

# **CHAPTER-III**

## **APPRAISAL OF GROUND WATER**

### **3.1 Introduction**

The ground water is crucial irrigation source since ages. Considering ground water potentials in the drought prone area government has promoted construction of wells and bore wells (FFC-1973). However, overuse of ground water is well felt in the region and hence strategy for proper utilization should be designed in the context of rainfall, irrigation system and cropping pattern. This chapter deals with the available ground water in the tahsil. The source of ground water resource in the tahsil are wells and bore wells. There are surface water sources like rivers, percolation tanks, K.T. wires etc. The Karmala tahsil is favored by canal irrigation on the basis of Ujani, Kolgaon, Mangi dams, K.T. wires, constructed across the river channel. These provide irrigation water and also responsible for recharging aquifers. Lift irrigation projects are observed mainly along Bhima and Sina. The present chapter attempts to of quantify ground water available in the study region.

### **3.2 Methodology :**

Ground water levels have been measured through randomly selected wells by GSDA. The data have been procured (Appendix 3.1). This has given ground water level in each village as depicted in the map( Fig. No. 3.1)

### **3.3 Available ground water Resources:**

Ground water used in agriculture can be quantified on the basis of water requirement of the crops grown on the basis of it. The ground water component for a crop is nothing but the water requirement of that crop as assumed by Saptarshi (1993) More (2008) Sonawne (2013) etc. Ground water used for a crop = water requirement of that crop - Available rainwater in the cropping season.

This is to say that a crop grown in kharip season is using less water from wells. As availability of rainfall is less in rabbi and summer season consumption of ground water is maximum. This kind of estimation has been observed in the studies like More (2005), Bhagat and Saptarshi (2001),etc. This kind of estimation requires village level data regarding hectarege of different crops under well irrigation. This kind of information was not available in the tahsil office. Therefore field study has been conducted to inquire about consumption of ground water from electrified and

non electrified wells. The field observations revealed that well irrigation supports kharip crops, for which water consumption is about 20 to 30 cm and in rabbi season about 70 to 80 cms. The crops dependent on well irrigation are mainly jowar (hybrid) bajara in kharip season and jowar, wheat, corn, groundnut, in rabbi season. It may be worth to revive ground water levels and difference sources irrigation in each village (Table No 3.1)

The present study has estimated water resource from ground water according to the following equation :

The quantity of ground water in a village in mh. under well irrigation = (Water requirement of crop in meter –rainfall in the cropping season in meter ) \* hecтарage under that crop.

**Table No.3.1**  
**Available ground water sources in Karmala Tahsil**

S.No Code	Village name	Geographical Area	No of wells	No of bore wells	No of hand pump	No of Tank	No of Stream	G.W.L
1	Ramvadi	620.75	36	39	1	0	2	65
2	Kavalvadi	505.26	68	2	1	1	2	70
3	Bhilarvadi	993.52	39	52	7	1	3	60
4	Gharatvadi	449.58	128	11	1	1	2	65
5	Kumbhargaon	1966.31	100	11	1	1	2	65
6	Diveghavan	880.06	45	5	0	0	2	65
7	Delvadi	1036.37	49	1	1	1	2	70
8	Hingani	1053.59	45	140	6	1	3	75
9	Gulmarvadi	438.45	22	32	3	1	2	60
10	Bhagatvadi	644.16	31	43	5	1	2	65
11	Jinti	2645.72	73	21	2	0	2	70
12	Katraj	837.72	14	11	2	0	2	65
13	Ko.Chincholi	1176.76	7	6	3	0	2	70
14	Takli	1547.56	116	97	7	0	2	65
15	Khatgaon	1205.76	62	43	4	0	2	65
16	Pomalvadi	888.77	49	2	4	0	2	70
17	Parevadi	1267.31	74	6	1	0	2	60
18	<b>Ketur</b>	1579	22	1	4	0	2	70
19	Goyegaon	692.57	37	3	0	0	2	60
20	Vashimbe	1947.06	245	23	8	0	2	65
21	Sogaon	1880.9	130	12	9	0	2	70
22	Savadi	2442.56	74	27	14	3	2	65
23	Gorewadi	689.24	47	1	2	1	2	60
24	Hulgewadi	1017.63	49	30	3	1	2	65
25	<b>Korti</b>	1763.41	225	12	12	0	2	70
26	Kuskarwadi	427.6	53	2	4	0	2	65

S.No Code	Village name	Geographical Area	No of wells	No of bore wells	No of hand pump	No of Tank	No of Stream	G.W.L
27	Morwad	1092.56	137	63	11	1	2	70
28	Vanjarwadi	1153.49	89	25	9	0	2	65
29	Limbewadi	745.49	54	3	2	0	2	70
30	Ravgaon	2628.63	238	34	14	0	2	65
30	Rajuri	3874.09	245	154	15	0	2	60
31	Veet	1330.61	150	235	6	7	4	65
32	Vihal	1225.15	168	34	8	3	2	60
33	Pondhawadi	2401.69	161	16	6	0	12	65
35	Manjargaon	640.19	112	112	5	0	2	60
36	Undergaon	734.18	115	21	2	0	9	65
37	Retewadi	314.64	50	8	0	0	2	70
38	Anjandhoh	1594.4	181	4	7	1	2	65
39	Punvar	1088.33	60	15	3	1	2	60
40	Jategav	1904.86	164	63	4	5	4	65
41	Khadki	1581.45	168	45	3	4	2	70
42	Aljapur	1030.28	92	167	17	0	2	70
43	Taratgav	691.93	64	22	5	3	2	65
44	Padali	834.79	89	22	22	3	4	65
45	Ghargav	793.82	149	15	15	3	4	60
46	Balevadi	669.66	26	64	64	0	3	60
47	Bitergav s	662.42	71	46	6	0	1	60
48	Kamone	1200.62	181	129	4	2	2	60
49	Wadgao N	1009.6	149	40	7	0	2	60
50	Wadgao S	522.54	55	25	8	1	2	60
51	Mangi	1389.16	130	30	9	1	3	60
52	Pothare	2117.54	170	50	30	0	3	60
53	Nilaj	221.99	18	15	5	0	2	60
54	Potegav	779.79	53	48	48	1	2	60
55	Borgav	981.79	110	55	7	0	2	60
56	Khambevadi	586.42	46	3	9	2	2	60
57	Hivarvadi	384.95	26	12	5	0	2	60
58	Bose	424.53	45	15	9	1	3	60
59	Pimpalvadi	1017.64	90	20	14	1	2	60
60	Roshevadi	528.83	33	15	4	2	2	60
61	<b>Karmala</b>	2089.39	123	52	9	2	5	65
62	Devichamal	108.62	9	12	4	0	2	70
63	Dhaikhindi	515.84	26	21	3	2	2	65
64	Pande	2821.36	116	106	12	3	3	65
65	Devlali	2242.33	269	36	11	3	2	65
66	Khakevadi	584.4	78	16	6	1	1	60
67	Wadachivadi	279.97	51	18	6	0	4	65
68	Dilmeshawar	311.13	31	34	5	1	4	65
69	Karanje	1005.15	66	61	6	2	2	60
70	Bhalevadi	597.62	39	45	3	2	2	60
71	Mirghavan	995.47	85	38	15	1	5	55

S.No Code	Village name	Geographical Area	No of wells	No of bore wells	No of hand pump	No of Tank	No of Stream	G.W.L
72	Kolgaon	753.68	47	9	3	2	2	55
73	Hivare	1240.42	145	13	6	2	3	60
74	<b>Arjunnagar</b>	1060.68	82	201	6	2	3	60
75	Hisare	2034.51	131	91	7	2	3	65
76	Phisare	862.2	89	26	5	1	2	65
77	Nimngaon(H)	941.55	34	14	4	1	2	55
78	Gaundare	1571.15	123	229	5	3	3	55
79	Awati	1188.1	59	11	7	0	1	55
80	Salse	1861.68	86	29	11	3	2	50
81	Sade	3266	224	535	37	2	2	70
82	Alsunde	808.6	85	120	11	1	1	70
83	Nerle	2870.5	223	67	11	3	2	70
84	Umrade	2566.31	112	10	20	0	2	70
85	Zare	2855.62	317	235	26	3	1	65
86	Gulsadi	1864.32	212	28	28	3	3	70
87	Shelgaon	812.87	120	42	7	1	4	70
88	Saunde	1365.07	165	44	8	1	1	70
89	Sarapdhoh	757.02	114	19	7	2	2	70
90	Kumbhej	2234.18	349	77	28	2	1	65
91	Phophalag	1386.41	168	4	14	0	2	70
92	Kedgaon	1578.74	225	30	15	1	1	65
93	Jeurvadi	445.82	65	27	7	1	2	70
94	Shetphal	1699.57	221	125	12	0	2	65
95	Kondhej	941.47	101	29	9	1	2	65
96	Varkatne	1532.15	226	82	11	1	2	70
97	Nimbhore	2182.68	162	65	13	2	2	70
98	Lavhe	1242.97	99	70	6	2	2	70
99	Shelgaon(v)	1706.96	186	301	12	4	2	65
100	<b>Jeur</b>	3109.29	79	35	19	1	2	65
101	Dahigaon	993.48	45	11	7	0	2	65
102	Chikalthan	2961.19	110	25	7	0	2	55
103	Kugaon	1554.1	65	8	6	0	2	55
104	Ghoti	1982.72	110	130	25	6	2	70
105	Varkute	1805.57	189	56	9	0	2	70
106	Pathurdi	1139.52	121	143	7	0	2	70
107	Malavdi	1695.03	157	302	21	4	2	75
108	Bhalavni	955.63	62	39	7	1	2	75
109	Pangare	1534.83	137	54	12	1	2	60
110	Wangi	4989.11	251	87	34	3	3	60
111	Sangavi	982.31	89	81	5	2	5	60
112	Kavitgaon	649.66	106	301	3	1	1	65
113	Wadshivane	1490.24	152	77	5	1	2	65
114	<b>Kem</b>	5125.78	301	270	36	1	2	70
115	Satoli	683.36	94	9	8	1	2	70
116	Kandar	3035.12	91	0	3	1	2	55

S.No Code	Village name	Geographical Area	No of wells	No of bore wells	No of hand pump	No of Tank	No of Stream	G.W.L
117	Bitargaon (V)	2053.77	94	85	6	3	4	55
118	Dhokari	930.99	29	16	2	1	2	60
	<b>Total</b>	<b>161609.89</b>	<b>13577</b>	<b>5478</b>	<b>1126</b>	<b>145</b>	<b>282</b>	<b>70</b>
	AVG		115.06	48.63489				
	STD		86.157	68.27907				

Source: Karmala Tahsil - 2010-2013

### 3.3.1 Wells:

The wells are main source of ground water in Karmala tahsil. The total wells are 13577 in the tahsil. Veet village has 557 wells, highest in the tahsil. The village Kem has about 301 wells. For spatial appraisal the data depicted in table 3.1 has been considered as attribute information and map has been prepared ( fig 3.1). The villages having wells more than 300 are Kumbhej (349),Sade (317) Zare (317) etc. The villages like Wangi (251) Delvadi (269),have also good number of wells. The villages having well less than ten are Kondure chincholi (7).

