Status of Ground Water in Marathwada Region

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Department of Geography

Shrikrushna Mahavidyalaya, Gunjoti

Under the Guidance of

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Shrikrushna Mahavidyalaya, Gunjoti

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Examed
25.6.22

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DECLARATION

I hereby declare that, the entire work incorporated in this thesis entitled **"Status of Ground Water Quality in Marathwada Region"**, which I am submitting for the degree of B.A, Research Project in Geography to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad is based on actual work carried out by me under the guidance and supervision of Dr. M.T. Suryawanshi.It is not published wholly or partly and not submitted for the award of any degree in any university or institute.

Place: Gunjoti

Date:

Research student

CERTIFICATE

I certify that the work incorporated in the Project "**Status of Ground Water Quality in Marathwada Region**", submitted by was carried out by the candidate under my supervision/guidance. The best of my knowledge (i) the candidate has not submitted the same research work to any other institution for any degree/ diploma or other similar titles (ii) the Project submitted is a record of original research work done by research scholar during the period of study under my supervision, and (iii) the Project represents independent research work on the part of Research Scholar.

Dr. M.T.Suryawanshi

Place: Gunjoti

Date:

ACKNOWLEDGEMENT

I respectfully convey my whole-hearted gratitude; express my thanks and sincere most acknowledgements to my Guide Dr. M.T. Suryawanshi, HOD & Research Guide, Department of Geography, for his illuminative guidance, wise advice, help, invaluable supervision, friendly cooperation and encouragements, providing of my work.

I also take this opportunity to express my heartiest thanks to Mr. Koli R.G., sir for their kind co-operation. I specially thank to my friends who helped me in all respect. I also thankful to those who have directly or indirectly helped me lot during the work.

Research Student

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ABSTRACT:

Water is necessary to support all "biological life, natural processes, communities, the economy, society, and future generations."As the supply of available water has decreased, demand for water has grown. Population growth, increased land development sprawl, and enhanced consumption patterns amplify water demand, alter the locations at which water is obtained, change the purposes for which water is sought, and degrade watershed lands (Arnold 2009, pp. 834-35).Water is essential to sustain life for all the human being. This is the reason why ancient civilization found all over the world were mostly restricted to river valley only. But when the population has grown, the ancient man seems to have spread all over the plains adjacent to the river valley and subsequently to the upland even. But in recent year due to the phenomenal explosion of population, the available surface water resources could not hope up with the man's demands and hence he started to hunt for the ground water reservoirs. In study region water table has gown down in many areas as a recent of indiscriminate and high withdrawal ground water for drinking and sanitation purposes, with lowering of water table, the cost of ground water extraction has not only increased but also affected the quality of water.

Introduction:

Tremendous increase of population in last two decade has put extra trace in water source in any area .The ground water quality directly depends upon geology of the area .The sewage water released from city contributes to the pollutant ground water surrounding the area. Therefore, detail study of hydro geological and hydro chemical condition of the area. To understand the groundwater quality of the hour. Water is most important natural resource. We depend on water for irrigation, industry, domestic needs, shipping and for sanitation and disposal of waste. Most of our water bodies as ponds, lakes, streams, river, sea, and ocean have become polluted due to industrial growth, urbanization and other man made problems. Ground water contamination is generally irreversible. Ground water has been exploited natural system due to over increasing demand of man for drinking, agricultural, industrial and domestic purposes. Calcium and magnesium are the major cations responsible for hardness. The high concentration of TDS, hardness is observed in ground water and its effects on human being. In the present investigation the relationship between ground water quality and health effects has been studied.

Ground Water is the major source of drinking water in both urban and rural Maharashtra and also an important source of water for the agricultural and the industrial sectors. Water

5^{1} – $20°41^{1}$ north latitude forms the part of the vast Deccan plateau all of India and is one of the six divisions of Maharashtra state. The total area of Marathwada region is of 64, 813 sq.km and is bounded by the Vidarbha Region on the North by Andra Pradesh on the East and Southeast, by Karnataka on the south and by Western Maharashtra on the West. The entire region is situated at an average height of about 300 – 650 m. above mean sea level, gradually slopping from West to East, and is traverse by hill ranges originated from the Sahyadries in the West and the Satpudas in the North. Different ranges derive their names from local sources, the northern being Ajanta – Satmala ranges and the Southern the Balaghat ranges. In addition to these there are scattered hillocks of varying heights through the region, the highest peak, SurpalNath (960 m. above Mean Sea Level) being situated near Kannad in Aurangabad district. The climate of Aurangabad, Jalna, Hingoli, Parbhani, Osmanabad and Beed is generally hot and dry. Nanded district experiences hot climatic in summer and cold climate in winter. Latur district experiences mild and dry summer and cold winter. Marathwada has an average rainfall of 882 mm and temperature fluctuations are generally large. Maximum temperature in summer is 43^{O} C and $10\,^{O}$C in winter season.

Rainfall:

Among climatic elements rainfall is the most important element which plays a vital role in the distribution as well as development i. e. towards plant succession. It is the factor which is responsible for the overall get up of hydrological cycle, each and every plant with its more or less distribution as vegetation cover specially, the canopy coverage of the trees naturally play a better role in increasing the moisture and decreasing the temperature.

The intensity of rainfall variability of rainfall, seasonal distribution of rainfall, the erratic nature of rainfall, uneven distribution of rainfall, etc., play an important role in overall distribution of the vegetation.

