount of water.

Springs in Study Area- There are total 9 springs in the study area. Out of these 6 springs are with water and seasonal.Only 2 springs are perennial. As per the data of ancestors and old aged people all springs were perennial. But due to over use of underground water they become seasonal. 3 springs are completely dried. The location of these springs is away from the bank of the river. This area is at high level than remaining 6 springs.

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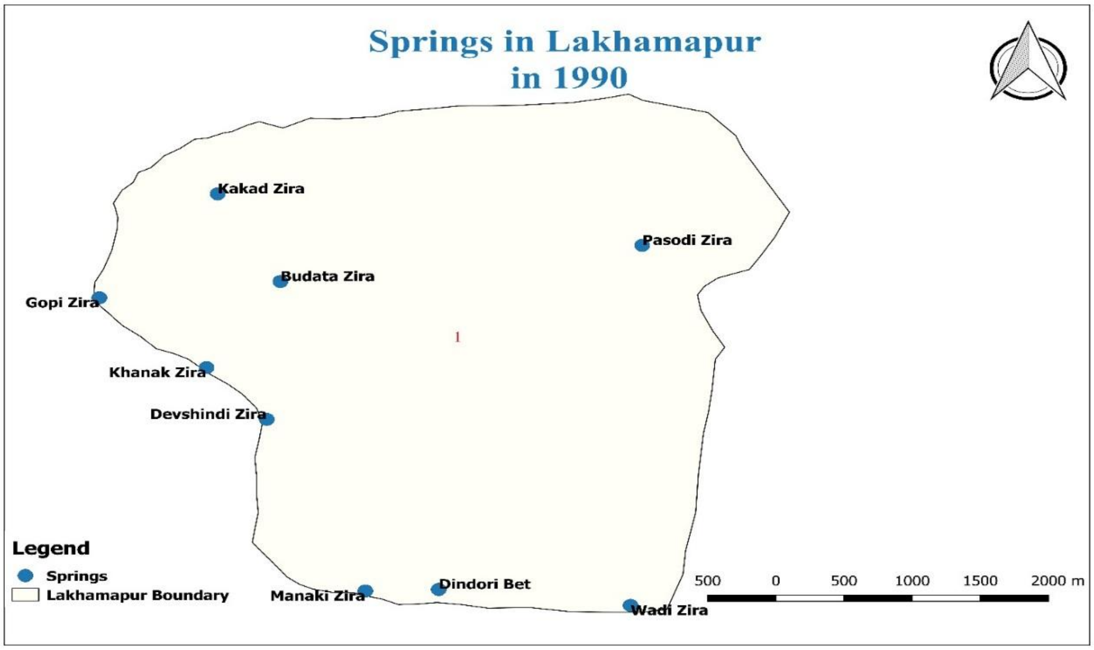
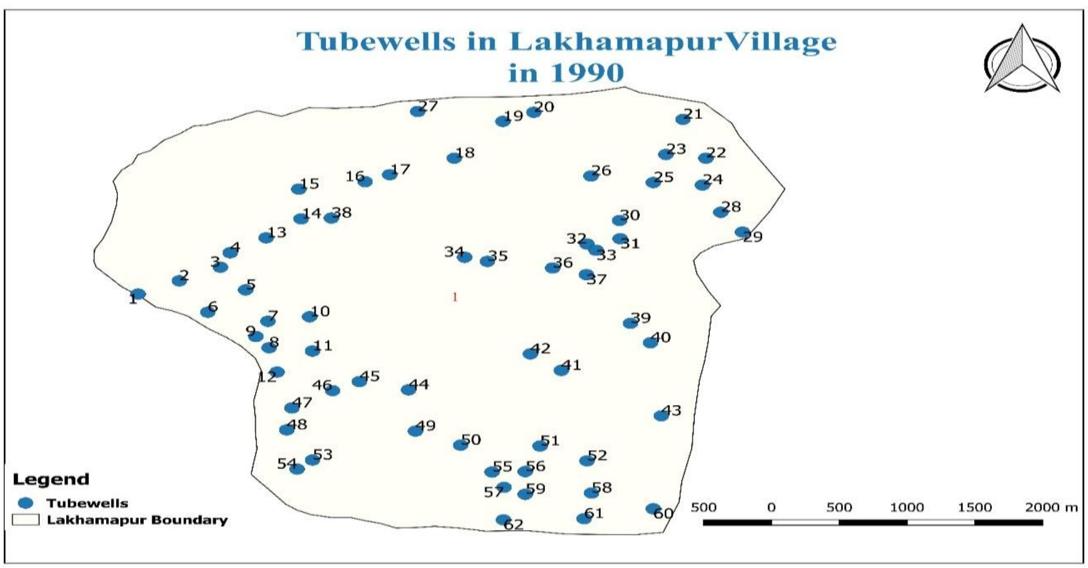
Figure No. 2:



Tube wells in Study Area-There were 62 tube wells in study area in 1990. Now there are 332 tube wells in the study area. The range of the depth of tube wells is 150m to 440m. Year by year the depth of tube wells is increasing in the study area. Out of 332 tube wells only 177 are in function. Means only 53.31 % tube wells are in function. This is the impact of decrease of underground water level. Out of 177 tube wells only 11 springs are perennial whileas other are seasonal. **Figure No. 3:**



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Per Year Data of Water Pumped from Tube wells-

5 HP Pump-

Water Pumped by 5 HP motor Per Day	**Water pumped per minute**	**Water pumped per Hour**	**Water pumped per Day (8 Hour limited by Load shading)**
By 1 motor	450 L	27000L	21600L
By 66 motors (Seasonal)	29700L	1782000L	14256000L

66 Tubewells are seasonal. Most of tubewells pumped the water up to the end of March. In the month of April 50 % Tubewells stop their pumping. Only 50% Tubewells pumped the water in the month of May, which are so poor in water.

3HP Pump-

Water Pumped by 3 HP motor Per Day	**Water pumped per minute**	**Water pumped per Hour**	**Water pumped per Day (8 Hour limited by Load shading)**
By 1 motor	300L	18000L	144000L
By 11 motors (Perennial)	3300L	198000L	1584000L

Total underground water pumped by Tube wells is 15,840,000L. It indicates huge amount of underground water is pumped per year.

Conclusion-

Average Depth of well is **6.76 m.** The average decline of underground water **is 2.81m.** in 29 years.Some wells are not in use so data is **not available** of these wells. Well no. 16,17,18,43, 96, 97 and 155 have not experienced decline in underground water. Because these wells are on the bank of Kadwa River.

Out of 195 wells 110 wellsare experiencedthat neighboring wells are dry. Land under various crops which requires more water is increased 73%. Total area increased under only sugarcane crop is 91% of the agricultural land. Total water pumped from wells is 16992000L per year. Total water pumped from Tube wells is15840000L per year.More water is pumped from wells. It indicates huge amount of water is pumped every year. The level of underground water is drastically declined.

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