**Table No.3.2**

#### Selection of Sample villages for study of wells

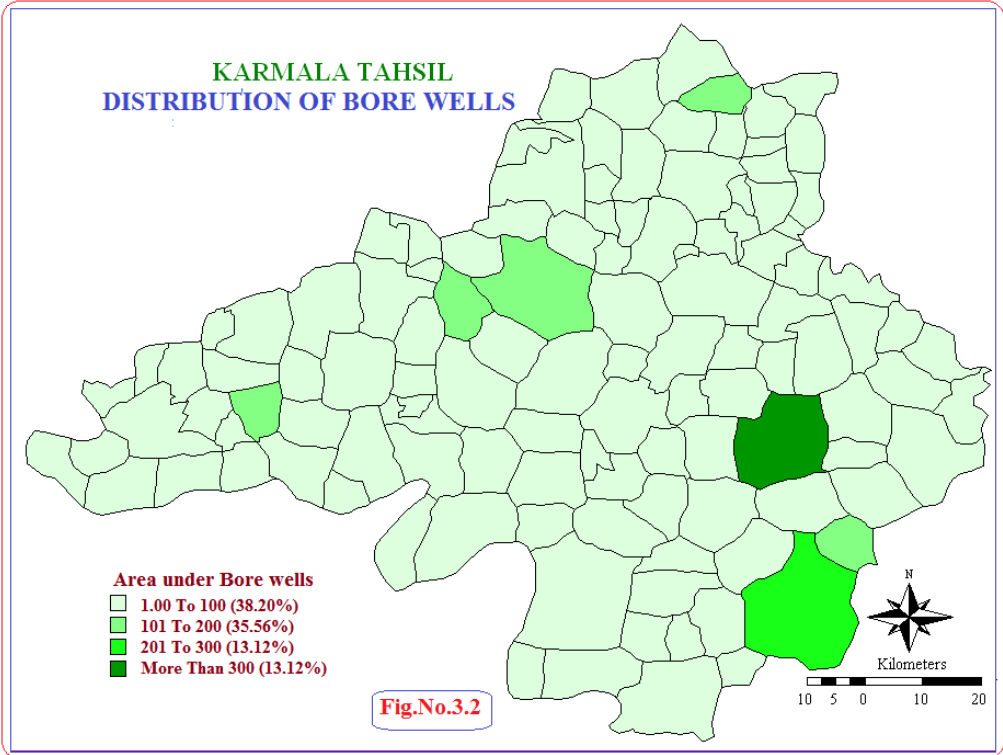
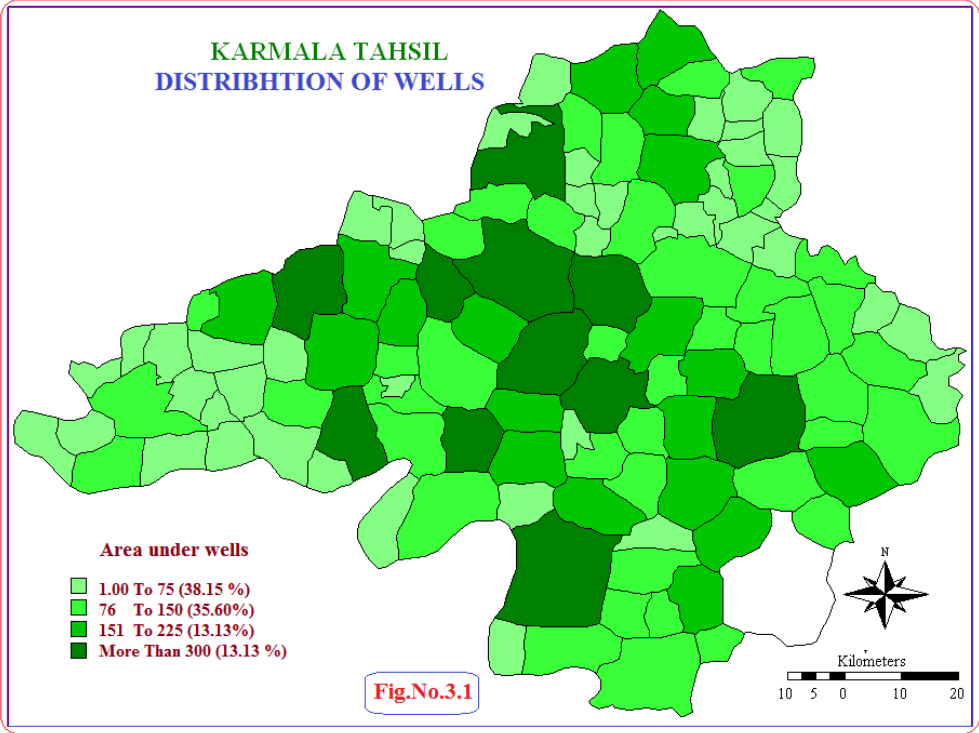
S.No	Class	Number of villages	%	Sample villages stratified random method
1	5 to 75	45	38.14	Jinti,Parevadi,Savdi
2	76 to 150	43	35.60	Veet,Ghargaon, Vadgaon,
3	151 to 225	15	13.13	Sade,Nerle,Kedgaon
4	More than 225	15	13.13	Varkatne,Wangi,Kem
	Total	118	100.00	12 villeges

Source: Karmala tahsil office & field survey data-2009-10

**Table No.3.3**

#### Selection of Sample villages for study of Bore wells

S.No	Class	Number of villages	%	Sample villages stratified random method
1	1 to 100	45	38.20	Kumbhargaon, Khatgaon, Hulgevadi,
2	101 to 200	43	35.56	Manjargaon,Kamone,Pande
3	201 to 300	15	13.12	Arjunnagar,Gaundare,Zare
4	More than 3001	15	13.12	Shelgaon,Malvadi,Kavitgaon
	Total	118	100.00	12 villeges



### **3.3.2 Bore wells:**

The construction of bore wells has become quite popular in the last three to four decades. The total number of bore wells is about 5,478 in the tahsil. Sade village has about 535 wells highest in the tahsil. The next is Kem having about 270 bore wells. The distribution of bore wells has been shown the map ( Fig No.3.2). The dominance of bore well irrigation has been observed in the villages like Hingani (140), Pande (106), Veet (235), Malavdi (70), Kavalvadi (02), Kandar ( 1), Varkatne (82),etc.

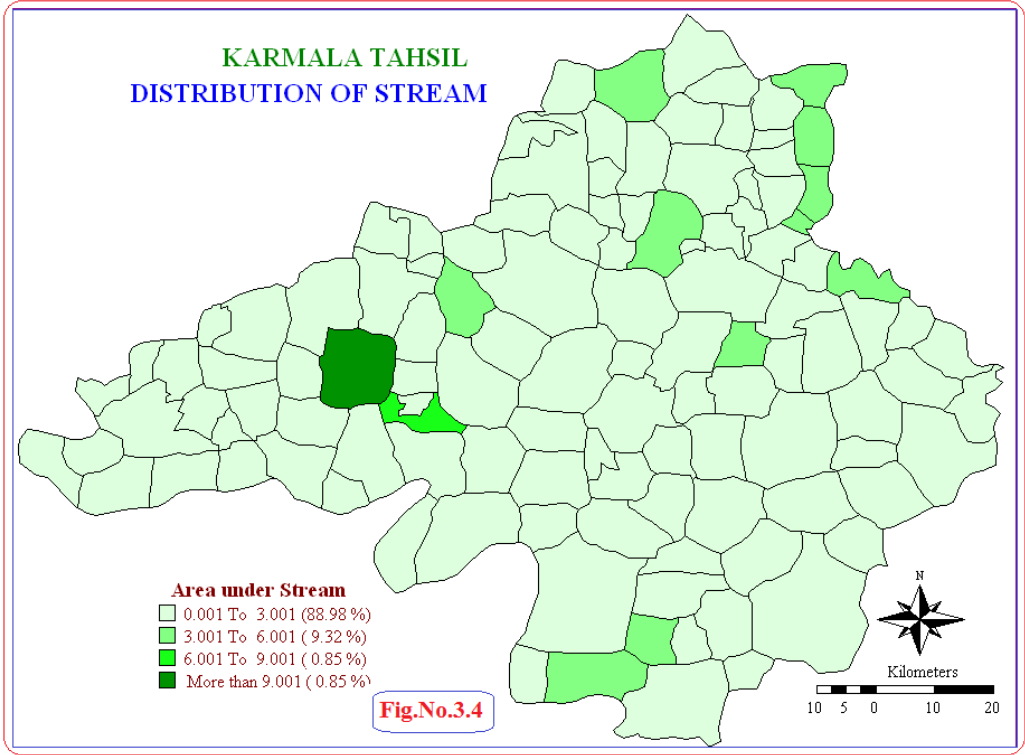
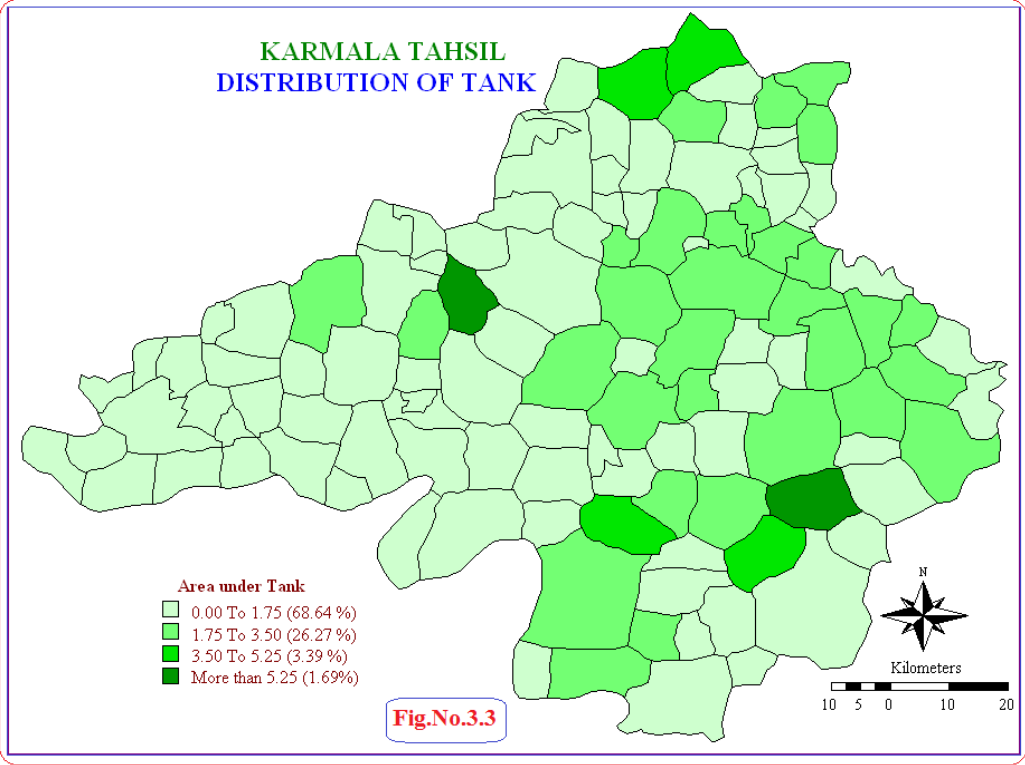
Permitted to construct a bore well and install a submercible pump within a day or two. Secondly, it is easy to take a bore up to the aquifer even if it is more than 200 to 300 feet below ground level. This has created an environmental issues. The old day wells are drying up as deeper aquifer is being exhausted. The use of ground water for agriculture should be allowed through dug well only. It such kind of resolution is made in the gram sabha it will improve sustainability of ground water .The example of Hivare Bazar is worth to understand such efforts. The field study has reveled that the number of bore wells is increasing from 2001 in the tahsil.