Table 1. Rainfall in Marathwada

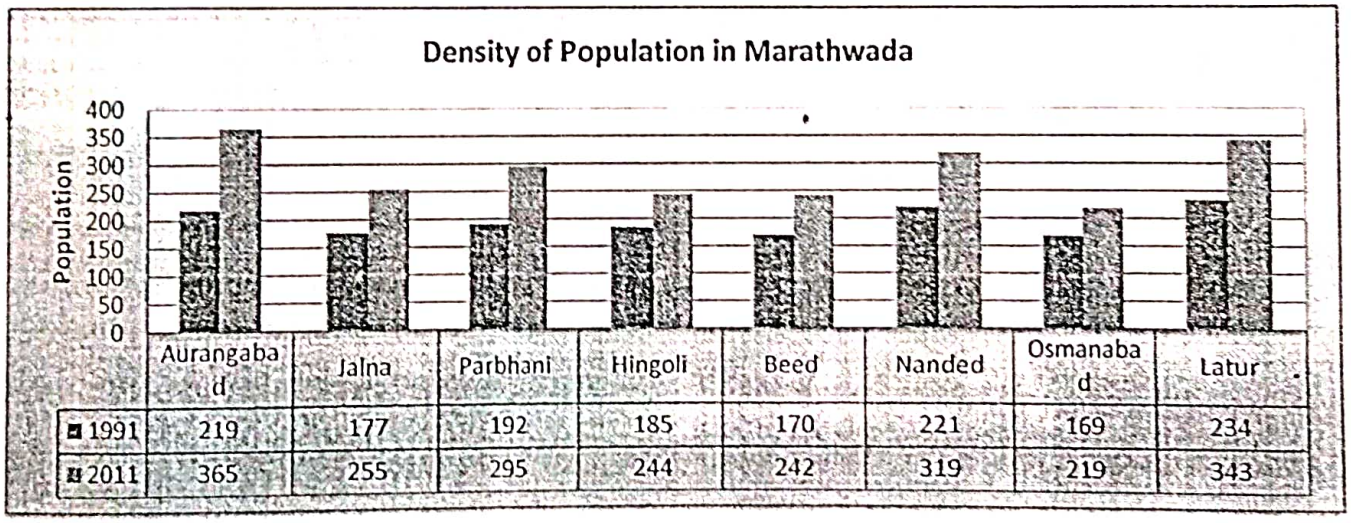
2001		2011	
Rainfall	**District**	**Rainfall**	**District**
Below 600	Osmanabad	Below 600	_
600 – 800	Aurangabad, Beed, Latur	600 – 800	Beed , Latur, Jalna
800 – 100	Jalna, Parbhani, Nanded	800 – 100	Aurangabad, Osmanabad, Nanded, Hingoli
Above 1000	Hingoli	Above 1000	_

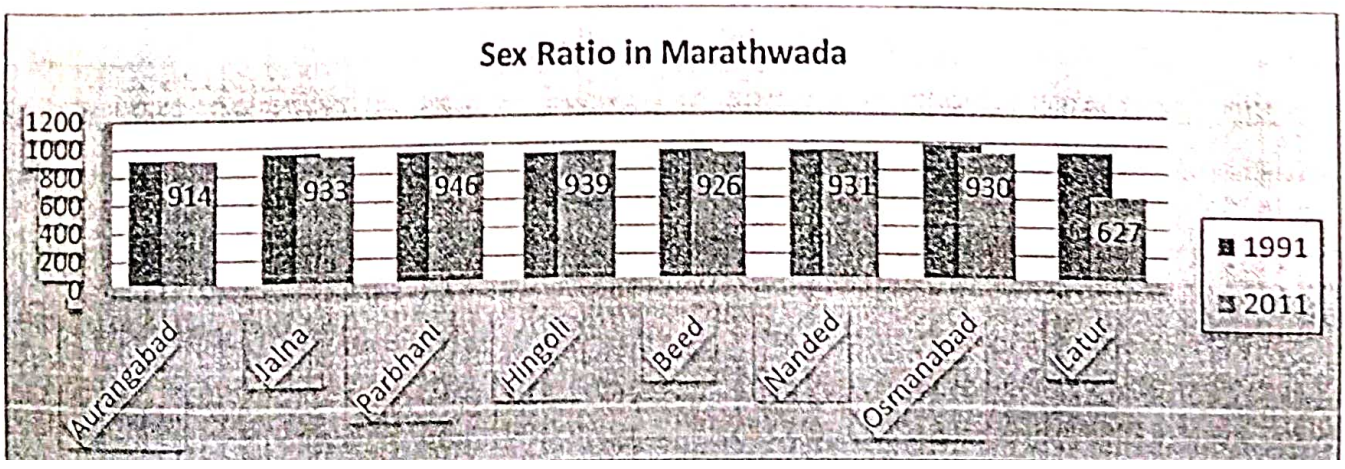
Source: Census of India 2001, 2011

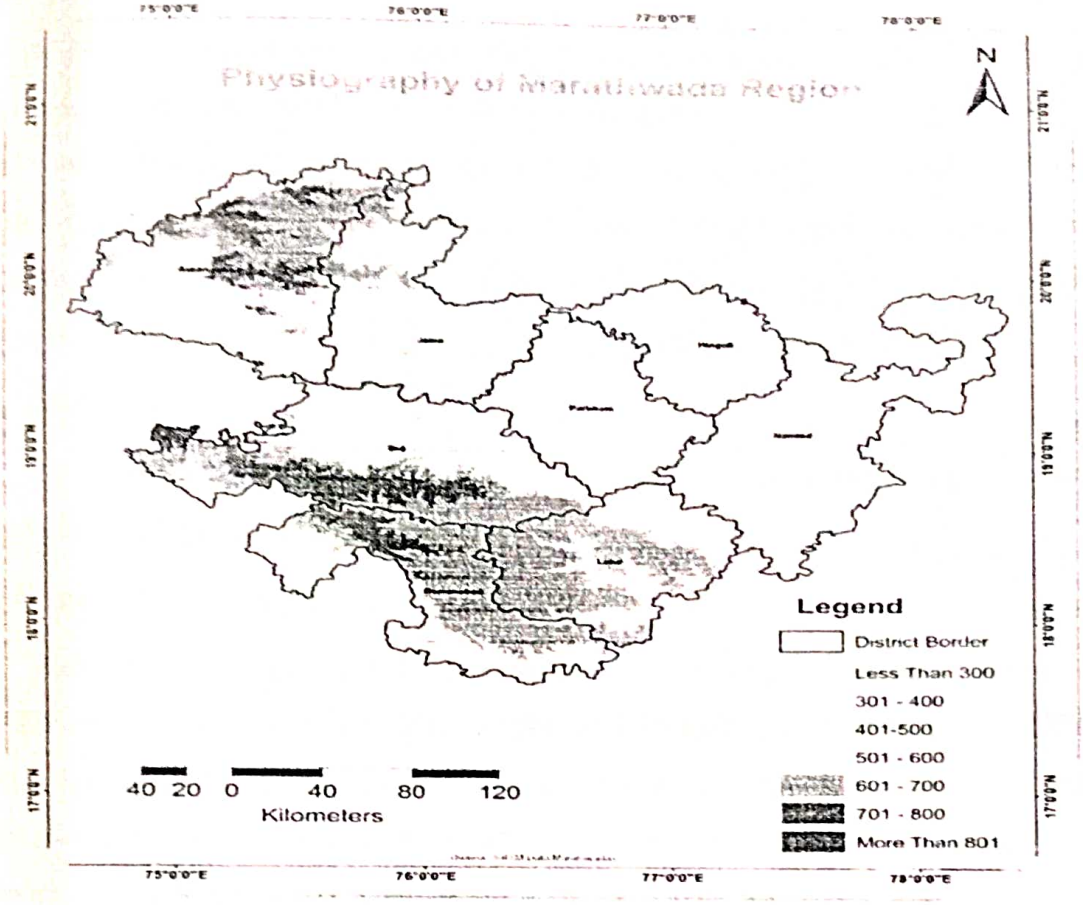
The above table clearly shows that above 100 mm rainfall occurred in Hingoli district in 2001, 800 – 1000 mm rainfall in Jalna, Parbhani and Nanded districts in 2001 whereas Aurangabad, Osmanabad, Nanded and Hingoli have the same rainfall in 2011. In 2001 below 600 mm rainfall observed in Osmanabad district. On the basis of the climatic data that the study area falls 600 – 1100 mm is the total annual rainfall, but it is very intensive fact

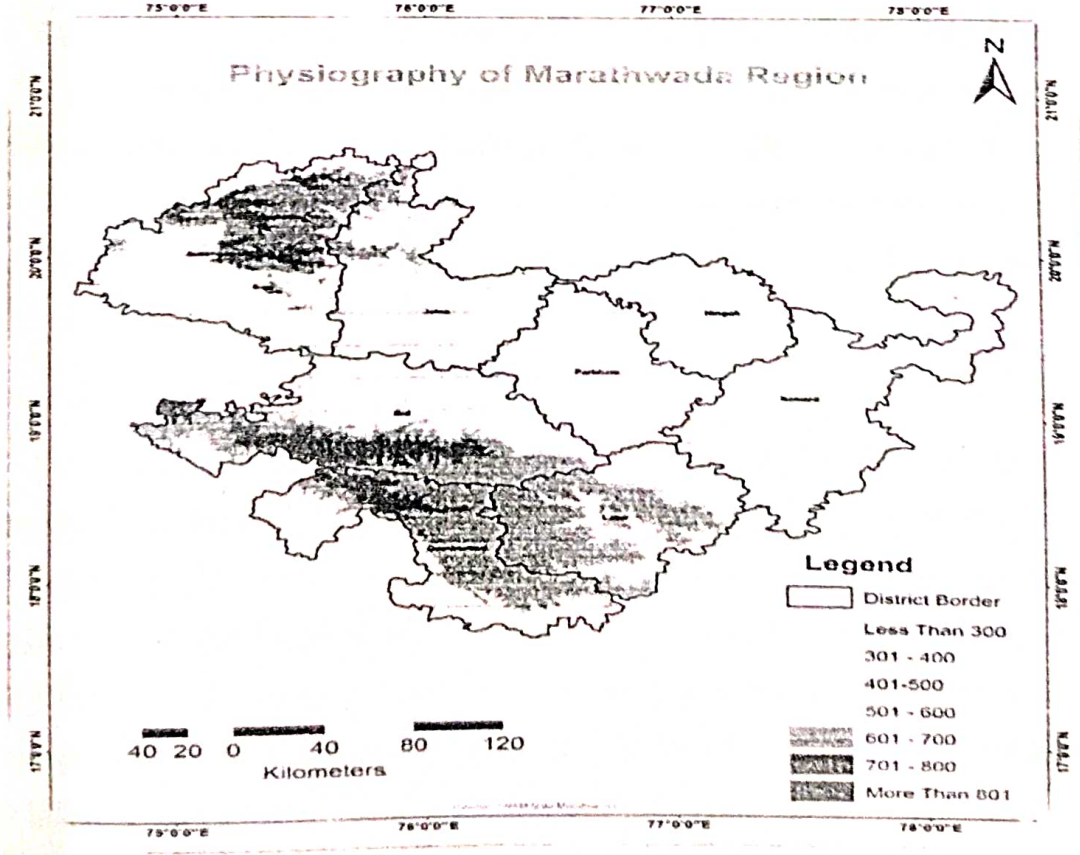
Table 2. District wise Density and Sex – ratio (1981 to 2011)

Sr. No.	Districts	No. of Tahsils	Density / sq. km				Sex Ratio(m/f) / thousand			
			1981	1991	2001	2011	1981	1991	2001	2011
1	Aurangabad	9	173	219	289	365	936	922	919	914
2	Jalna	8	119	177	209	255	970	958	952	933
3	Parbhani	7	149	192	229	295	967	953	957	946
4	Hingoli	5	-	185	218	244	-	-	953	939
5	Beed	11	133	170	202	242	965	945	943	926
6	Nanded	16	166	221	272	319	960	945	930	931
7	Osmanabad	8	137	169	195	219	958	987	930	930
8	Latur	10	175	234	290	343	959	942	334	627
Total		76	76.37	195.87	238	285.25	480.25	477.37	864.75	893.25
State		353	257	314	315	365	930	934	922	925