### **3.3.3 Tanks :**

The Tanks is anothr source of ground water in Karmala tahsil. The total number of Tanks are 145 in the tahsil . Veet village has 7 tanks, highest in the tahsil. Ghoti village has about 6 tanks. The distribution of tanks has been shown the map ( Fig No.3.3) tank irrigation has been observed in the like village Jategaon (05), Sade (02), Kumbhej (2), Shelgaon (1), Salse (3), Jeur (7), Saunde (1), Kandar (1), Kondhej (1), Karanje (1) etc ,

### **3.3.4 Stream :**

The Stream is the source of ground water in Karmala tahsil. the total Stream are 1282 in the tahsil. Pondhavadi village has 12 Stream, highest in the tahsil. The distribution of stream has shown the map (Fig.No.3.4), stream irrigation like Undergaon village has (09), Shelgaon (04), Sade (02), Padali (04), Veet (04), Ghargaon (04), Jategaon (04), Hiware (03), Arjunnagar (03),Wadachiwadi (04), Dilmeshawar( 04), Mirghavan (05), etc ,





### **3.3.5 Hand pump :**

The Hand pump are the source of ground water in Karmala tahsil. the total no of hand pump are 1126 in the tahsil. Bhelwadi village has 64 hand pump, highest in the tahsil. The distribution of hand pump has shown the map (fig.No.3.5), The hand pump has been observed like village Nilaj village has (48) hand pump, Sade (37), Kem (36), Wangi (34), Pothare (30), Kumbhej (28) ,Gulsadi (28) ,Zare (26), Ghoti (25), Malavadi (21), Umrad (20), Aljapur (17), Pangare (17) etc .

### **3.4 Research Methodology :**

The villages of the study area have been selected with the help of random sampling technique. The micro level study has been carried out at farm level in the selected villages. The wells and bore wells are the only source to irrigate crops. In the irrigated area it is found that, Groundnut, Sugarcane, Wheat, Sunflower Onion, Garlic, Chilies and vegetables are taken. The unirrigated area is very large, it totally depends on rainfall. Jowar, Bajara, Maize, Groundnut Kardai, Jawas, cropped in this area, but the rainfall of this area is irregular and very less. The irrigated area is totally depended on wells and tube wells.

Often, the wells and Tube wells, of this area are seen the dry in summer and winter season. And in the same way the ground water level is seen to have very deep so there is water problem also seen in this area.

This Chapter deals with the study of ground water levels in selected sample wells and bore wells. Selection of sampling stations and standard procedures of measurement of this wells and bore wells ground water level checking. Observation and discusses the Methodology.(Fig. No 3.1)

That is why; researcher has selected 12 wells and 12 bore wells of the Karmala tahsil to study the ground water level. These wells and bore wells have been randomly selected from the different village in the karmala tahsil.

### **3.5 The ground water level Study:**

The ground water level survey of following villages of per circle are as under

- 1) Ketur in this circle is i) Jinti ii) Parevadi iii) Kumbhargaon iv)Khatgaon
- 2) Korti in this circle i) Savdi ii) Veet iii) Hulgevadi iv) Manjargaon
- 3) Karmala in this circle i) Ghargaon ii) Wadgaon (Kh) iii) Kamone iv) Pande
- 4) Arjunnagar in this circle i)) Sade ii) Nerle iii) Arjunnagar iv) Gaundare
- 5) Jeur in this circle i) Kedgaon ii) Varkatne iii) Zare iv) Shelgaon

6) Kem in this circle i) Wangi ii) Kem iii) Malvadi iv) Kavitgaon wells and Bore wells of the villages are as under.

The following points have been taken into consideration to study the ground water level.

### **Points**

- 1) Monsoon Season water level of well or bore well
- 2) Post Monsoon Season water level of well or bore well
- 3) Summer Season water level well or bore well

The selected wells and bore wells has been studied as under. Wells are selected one from east side and another from west side of each village. Bore wells are selected one from south side and another from north side of each village. The total area and all wells and Bore wells of these villages have been taken into consideration.

The study is done in the following way –

### **3.6 Ketur Circle**

Observation of ground water levels have been made by surveying dug wells and bore wells of the ground water level.

The total area of village and the total number of wells and bore wells have been taken into consideration. While selecting the two wells and two bore wells of the different village. Wells are selected one from east side and another from west side. Bore wells are selected one from south side and another from north side. The total area of the circle is 22442.85 hect, total numbers of wells are 1569, and total of Bore wells are 561, Hand Pump 70, the measurements and observation and selected wells and bore wells are found as under:

*Ketur* in this circle is i) *Jinti* ii) *Parevadi* iii) *Kumbhargaon* iv) *Khatgaon*

Showing the map (Fig.No.3.6, 3.8, 3.9)

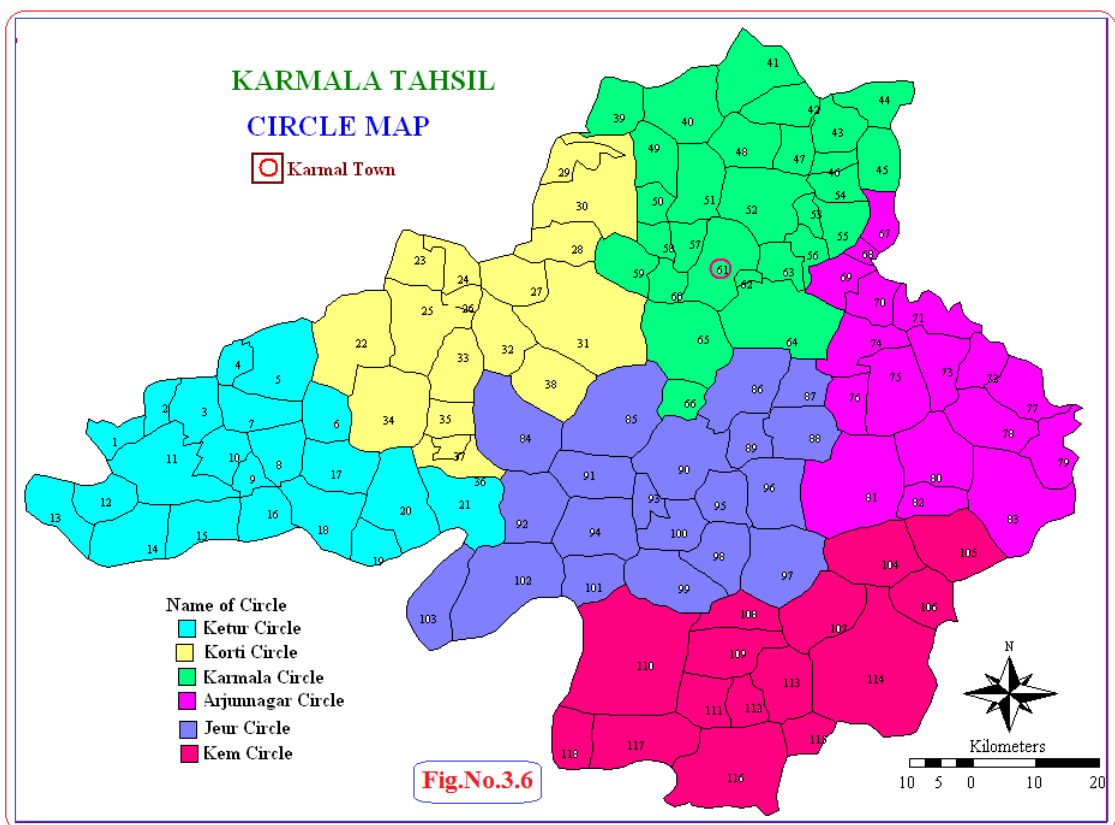
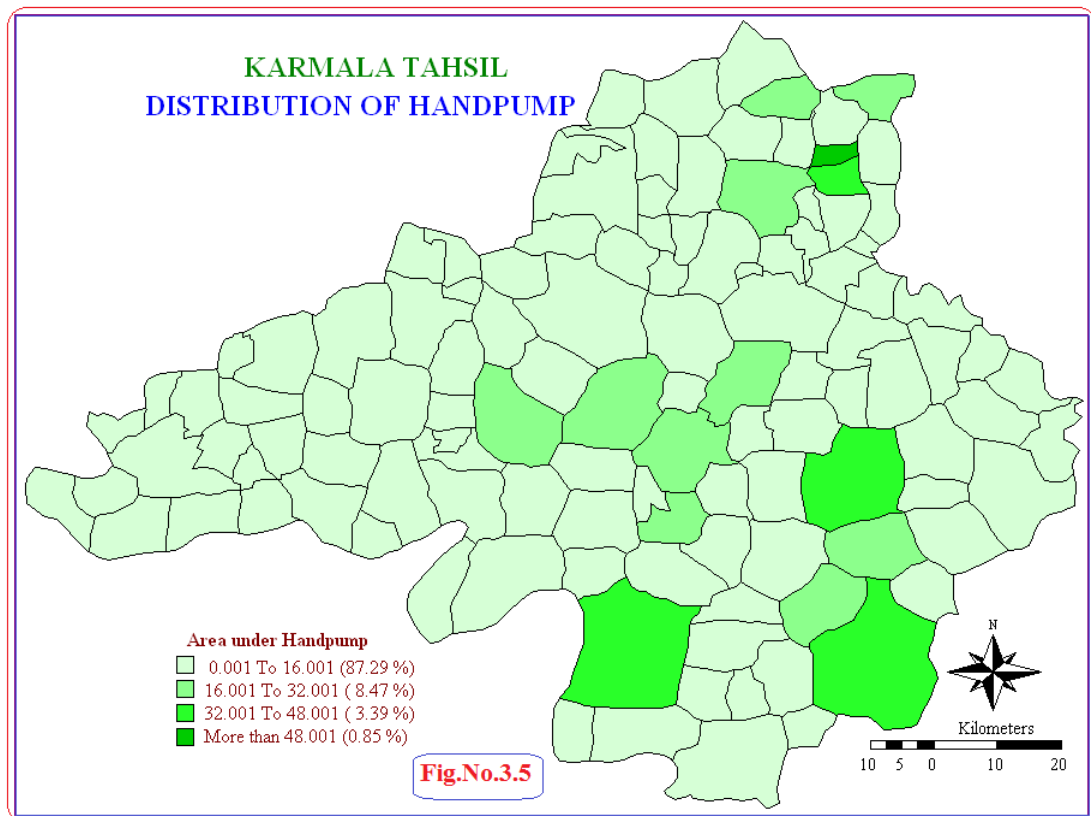
#### **Jinti village:**