Physiography of Marathwada Region
N
Legend
District Border
Less Than 300
301 - 400
401-500
501 - 600
601 - 700
701 - 800
More Than 801
40 20 0 40 80 120
Kilometers
75°0'0"E
76°0'0"E
77°0'0"E
78°0'0"E


Physiography of Marathwada Region
N
Legend
District Border
Less Than 300
301 - 400
401-500
501 - 600
601 - 700
701 - 800
More Than 801
40 20 0 40 80 120
Kilometers
75°0'0"E
76°0'0"E
77°0'0"E
78°0'0"E

REVIEW OF LITERATURE:

The study of water resource geography as a separate branch is being done for the last five decade. It was considered as a study of hydrosphere in the beginnirg, which includes ground water besides oceanic water, subsequently after climatic and meteorological studies. The quantity of water existing in the atmosphere was also considered as a part of water resource geography. Since it was an important link of hydrological cycle In India many scholars and organizations have worked on distribution, use and management of water resource.

Mathur A.(1987)

He studied on Heavy Metal Pollution in Ganga river at Varanasi. For this study he selected 10 smples for analyzing t heavy metals.

Anuj Kumar Purwar (2009):

The author is working as a Sr. Lecturer in Civil Engineer Department, Kanpur. He had studied on GIS based water quality mapping for Allahabad city, India. In his paper a GIS based database consisting of various water quality parameters is prepared for their analysis in an efficient manner for Allahabad city. Water quality index model has been implemented and compared under GIS environment for assertion the quality of water.

M.Y. Kulkarni/S.Y. Shivanikar (2015):

These authors are presented a paper on Physiochemical analysis of Godavari River at Nav Ghat, Nanded. In this paper they are discussed about all general parameter of water such as Temperature,Turbidity,PH,DO,BOD,COD,TDS and TSS .He concluded that, water of Godavari river is polluted and Use of this polluted water may be cause various water diseases. Remedial measures are requiring to sustain the good quality of water and also to save the life of people as well as the biota of the river.

M.G. Lange& others (2015)

The authors are wrote a paper on Ground water Pollution Near the Industrial area at Jalgaon District of Maharashtra. In this article they are monthly analyzed the well and Tube well water, PH,BOD,COD,Total Hardness,Alkalinity,Chloride,Fluride,Turbidity,Total solid,TDS,TSS,Calcium,Sulphate and Magnesium these parameters were analyzed for well water. After that they concluded that, due to the vast industrialization improper waste management, pollutant are increased in surface and subsurface water in the near the Industrial area at MIDC, Jalgaon.

RESULT AND DISCUSSION:

Ground Water Quality:

The chemical quality of ground waters from the shallow basaltic aquifers is goodIn most samples the pH values range from 7.5 to 8.5 indicating the alkaline nature of the ground waters.. The drinking water quality was analyzed in all season. The water quality parameters such as Electrical conductivity, T.D.S, Hardness, Calcium, Mg, sodium, alkalinity, Chloride and Sulphate were analyzed. The water sample collected from 12 stations. One result was compared with water quality standards of WHO, ICMR indicated that it is not suitable for drinking. So, the water needs treatment before human consumption.

Water sample from different locations were also examined for the physio-chemical attributes (Table No.3). It was observed that was sample from hand pump, Dug wells and bore wells entire the study area.

Physical characteristics of water sample the entire water sample observed to be colorless. The temperature of different water samples ranged between 24° to 28°c. And no marked variation on temperature was observed during the study period. The P^{H}, values in sampling area ranged from 6.06 to 8.5 i.e. alkaline natures.

Chemical characteristics of water sample: Permissible quality is 1500 mg/L (WHO, 1984)[2] and recommended level of TDS (250-2100 Mg/L) for the protection of aquatic life (USEPA, 1975)[3]. Irrigation (ISI, 1982)[4] and domestics use (ICMR, 1975)[5]. The amount of TDS ranged between 416 to 1610 mg/l. The electrical conductivity is a function of ions concentration. This can be used for quick checking of dissolved substance in water. Langenegger (1990)[6] and Edet (1993)[7] have described the importance of electrical conductance EC were observed.

Total hardness is an important parameter of water quality. Calcium and Magnesium are the, principle cations responsible for hardness in present study values of Total hardness varied in between 148 to 750 Mg/L. These result exceed the limit set by WHO (150 Mg/L) and ISI (300 Mg/L) Thus the water is very hard water and not suitable for drinking and domestic purposes.

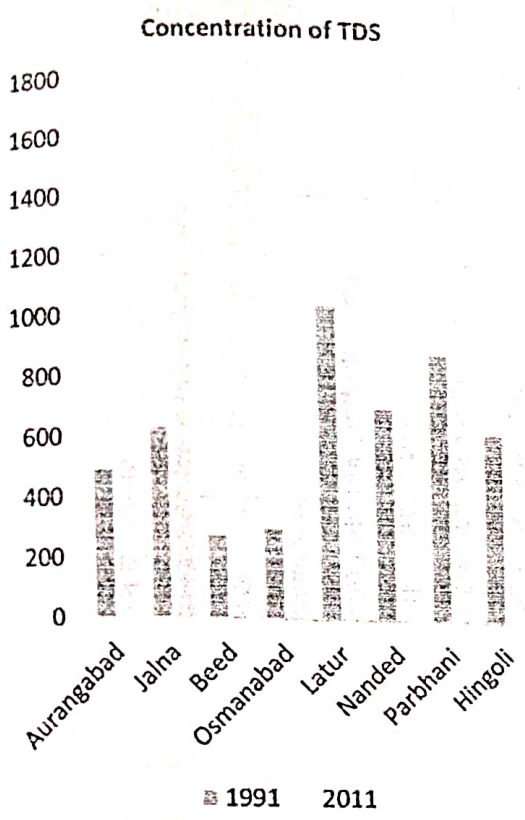
Ground water is one of the predominant source of drinking and other related requirements. It has the most exploited natural system due to over increasing demand of man for food, cloths, industrialization, enormous growth of population and agriculture. The drinking water quality was analyzed in all season. The water quality parameters such as T.D.S, Hardness, Calcium, Mg, were analyzed.

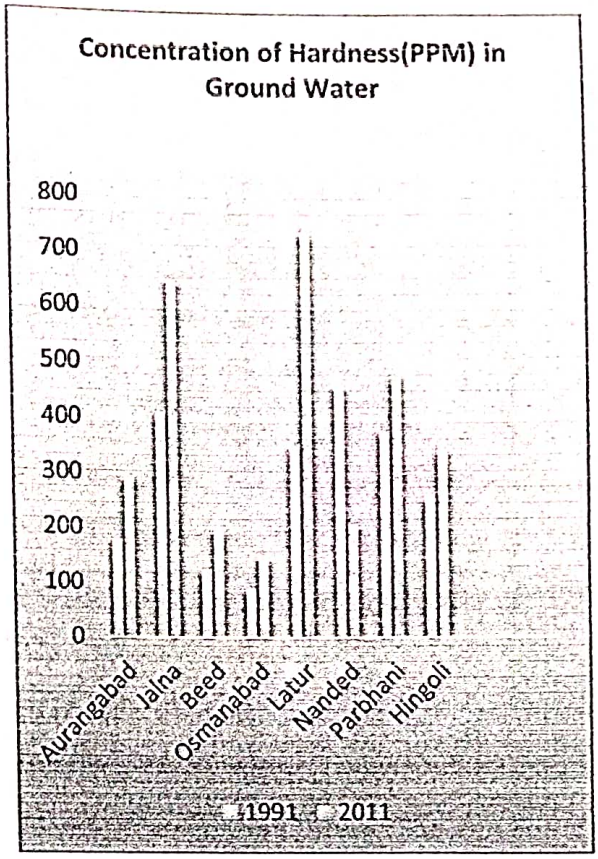
Table 3. Physio-chemical analysis of Ground water in Marathwada (1991-2011)

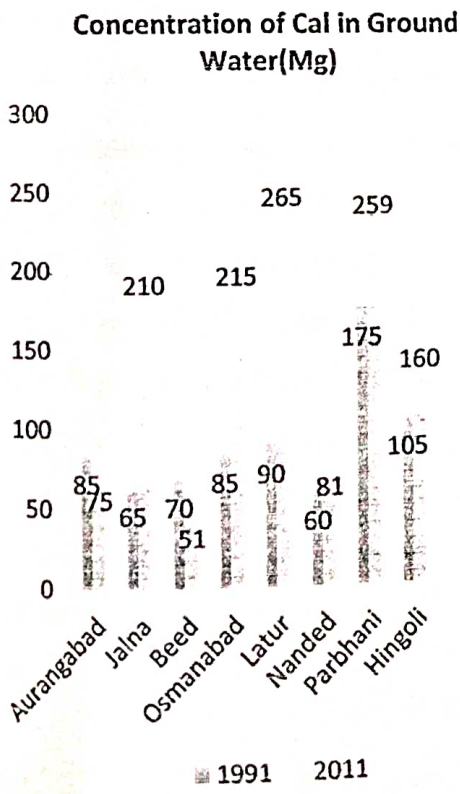
Sr. no.	Districts	Parameters							
		TDS (PPM)		Hardness (PPM)		Cal (Mg)		Mg(Mg)	
		1991	2011	1991	2011	1991	2011	1991	2011
1	Aurangabad	490	530	180	293	85	75	415	272
2	Jalna	631	1420	410	650	65	210	120	65
3	Beed	275	810	125	198	70	51	85	37
4	Osmanabad	300	416	90	148	85	215	105	158
5	Latur	1038	1605	350	740	90	265	83	159
6	Nanded	705	950	460	208	60	81	65	35
7	Parbhani	890	1200	375	478	175	259	10	142
8	Hingoli	630	810	260	345	105	160	75	60

Source: Compiled by researcher

The water sample collected from 08 stations in different tahsil of study area. Result was compared with water quality standards of WHO, BIS indicated that it is not suitable for drinking. So, the water needs treatment before human consumption. Higher concentration of TDS observed in Latur (1038 PPM) district in 1991 year, whereas 1605 recorded in 2011 year. On the other hand higher concentration of hardness observed 460 in Nanded district in 1991, but it is higher in Jalna in 2011.Higher percent of Ca (265mg) and higher percent of mg (272 mg) in Latur and Aurangabad district respectively. 1991-2011


Concentration of TDS
1800
1600
1400
1200
1000
800
600
400
200
0
Aurangabad
Jalna
Beed
Osmanabad
Latur
Nanded
Parbhani
Hingoli
1991
2011


Concentration of Hardness(PPM) in Ground Water
800
700
600
500
400
300
200
100
0
Aurangabad
Jalna
Beed
Osmanabad
Latur
Nanded
Parbhani
Hingoli
1991
2011


Concentration of Cal in Ground Water(Mg)
300
250
200
150
100
50
0
85
75
65
70
51
85
90
60
81
210
215
265
259
175
160
105
Aurangabad
Jalna
Beed
Osmanabad
Latur
Nanded
Parbhani
Hingoli
1991
2011