##### **3.6.1 Well No.1**

Observations of water levels have been made by surveying dug wells and bore wells ground water level of village Jinti. The first well is chosen as a sample well. And this well is from east side.. The ground water level of this well is at 45 feet, of monsoon season reaches to 75 feet by the post monsoon season. And it is seen at 85feet in the summer season

The study of ground water level of the well has been made after the discussion with owner of well by researcher. He has made the study after taking the

measurement and observation of the well. Showing the map (Table No.3.4, Fig. No.3.7, Fig. No.3.9 & Fig.No.3.10)



### **Parevadi village:**

#### **3.6.2 Well No.2**

To study the ground water level, the well No. 2 is chosen from Parevadi. It is a second sample well. The ground water level of this well is generally of 48 feet after monsoon season. And ground water level is at 60 feet by the post monsoon season. And the ground water level is at 88 feet by the summer season. The study of ground water level of the village has been made after the discussion with the owner of well by researcher. He has made the study after taking the measurement & observation of the well. Showing the map (Table.No.3.2, Fig. No.3.7, Fig. No.3.11& Fig.No.3.12)

### **Kumbhargaon village:**

#### **3.6.3 Bore Well No. 1**

To study the water level, the bore well No.1 is chosen from Kumbhargaon. It is a first sample of bore well. The ground water level of this bore wells at 122 feet, in monsoon season. And water level is at 230 feet by the post monsoon season. The water level is at 300 feet by the summer season. The study of ground water level of the bore well has been made after the discussion with the owner of bore well by researcher. He has been made the study after taking the measurement and observation of the bore well. Showing the map (Table No.3.2, Fig. No.3.8, Fig. No.3.13 & 3.14)

### **Khatgaon village**

#### **3.6.4 Bore Well No. 2**

To study the water level, the bore well No.2 is chosen from Khatgaon. It is a second sample bore well. The water level of this bore well at 150 feet in monsoon season. And water level is at 190 feet by the post monsoon season. The water level is at 260 feet by the summer season. The study of ground water level of the bore well has been made after the discussion with the owner and he has been made the study after taking the measurement and observation of the bore well. Showing the map (Table No.3.2, Fig. No.3.8, Fig. No. 3.15 & Fig.No.3.16)

### **3.7 Korti Circle**

To study the ground water level of *Korti* Circle; two wells and two bore wells have been chosen. The total Area of village and the total number of wells and bore wells have been taken in to consideration. While selecting the two wells and two bore of the different village. Wells are chosen one from Savdi village. and another from Veet village. Bore wells are selected one from Hulgevadi village. and another from Manjargaon village. The total area of the circle is 24075.56.18 hect. The total of wells

are 2815 and total no of bore wells are 681.Total hand pump 120. The Measurements and observation of selected wells and bore wells are found as under.

*Korti in this circle i) Savdi ii) Veet iii) Hulgevadi iv) Manjargaon*  
showing the map (Fig.No.3.6, 3.8, 3.9)

### **Savdi village**

#### **3.7.1 Well No – 3**

To study the ground water level of village *Savdi*, The third well is chosen as a sample well. And this well is from east side. The water level of this well is at 50 feet, by monsoon season. It reaches to 75 feet by the post monsoon season and it is seen at 85 feet in the summer season.

The study of ground water level of the well has been made after the discussion with owner of well by researcher. He has made the study after taking the measurement and observation the well. Showing the map (Table.No.3.5, Fig No.3.7, Fig.No.3.9 & 3.10)

### **Veet Village**

#### **3.7.2 Well No – 4**

To study the ground water level, the well No.4 is chosen from Veet Village It is a second sample well. The water level of this well is generally at 45 feet monsoon season. water level is at 65 feet by the post monsoon season. and the 70 feet water level of summer season. The study of ground water level of the village has been made after the discussion with owner of well by researcher. He has made the study after taking the measurement and observation of the well. Showing the map (Table No.3.5, Fig.No.3.7, Fig. No.3.11 & Fig.No.3.12)

**Table No-3.4**  
**Selected sample wells and bore wells of Ketur circle**

S.No	Name of the Village	Total Area	No. of Wells	N0.of Bore wells	Sel.Well, Bore well	Depth of water Level In various season	Water level in feet
1	<i>Jinti</i>	2645.52 Hect.	75	21	Well No.1	Monsoon Season Post Monsoon Season Summer Season	40 feet 75 feet 85 feet
2	Parevadi	891.59 Hect.	75	06	Well No.2	Monsoon Season Post Monsoon Season Summer Season	50 feet 75 feet 85 feet
3	Kumbhargaon	1966.31 Hect.	90	11	Bore Well No.1	Monsoon Season Post Monsoon Season Summer Season	122 feet 230 feet 300 feet
4	Khatgaon	1219.91 Hect.	62	43	Bore Well No.2	Monsoon Season Post Monsoon Season Summer Season	165 feet 190 feet 260 feet

Source: Ground water level survey 2010-2013

### **Hulgevadi village**

#### **3.7.3 Bore Well No-3**

To study the ground water level, the bore well No-1 is chosen from Hulgevadi Village.

It is a third sample bore well. The water level of this bore well at 165 feet, in monsoon season. And ground water level is at 190 feet. by the post monsoon season, and the water level is reaches at 260 feet by the summer season. The study of ground water level of the bore well has been made after the discussion with the owner of bore well by researcher. He has been made the study taking the measurement and observation of the bore well. Showing the map (Table No.3.5, Fig.No.3.8, Fig. No.3.13, Fig. No.3.14)

## **Manjargaon Village**

### **3.7.4 Bore Well No-4**

To study the ground water level, the bore well No-4 is chosen from Manjargaon Village. It is a sample bore well. and the water level of this bore well at 190 feet in monsoon season. and water level is at 240 feet by the post monsoon season. and the water level is at 310 feet by the summer season. Showing the map (Table No.3.3, Fig. No3.8, Fig. No.3.15 & 3.16)

### **3.8 Karmala Circle**

To study the ground water level of the village, 2 wells and 2 bore wells have been selected. The total area of village, and the total no of wells and bore wells have been taken in to consideration, while selecting the 2 wells and 2 tube wells of the different village. Wells are chosen one from *Ghargaon* village and another from Wadgaon (S) bore well are selected one from Kamone village. and another from Pande village. The total area of the circle is 28784.91 Hect. and total of wells are 2473 and total bore well are 1059. Total hand pump 343, the measurements and observation of selected wells and bore wells are found as under.

- 4) *Karmala* in this circle i) *Ghargaon* ii) Wadgaon (Kh) iii) Kamone iv) Pande  
Showing the map (Fig.No.3.6, 3.8, 3.9)

### ***Ghargaon* - village**

#### **3.8.1 Well No-5**

The study of water level is Ghargaon Village. The five well is chosen as a sample well and this well is from *Ghargaon* - Village. The total depth of the well is 90 feet. While digging this well, original level of water is found at 60 feet. The water level of this well is at 45 feet. of monsoon season and it reaches to 80 feet by the post monsoon season .and it reaches to 85 feet by the summer season. The study of ground water level of the village has been made after the discussion with the owner of well by researcher. He has made the study. After taking the measurement and observation of the well. Showing the map (Table No.3.4, Fig.No.3.7, Fig. No.3.9,& Fig.No.3.10)

### **Wadgaon (S) Village:**

#### **3.8.2 Well No-6**

To study the water level, the well no-6 is chosen from Wadgaon (S) Village  
The water level of this well is generally at 43 feet. In monsoon season. The water level is at 73 feet by the post monsoon. And the ground water level is at 80 feet by the

summer season. He has made the study after taking the measurements and observation of the well. Showing the map (Table No.3.6, Fig. No.3.7, Fig. No.3.11,& 3.12)

**Kamone village:**

**3.8.3 Bore Well No-5**

To study the water level, the bore well no-5 is chosen from Kamone Village.

It is first sampling bore well. The water level is found at 100 feet in monsoon season. And water level is at 180 feet by the post monsoon season. And the water level is at 250 feet by the summer season. The study of water level of the bore well has been made after the discussion with the owner. He has made the study after taking the measurements and observation of the bore well. Showing the map (Table No.3.4, Fig. No.3.8, Fig. No.3.13 & 3.14)

**Pande Village:**

**3.8.4 Bore Well No-6**

To study the ground water level, the well no-6 is chosen from Pande village. It is sample bore well. The water level is found at 120 feet in monsoon season. And water level is at 210 feet by the post monsoon season. The water level is at 300 feet by the month of summer season.

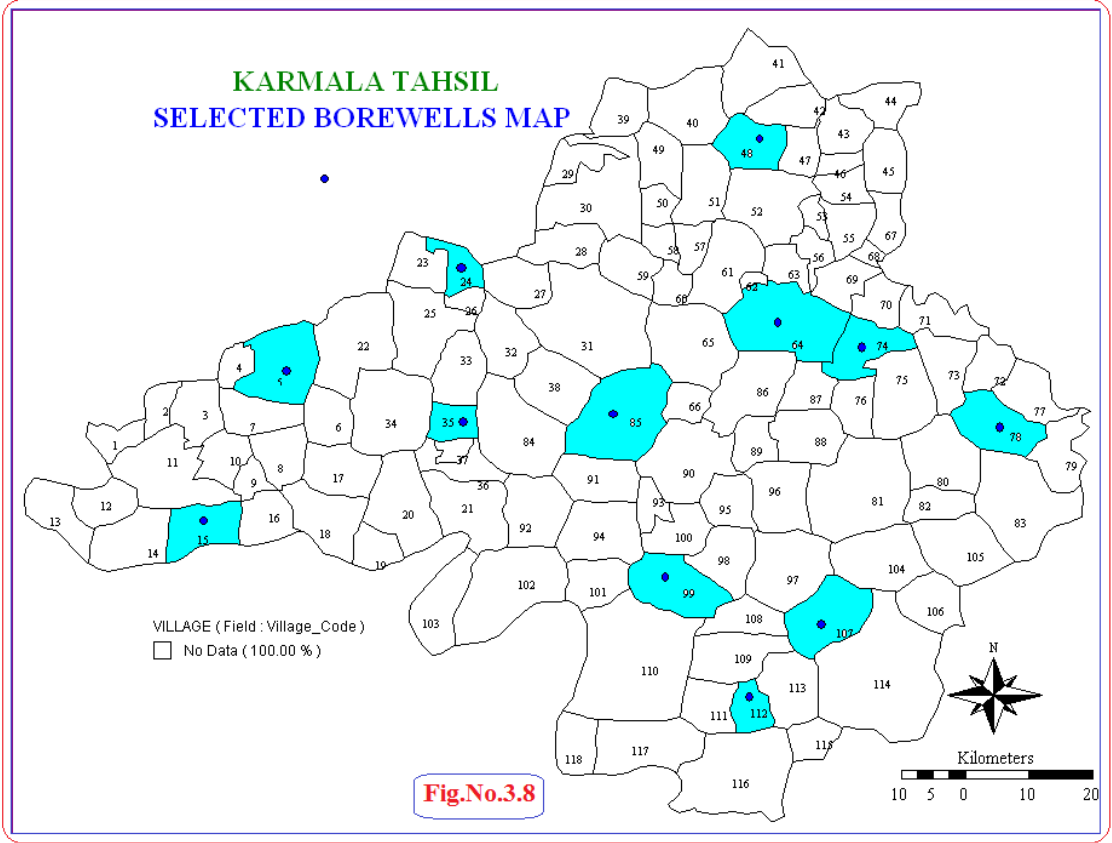
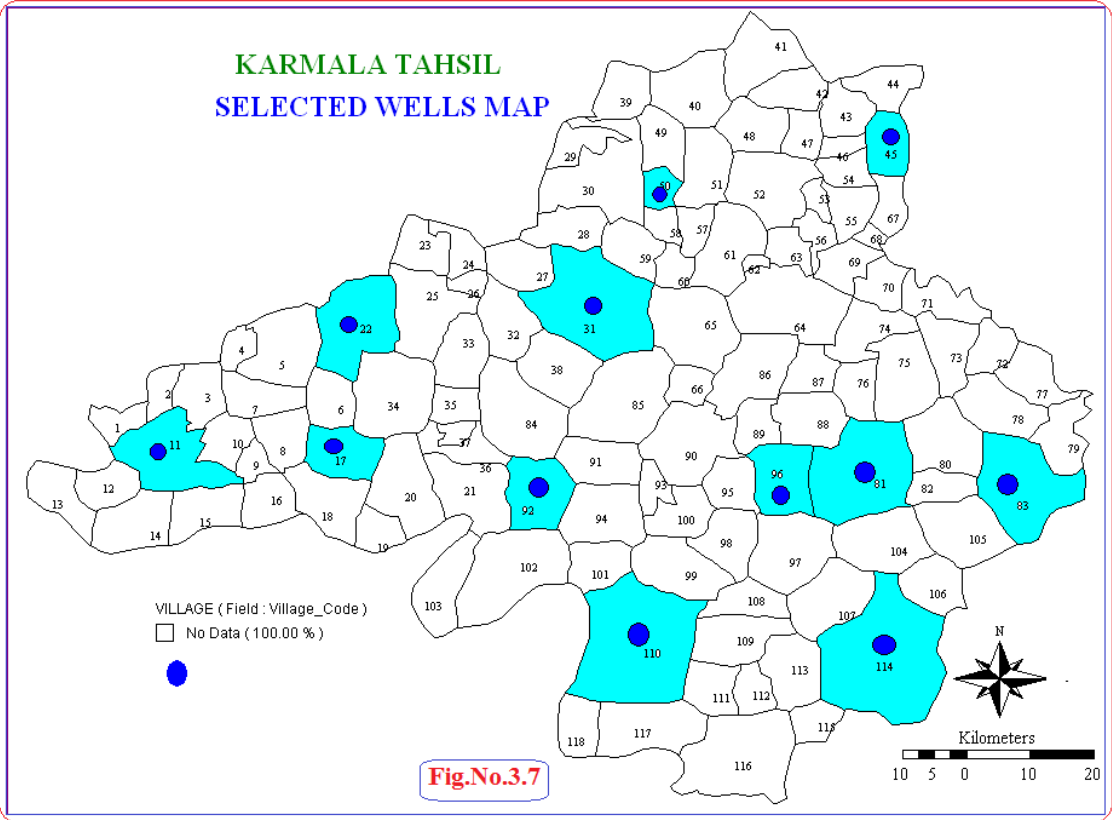
The study of ground water level of the bore well has been made after the discussion with the owner of bore well by researcher. He has made the study after taking the measurements and observation of the bore well. Showing the map (Table No.3.6, Fig.No.3.7, Fig. No.3.11,& Fig.No.3.12)



**Table No-3.5****Selected sample wells and bore wells of Korti circle**

S.No	Name of the Village	Total Area	No.of Wells	N0.of Bore wells	Sel.Well, Bore well	Depth of water Level In various season	Water level in feet
5	Savdi	2442.56 Hect.	74	27	Well No.3	Monsoon Season Post Monsoon Season Summer Season	50 feet 80 feet 85 feet
6	Veet	3874.09 Hect.	150	06	Well No.4	Monsoon Season Post Monsoon Season Summer Season	45 feet 65 feet 80 feet
7	Hulgevadi	1017.63 Hect.	49	30	Bore Well No.3	Monsoon Season Post Monsoon Season Summer Season	100 feet 180 feet 260 feet
8	Manjargaon	640.19 Hect.	11	112	Bore Well No.4	Monsoon Season Post Monsoon Season Summer Season	190 feet 240 feet 310 feet