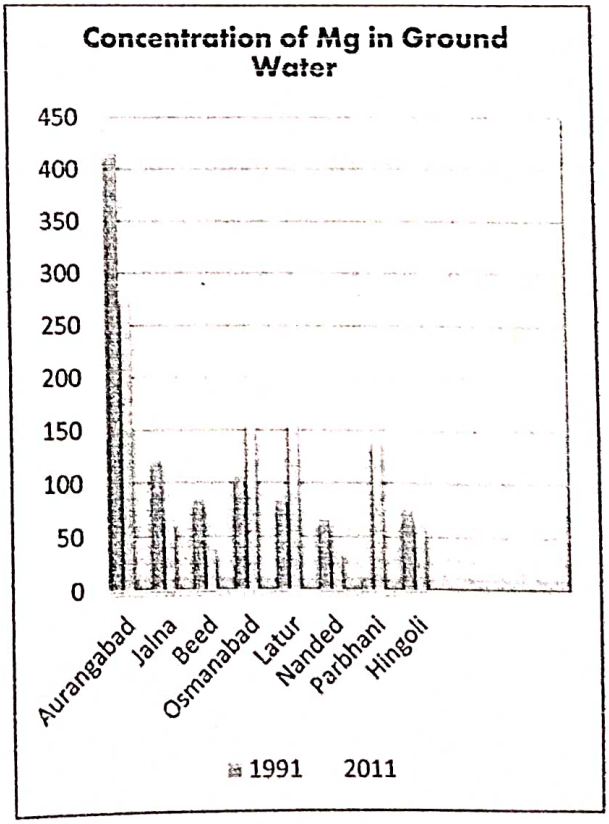

Concentration of Mg in Ground Water
450
400
350
300
250
200
150
100
50
0
Aurangabad
Jalna
Beed
Osmanabad
Latur
Nanded
Parbhani
Hingoli
1991
2011

Table 4. Classification of ground water quality of selected Taluka in Marathwada

Sr no.		1	2	3	4	5	6	7	8	Total
District		Abad.	Jalna	Beed	Os'bad	Latur	Nanded	Parbhani	Hingoli	
Taluka		Vaijapur	Jafrabad	Gevrai	Omerga	Latut	Kandhar	Sonpeth	Hingoli	
Excellent	NS	2	1	1	3	1	1	3	2	14
	%	2	8	4	11	2	8	25	4	
Good Water	NS	3	4	2	3	2	2	3	2	21
	%	50	54	57	79	58	83	50	71	
Poor water	NS	2	1	3	2	3	3	1	3	18
	%	36	21	39	5	11	8	25	25	
Very poor	NS	2	3	3	1	2	1	2	1	15
	%	7	4							
Unsuitable	NS	1	1	1	1	2	3	1	2	12
	%	5	13		5					
	Total	10	10	10	10	10	10	10	10	80

Source: Compiled by Researcher

With the help of GSDA, Maharashtra pollution control board has collected the samples and analyzes the quality of water from selected taluka of every district in Marahtwada region. 176 samples whereas analyzing from different location. it is found that 21 samples have excellence, 113 sample good water, 32 sample have poor water where as 6 samples water have unsuitable for drinking purposes. Hence there are imbalanced between water qualities.

Following Table. No. 5 shows that, higher percentage of ground water development stage is observed in Fulambri, Badnapur, 8, 9, (Beed), Osmanabad, Nilanga, Renapur, Mukhed, Patria ns Sengaon tehsils in Maharashtra whereas below 50 % in Pathan, Beed, Bhoom, Paranda (Osmanabad), Jalkot, except Ardhapur, Mukhed all tehsils in Nanded district all tehsils in Parbhani and Hingoli district in Marathwada region.

Table 5. Status of Ground water in Marathwada (CM^2)

Dist.	Sr. no.	Taluka	Net annual g/water	Irri	Dom /Indu	Total	Projected Demand for next 25 yrs.	Allocation for proj. demand	Stage of G/W Devp.	Category for future G/W Devp.
A'bad	1	A"bad	17561	10864	649	11513	1268	1268	66	Safe
	2	Fulambri	5600	4371	102	4473	207	207	80	Safe
	3	Gangapur	13990	9913	467	10380	968	725	74	Safe
	4	Kannad	17601	9601	486	10087	973	973	57	Safe
	5	Khultabad	6223	3204	197	3401	392	392	55	Safe
	6	Paithan	18320	7866	903	8769	1810	1609	48	Safe
	7	Sillod	14913	8302	365	8667	739	739	58	Safe
	8	Soygaon	6271	2108	101	2209	198	198	35	Safe
	9	Vaijapur	20344	13902	492	14394	971	971	71	Safe
		Total	120823	70131	3462	73593	7526	7082	544	Safe
Jalna	1	Ambd	12465	5660	124	5784	255	255	46	Safe
	2	Badnapur	5738	4515	63	4578	127	127	80	Safe
	3	Jalna	14172	8595	185	8780	373	373	62	Safe
	4	Bhokardan	17196	5276	101	5377	195	195	31	Safe
	5	Jafrabad	9062	5592	130	5722	256	256	63	Safe
	6	Partur	121612	6961	92	7053	185	185	56	Safe
	7	Mantha	8869	3296	113	3409	228	228	38	Safe
	8	Ghansavangi	11853	4369	85	4454	168	168	38	Safe
		Total	200967	44264	893	45160	1787	228	414	Safe
Beed	1	Gevrai	10623	4617	368	4984	741	707	47	Safe
	2	Ashti	16659	8269	806	9075	1616	1606	54	Safe
	3	Majalgaon	16487	8543	791	9334	1558	1558	57	Safe
	4	Patoda	3175	1641	69	1710	121	121	54	Safe
	5	Kaij	21109	11638	604	12242	1207	1207	58	Safe
	6	Ambejogai	15964	7855	649	8504	1319	1319	53	Safe
	7	Beed	14004	5643	345	5988	663	663	43	Safe
	8	Dharur	10438	3764	235	3998	495	495	38	Safe
	9	Parali(V)	8444	4601	312	4913	622	622	58	Safe
	10	Vadvani	6996	3468	280	3748	559	559	54	Safe
	11	Shirur(K)	9869	3739	302	4041	619	619	41	Safe
		Total	133768	63778	4761	68537	9520	9520	557	Safe
Os'bad	1	Bhoom	6464	2792	101	2893	204	204	45	Safe
	2	Paranda	13421	6110	197	6307	392	392	47	Safe
	3	Osmanabad	22011	16528	355	16883	705	705	77	Safe
	4	Kalamb	15334	11492	325	11817	655	655	76	Safe

	5	Tuljapur	22236	10424	400	11124	796	796	50	Safe
	6	Omerga	17002	11693	281	11974	518	518	70	Safe
	7	Washi	9255	6214	162	6376	324	324	69	Safe
	8	Lohara	9044	6302	151	6452	303	303	71	Safe
		Total	114767	71555	1972	73826	3897	3897	505	Safe
Latur	1	Ahmadpur	14803	8355	304	8659	623	558	58	Safe
	2	Anantpal	2876	2126	52	2178	145	137	76	Safe
	3	Ausa	26266	19989	332	20321	665	650	77	Safe
	4	Chakur	8537	7253	162	7415	342	140	87	Safe
	5	Devni	3376	1911	65	1976	641	141	59	Safe
	6	Jalkot	3258	1496	36	1533	96	96	47	Safe
	7	Latur	20034	18639	335	18973	666	465	95	Safe
	8	Nilanga	20811	17442	422	17804	789	643	89	Safe
	9	Renapur	8098	7049	135	7183	269	171	89	Safe
	10	Udgir	11957	7358	221	7599	394	394	64	Safe
		Total	120016	91618	2064	93641	4630	3395	741	Safe
Nanded	1	Ardhapur	4530	2888	76	2964	150	150	65	Safe
	2	Bhokar	9087	2592	87	2679	176	176	29	Safe
	3	Biloli	7502	1492	109	1601	242	242	21	Safe
	4	Degloor	7811	1591	304	1895	612	612	24	Safe
	5	Dharmabad	3564	722	53	775	122	122	22	Safe
	6	Hadgaon	14086	5042	214	5255	428	428	37	Safe
	7	Himayat n	6417	2423	67	2490	152	152	39	Safe
	8	Kandhar	12502	2776	204	2980	401	401	24	Safe
	9	Kinwat	18593	3146	270	3416	538	538	18	Safe
	10	Lohara	12924	4473	224	4697	448	448	36	Safe
	11	Mahur	7275	1478	126	1603	236	236	22	Safe
	12	Mukhed	15938	3113	354	5467	710	710	85	Safe
	13	Naigaon	7656	1570	126	1696	232	232	22	Safe
	14	Nanded	6521	2606	341	2947	681	681	45	Safe
	15	Umari	4972	1270	100	1370	183	183	28	Safe
		Total	**139378**	**37182**	**2655**	**41835**	**5311**	**5311**		Safe
Parbhani	1	Gangakhed	7997	6001	150	1751	313	5627	22	Safe
	2	Jintoor	18520	6307	213	6520	399	11339	35	Safe
	3	Manwat	6258	2097	100	2797	198	3070	45	Safe
	4	Palam	5839	1594	89	1683	182	4525	29	Safe
	5	Parbhani	16606	5315	266	5581	521	10696	34	Safe
	6	Pathri	7972	3606	163	3769	315	3942	47	Safe
	7	Purna	12438	3066	157	3233	337	8872	26	Safe
	8	Selu	8197	3180	131	3310	275	4809	40	Safe
	9	Sonpeth	3544	678	67	745	132	2628	21	Safe
	1	Gangakhed	7997	6001	150	1751	313	5627	22	Safe
	2	Jintoor	18520	6307	213	6520	399	11339	35	Safe

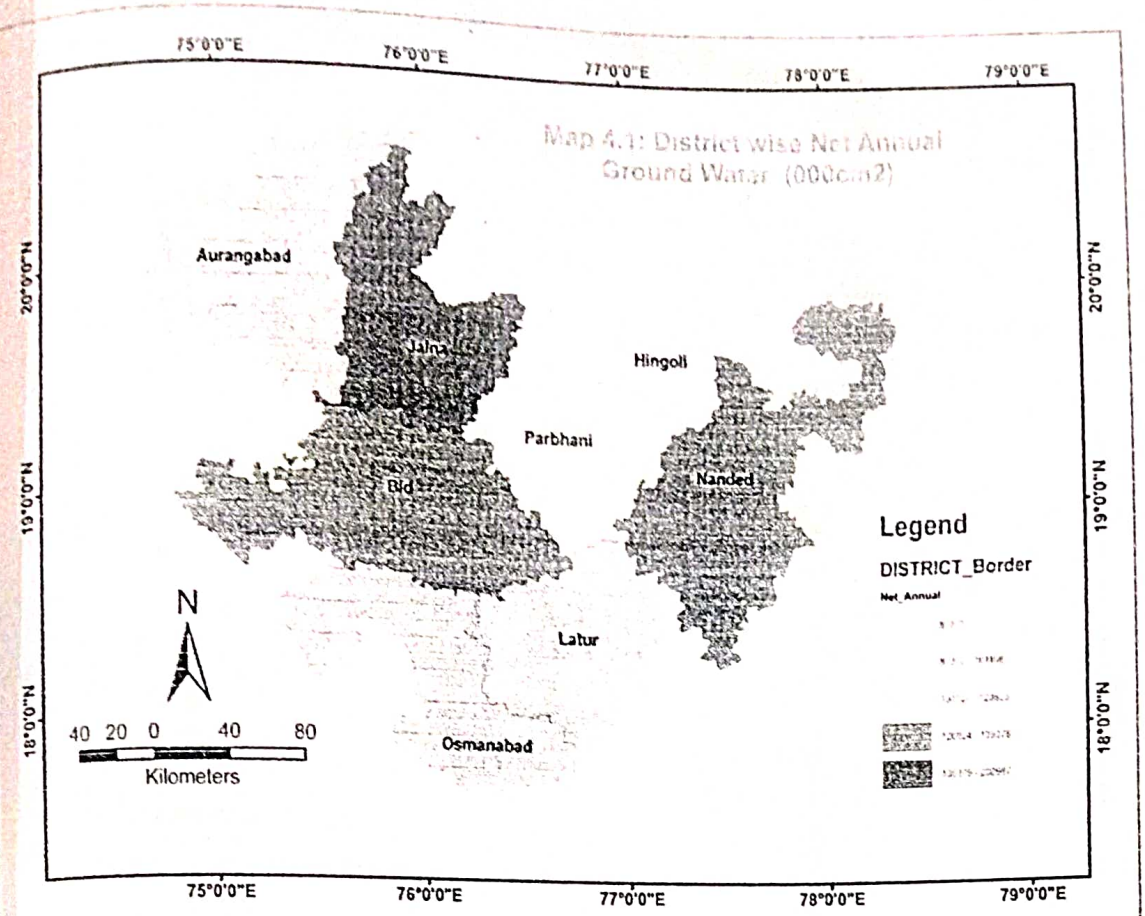
	3	Manwat	6258	2097	100	2797	198	3070	45	Safe
	4	Palam	5839	1594	89	1683	182	4525	29	Safe
		Total	87371	31844	1336	29389	2672	55508	299	Safe
Hingoli	1	Aundha	21582	6428	595	7024	1148	1148		Safe
	2	Basmat	31266	11963	500	12463	1023	1023		Safe
	3	Hingoli	14116	4530	271	4801	551	551		Safe
	4	Kalmunari	17458	7427	279	7707	570	570		Safe
	5	Sengaon	16684	5896	117	6013	234	234		Safe
		Total	101106	36244	1762	38008	3526	3526	517	Safe