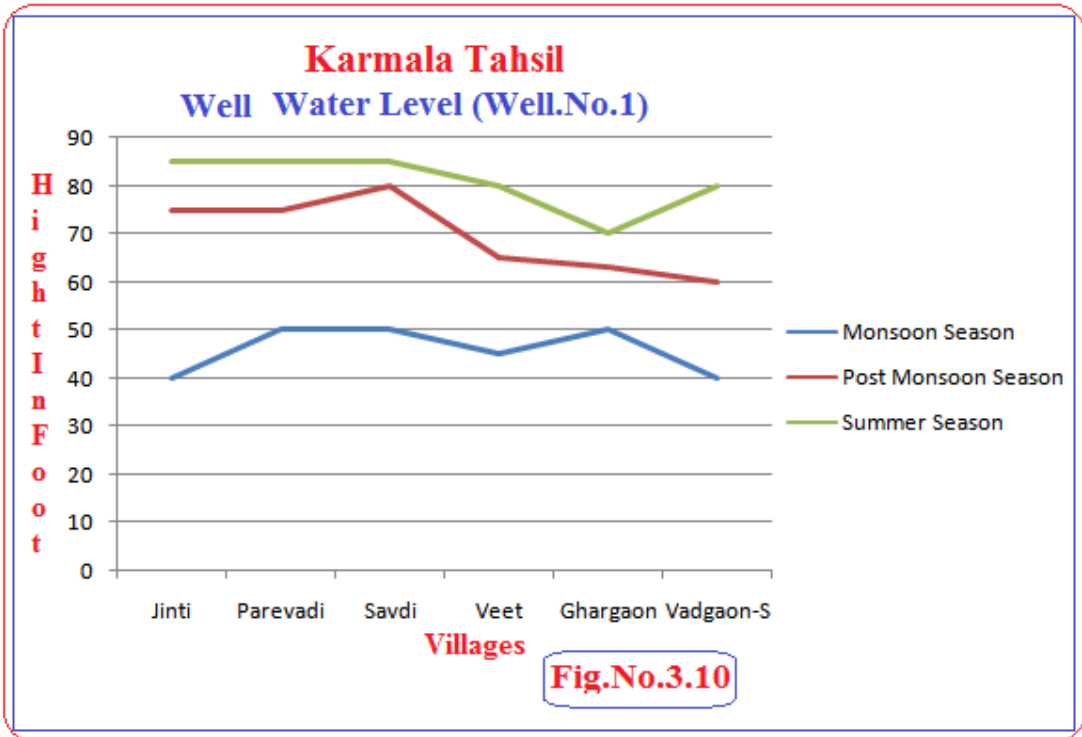
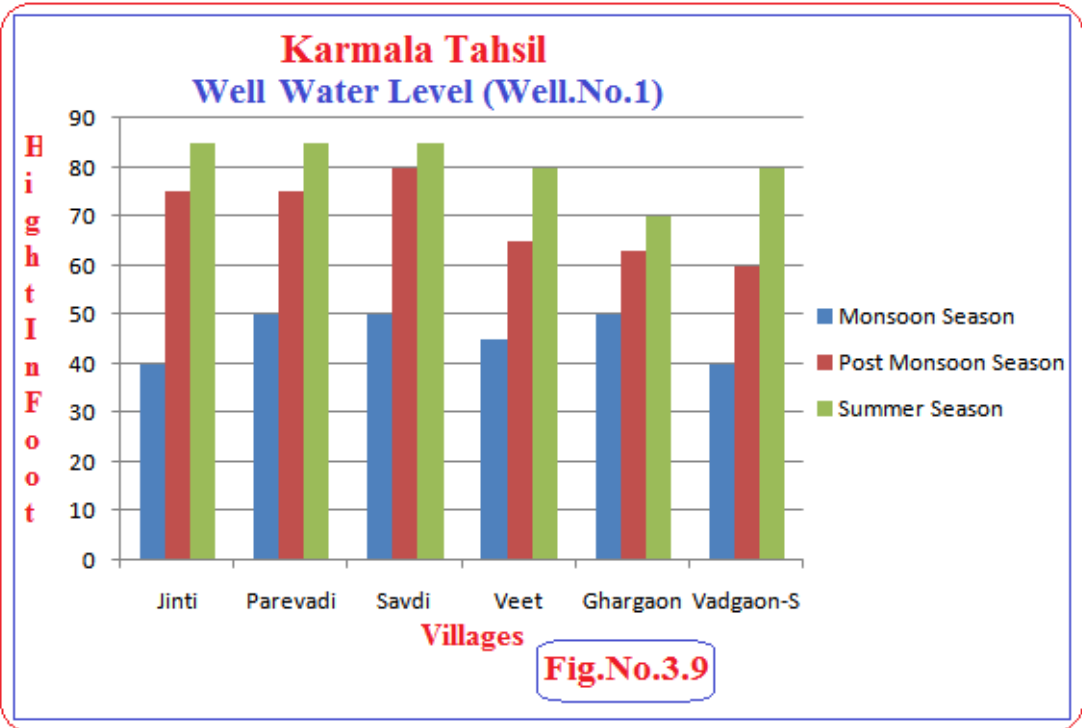
Source: Ground water level survey 2010-2013



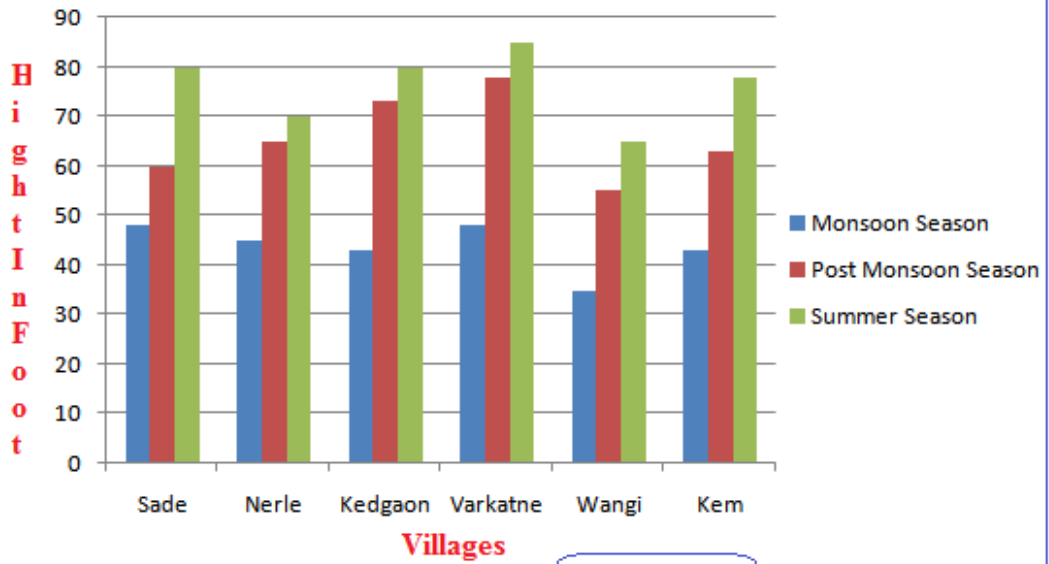
**Table No-3.6****Selected sample wells and Bore wells of Karmala circle**

S.No	Name of the Village	Total Area	No. of Wells	N0.of Bore wells	Sel.Well, Bore well	Depth of water Level In various season	Water level in feet
9	Ghargaon	794.82 Hect.	145	15	Well No.5	Monsoon Season Post Monsoon Season Summer Season	50 feet 63 feet 70 feet
10	Vadgaon(S)	522.54 Hect.	142	25	Well No.6	Monsoon Season Post Monsoon Season Summer Season	40 feet 60 feet 80 feet
11	Kamone	1200.6 2 Hect.	181	101	Bore Well No.5	Monsoon Season Post Monsoon Season Summer Season	100 feet 160 feet 240 feet
12	Pande	2821.3 6 Hect.	116	106	Bore Well No.6	Monsoon Season Post Monsoon Season Summer Season	175 feet 250 feet 310 feet

Source: Ground water level survey 2010-2013

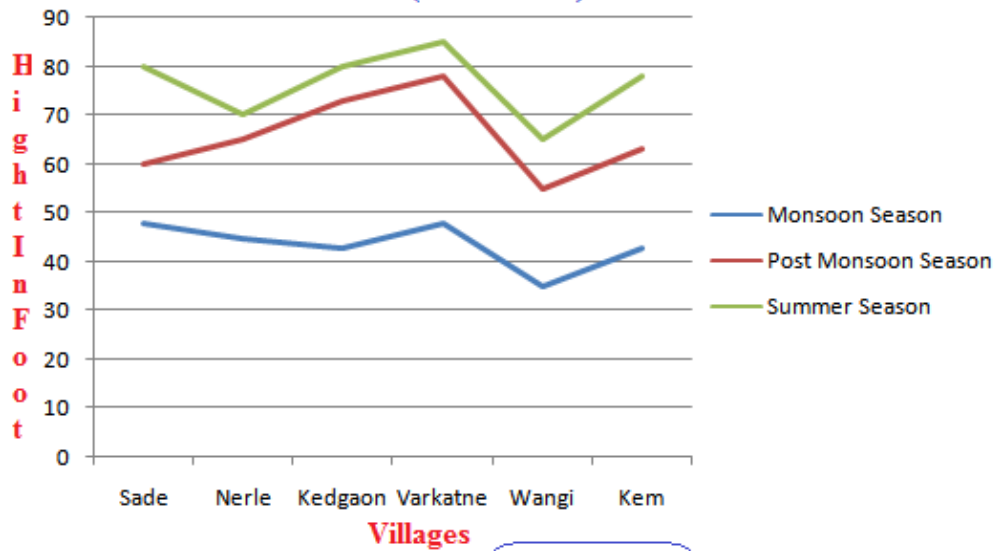


**Karmala Tahsil**  
**Well Water Level (Well.No.2)**



**Fig.No.3.11**

**Karmala Tahsil**  
**Well Water Level (Well.No.2)**



**Fig.No.3.12**

### **3.9 Arjunnagar Circle:**

To Study the ground water level of village, two wells and two bore wells have been selected. The total area of village and the total no of wells and bore wells have been taken into consideration. While selecting the two wells and two bore wells of the separate village wells are selected, one from Sade village and another from Nerle Village. Bore wells are selected one from Arjunnagar and another from Gaundare Village. The total Area of the village is 21648.41 hect, and total no of wells is 1602 and total bore wells are 1148. And total hand pump is 148. The measurements and observation of selected wells and bore wells are found as under.

5) *Arjunnagar* in this circle i)) Sade ii) Nerle iii) Arjunnagar iv) Gaundare

Showing the map (Fig.No.3.6, 3.8, 3.9)

#### **Sade village**

##### **3.9.1 Well No.7**

The No.7 well is chosen as a sample well from Sade village. The ground water level of this well is at 40 feet in monsoon season. and it reaches to 65 feet by the post monsoon season. It reaches to 80 feet by the summer season. The study of ground water level of the well has been made after the discussion with owner of well by researcher. He has made the study after taking the measurement and observation of the well. Showing the map (Table No.3.7, Fig. No.3.7, Fig. No .3.9 & 3.10)

#### **Nerle Village**

##### **3.9.2 Well No. 8**

To study the ground water level, the well No.8 is chosen from Nerle Village. It is a sample well. The water level of this well is generally at 48 feet monsoon season and water level is at 78 feet by the post monsoon season. the water level is at 85 feet by the summer season.

The study of ground water level at the village has been made after the discussion with the owner of well by researcher. He has made the study after taking the measurement and observation of the well. Showing the map (Table No.3.7, Fig.No.3.7, Fig.No.3.11 & Fig.No.3.12)

#### **Arjunnagar Village**

##### **3.9.3 Bore Well No.7**

To study the water level, the bore well No.7 is chosen from Arjunnagar Village. It is a sample bore well. The water level of this bore well at 150 feet, in monsoon season. and water level is at 220 feet by the post monsoon season. The water

level is at 260 feet by the summer season. The study of ground water level of the bore well has been made after the discussion with the owner of bore well by researcher .He has been made the study after taking the measurement and observation of the bore well. Showing the map (Table No.3.7, Fig. No.3.8, Fig. No.3.13 & 3.14)

#### **Gaundare village:**

##### **3.9.4 Bore Well No.8**

To study the water level, the Bore well No.8 is chosen from Gaundare village. It is a sample bore well. And the water level of this bore well at 175 feet, in monsoon season. and water level is at 250 feet by the post monsoon season. The water level is at 310 feet by the summer season.

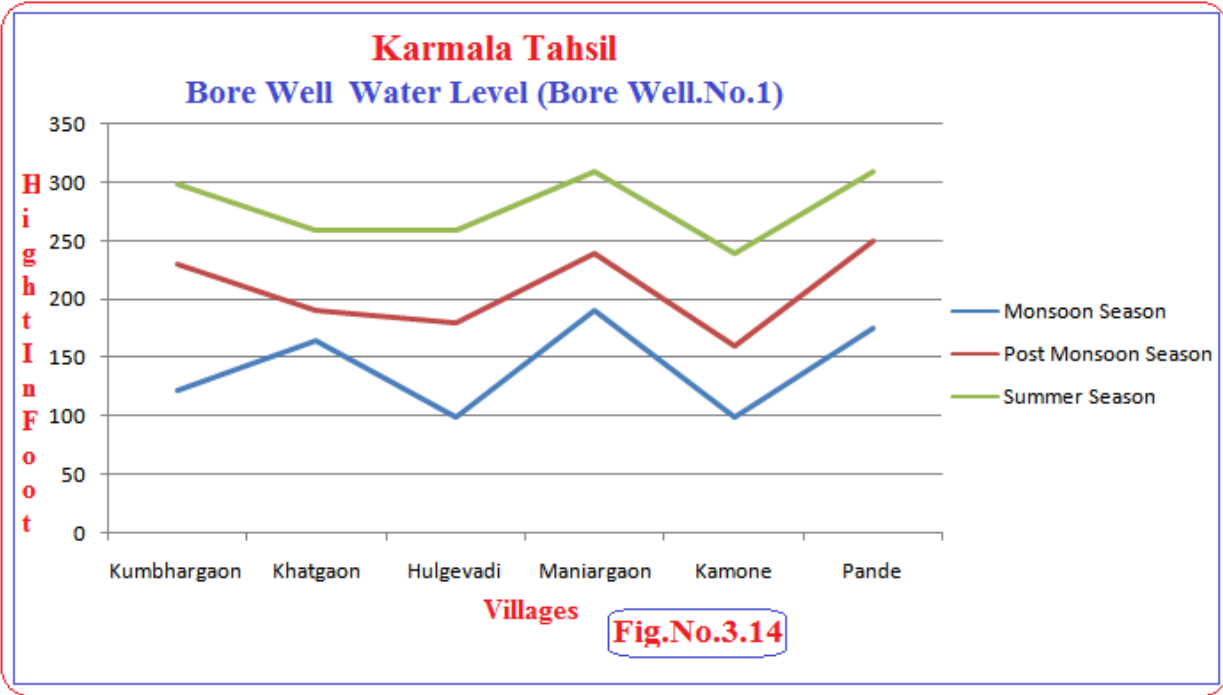
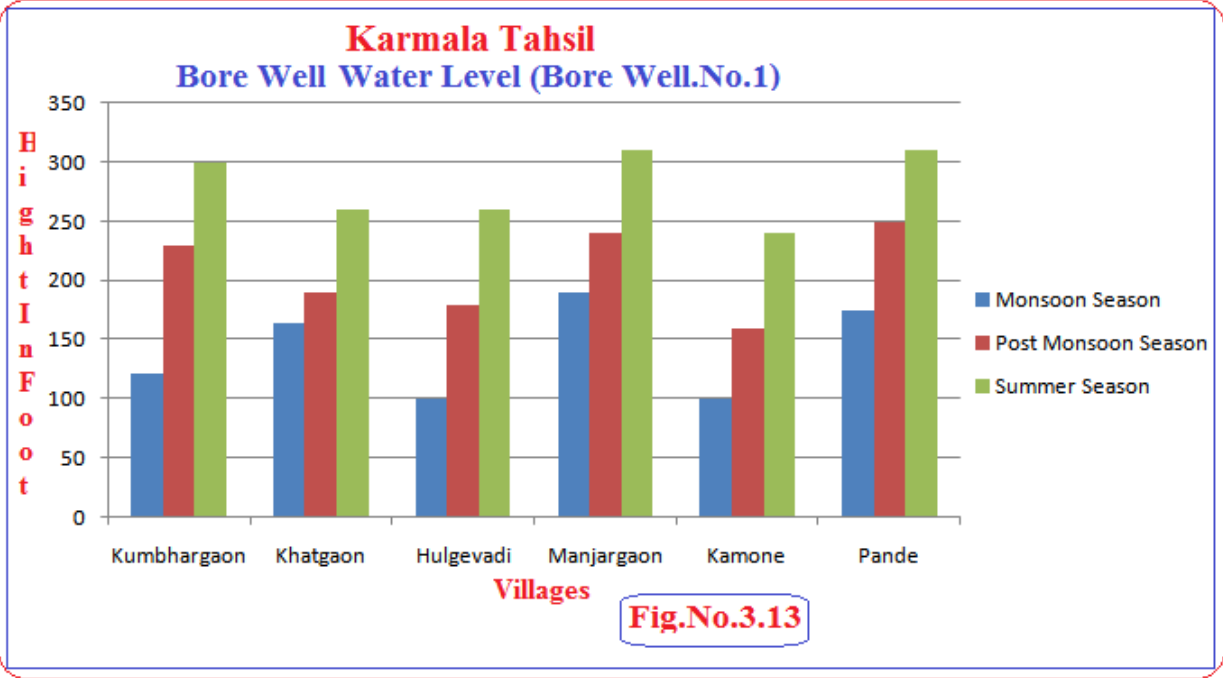
The study of ground water level of the village has been made after the discussion with the owner of bore well by researcher. He has made the study after taking the measurement and observation of the bore well. Showing the map (Table No.3.7, Fig No.3.8, Fig. No.3.15 & Fin.No.3.16 )

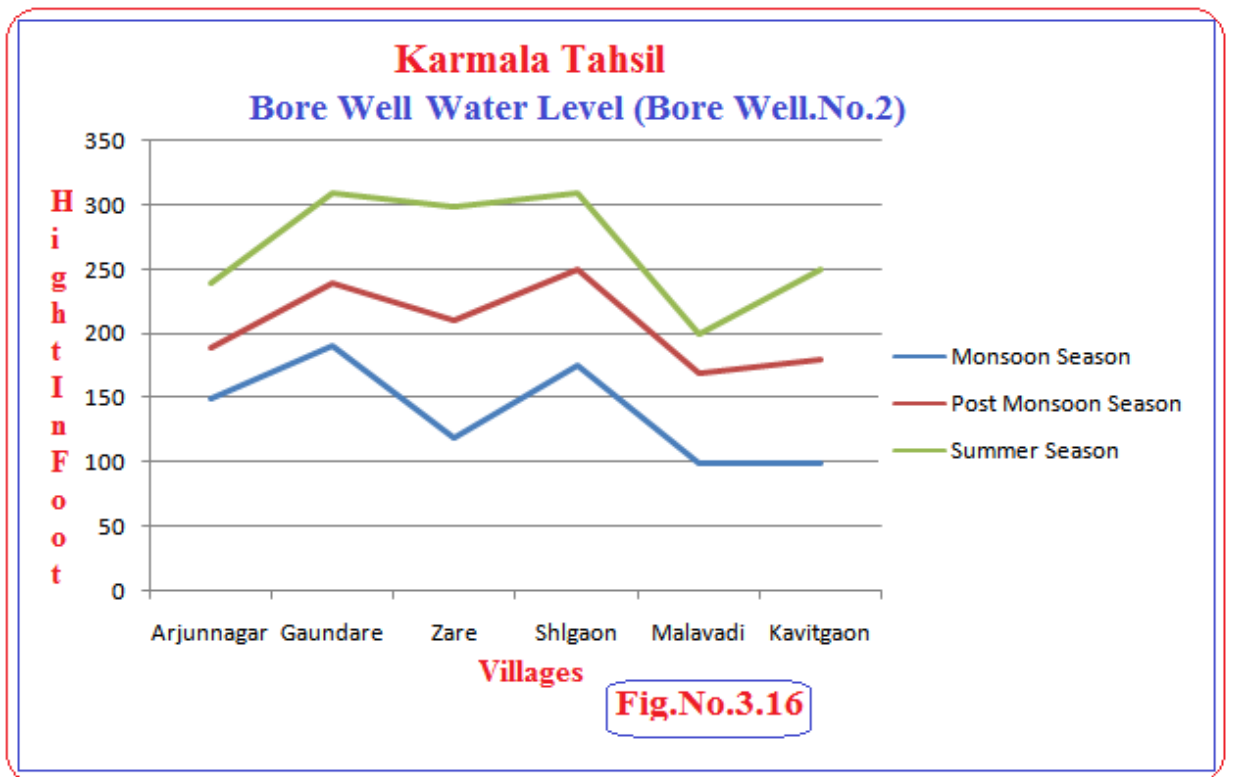
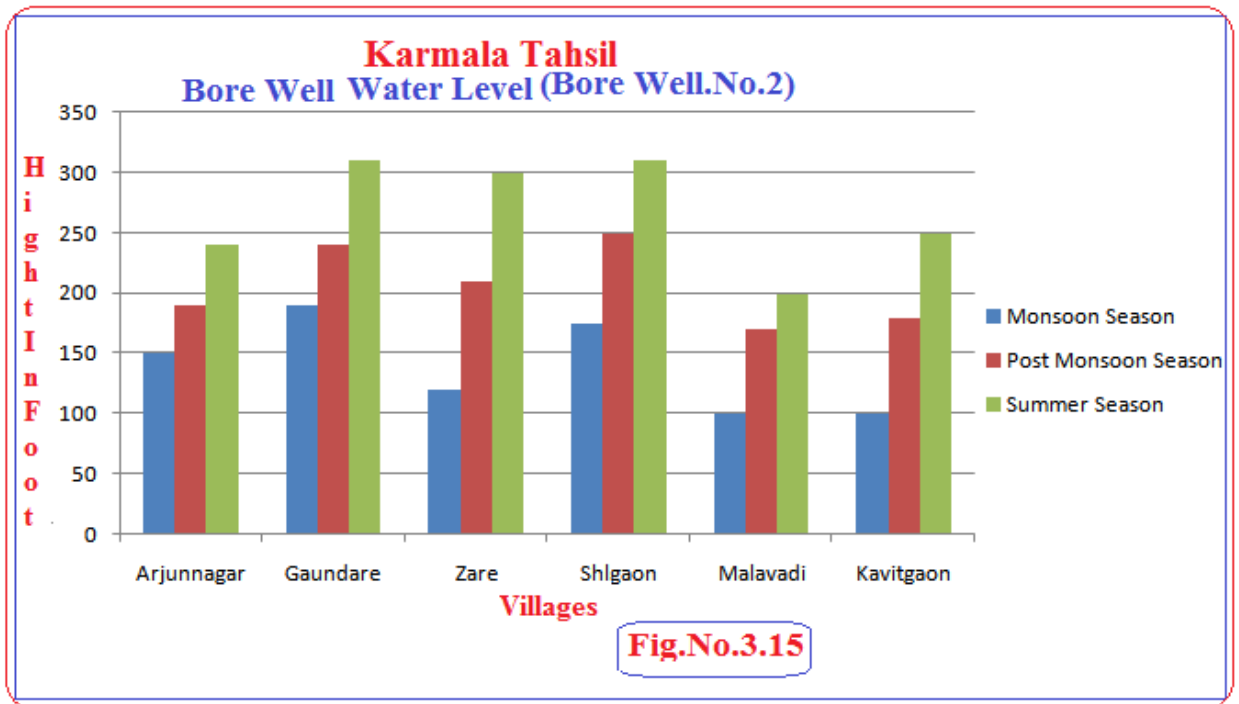
**Table No-3.7**  
**Selected sample wells and bore wells of Arjunnagar circle**

S.No	Name of the Village	Total Area	No. of Wells	N0.of Bore wells	Sel.Well, Bore well	Depth of water Level In various season	Water level in feet
13	Sade	3266.00 Hect.	150	535	Well No.7	Monsoon Season Post Monsoon Season Summer Season	48 feet 60 feet 80 feet
14	Nerle	2870.50 Hect.	142	67	Well No.8	Monsoon Season Post Monsoon Season Summer Season	45 feet 65 feet 70 feet
15	Arjunnagar	1060.68 Hect.	82	201	Bore Well No.7	Monsoon Season Post Monsoon Season Summer Season	150 feet 190 feet 240 feet
16	Gaundare	1571.15 Hect.	123	202	Bore Well No.8	Monsoon Season Post Monsoon Season Summer Season	190 feet 240 feet 310 feet

**Source:** Ground water level survey 2010-2013







### **3.10 Jeur Circle**

To study the ground water level of the village two wells and two bore wells have been chosen. The total area of village and the total of no wells and bore wells have been taken in to consideration. While selecting the two wells and two bore wells of the separate village. Wells are selected, one from Kedgaon village and another from Varkatne village.

Bore well is selected one from Zare village. and another from Shelgaon. Total area of the circle is 33590.22 hect. The total wells is 41 and total bore well is 883, and hand pump 262. The measurements and observation of selected wells and bore wells are found as under.

6) *Jeur* in this circle i) *Kedgaon* ii) *Varkatne* iii) *Zare* iv) *Shelgaon*

Showing the map (Fig.No.3.6, 3.8, 3.9)

#### ***Kedgaon Village***

##### **3.10.1 Well No.9**

To study the water level of Kedgaon village. The no.9 well is selected as a sample well. and this well is from Kedgaon village. The water level of this well is at 50 feet, at the monsoon season. and it reaches to 63 feet by the post monsoon season and it reaches to 70 feet by the summer season.

The study of ground water level of the well has been made after the discussion with owner of well by researcher. He has made the study after taking the measurement and observation of the well. Showing the map (Table No.3.8, Fig. No.3.7, Fig. No.3.9 & Fig. No. 3.10)

#### ***Varkatne Village***

##### **3.10.2 Well No. 10**

The water level study is varkatne village. The well no.10 is chosen from Varkatne village. It is a sample well. The water level of this well is generally at 35 feet by monsoon season and water level is at 55 feet the post monsoon season. It is seen at 65 feet by the summer season. The Study of ground water level of well has been made after the discussion with the owner and he has made the study after taking the measurement and observation of the well. Showing the map (Table No.3.8, Fig No.3.7, Fig. No.3.11 & Fig.No.3.12)

## **Zare village**

### **3.10.3 Bore Well No.9**

To study the water level, the tube well no.9 is chosen from Zare village. It is a sample bore well. The water level of this bore well at 100 feet, in monsoon season. The water level is at 160 feet by the post monsoon season. and the water level is at 240 feet by summer season. The study of water level of the bore well has been made after the discussion with the owner of bore well by researcher. He has been made the study after taking the measurement and observation of the bore well. Showing the map (Table No.3.6, Fig No.3.8, Fig. No.3.13 & Fig.No.3.14)

## **Shelgaon village**

### **3.10.4 Bore Well No.10**

To study the water level, the bore well No.10 is chosen from shelgaon village. It is a sample bore well. The water level of this bore well is at 100 feet, in monsoon season. and water level is at 160 feet by the post monsoon season. The water level is at 240 feet by the summer season.

The study of water level of the village has been made after the discussion with the owner of tube well by researcher. He has made the study after taking the measurement and observation of the bore well. Showing the map (Table No.3.8, Fig. No.3.8, Fig. No.3.15 & Fig. No. 3.16)

**Table No-3.8****Selected sample wells and bore wells of Jeur circle**

S.No	Name of the Village	Total Area	No.of Wells	N0.of Bore wells	Sel.Well, Bore well	Depth of water Level In various season	Water level in feet
17	Kedgaon	1578.74 Hect	225	30	Well No.09	Monsoon Season Post Monsoon Season Summer Season	43 feet 73 feet 80 feet
18	Varkatne	1532.15 Hect	226	82	Well No.10	Monsoon Season Post Monsoon Season Summer Season	48 feet 78 feet 85 feet
19	Zare	2855.62 Hect.	317	203	Bore Well No.09	Monsoon Season Post Monsoon Season Summer Season	120 feet 210 feet 300 feet
20	Shelgaon	812.87 Hect.	120	301	Bore Well No.10	Monsoon Season Post Monsoon Season Summer Season	175 feet 250 feet 310 feet

Source: Ground water level survey 2010-2013

**3.11 Kem Circle**

To study the ground water level of the Kem circle, two wells and two bore wells have been chosen. The total area of village and the total of wells and bore wells have been chosen into consideration. While selecting the two wells and two bore wells of the said village. Wells are selected, one from Wangi village and another from Kem village. Two bore wells are selected one from Malavdi village and another from Kandar village.

The total area of the Kem circle is 28953.64 hect, and total wells are 1989 and bore well is 1146. Hand pump is 183 the measurement and observation of selected wells and bore wells are found as under.

7) *Kem* in this circle i) *Wangi* ii) *Kem* iii) *Malvadi* iv) *Kavitgaon*

Showing the map (Fig.No.3.6, 3.8, 3.9)

### ***Wangi village***

#### **3.11.1 Well No.11:**

The study of water level is *Wangi* village. The no.11 well is chosen as a sample well and this well is from *Wangi*. The water level of this well is at 40 feet, in monsoon season. and it reaches to 60 feet by the post monsoon season. It is seen at 80 feet in the summer season.

The study of ground water level of the well has been made after the discussion with owner of well by Researcher. He has made the study after taking the measurement and observation of the well. Showing the map (Table No.3.7, Fig. No.3.9, Fig. No.3.9 & Fig.No.3.10)

### ***Kem village***

#### **3.11.2 Well No.12:-**

To study the ground water level the well No.12 is chosen from *Kem* village. It is sample well. The water level of this well is at 43 feet, monsoon season. And water level is at 63 feet by the post monsoon season. And the water level is at 78 feet in the summer season.

The study of ground water level of the village has been made after the discussion with owner of well by researcher. He has made the study after taking the measurement and observation of the well. Showing the map (Table No.3.7 Fig. No.3.7, Fig. No.3.11 & Fig.No.3.12)

### ***Malvadi Village:***

#### **3.11.3 Bore Well No.11:**

*To study the ground* water level, the bore well No.11 is chosen from *Malavdi* village. It is sample bore well. The water level of this bore well is at 100 feet, in monsoon season. And water level is at 190 feet by the post monsoon season. And the water level is at 210 feet in the summer season.

The study of water level of the tube well has been made after the discussion with owner of tube well by researcher. He has made the study after taking the

measurement and observation of the bore well. Showing the map (Table No.3.9, Fig.No.3.8, Fig. No.3.13 & Fig.No.3.14)

**Kavitgaon village:**

**3.11.4 Bore Well No.12:-**

To study the water level, the tube well No.12 is chosen from Kavitgaon village. It is sample bore well. The water level of this bore well is at 100 feet, in monsoon season. And water level is at 180 feet by the post monsoon season. And the water level is at 250 feet in the summer season. Showing the map (Table No.3.9, Fig. No.3.8, Fig. No.3.15 & Fig.No.3.16).

The study of water level of the bore well has been made after the discussion with owner of tube well by researcher. He has made the study after taking the measurement and observation of the bore well.

The Study of ground water level of the bore well has been made after the discussion with the owner and he has been made the study after taking the measurement and observation of the bore well.

**Table No-3.9**  
**Selected sample wells and bore wells of Kem circle**

S.No	Name of the Village	Total Area	No.of Wells	N0.of Bore wells	Sel.Well, Bore well	Depth of water Level In various season	Water level in feet
21	Wangi	4989.11 Hect.	251	87	Well No.11	Monsoon Season Post Monsoon Season Summer Season	35 feet 55 feet 65 feet
22	Kem	5125.78 Hect	301	270	Well No.12	Monsoon Season Post Monsoon Season Summer Season	43 feet 63 feet 78 feet
23	Malavdi	1695.03 Hect.	157	302	Bore Well No.11	Monsoon Season Post Monsoon Season Summer Season	100 feet 170 feet 200 feet
24	Kavitgaon	649.66 Hect.	106	301	Bore Well No.12	Monsoon Season Post Monsoon Season Summer Season	100 feet 180 feet 250 feet

**Source:** Ground water level survey 2010-2013

**Résumé:**

This chapter has presented how the ground water resource can be quantified with the help of methodology explained in the first chapter. It is observed that there is about 12 wells and 12 bore wells of available ground water level in the tahsil. However the present ground water level is deep. This kind of quantification can be used for developing strategy for sustainable agricultural development in the tahsil. The next chapter is mainly devoted for Agriculture and well density for proper agricultural development.