Source: Compiled by Researcher

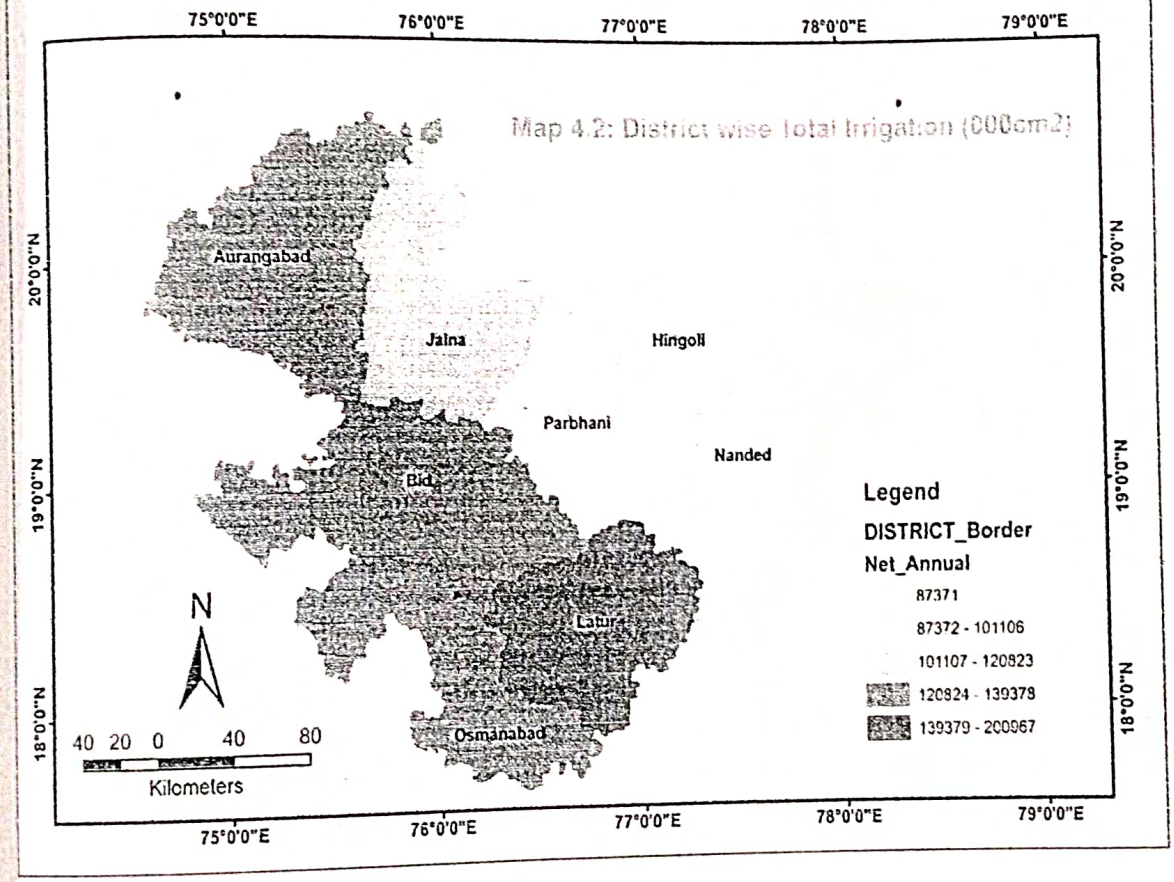
Following Table. shows that, higher percentage of ground water development stage is observed in Fulambri, Badnapur, 8, 9, (Beed), Osmanabad, Nilanga, Renapur, Mukhed, Patria ns Sengaon tehsils in Maharashtra whereas below 50 % in Pathan, Beed, Bhoom, Paranda (Osmanabad), Jalkot, except Ardhapur, Mukhed all tehsils in Nanded district all tehsils in Parbhani and Hingoli district in Marathwada region.

Table 6. Grand total Status of Ground water in Marathwada (000cm2)

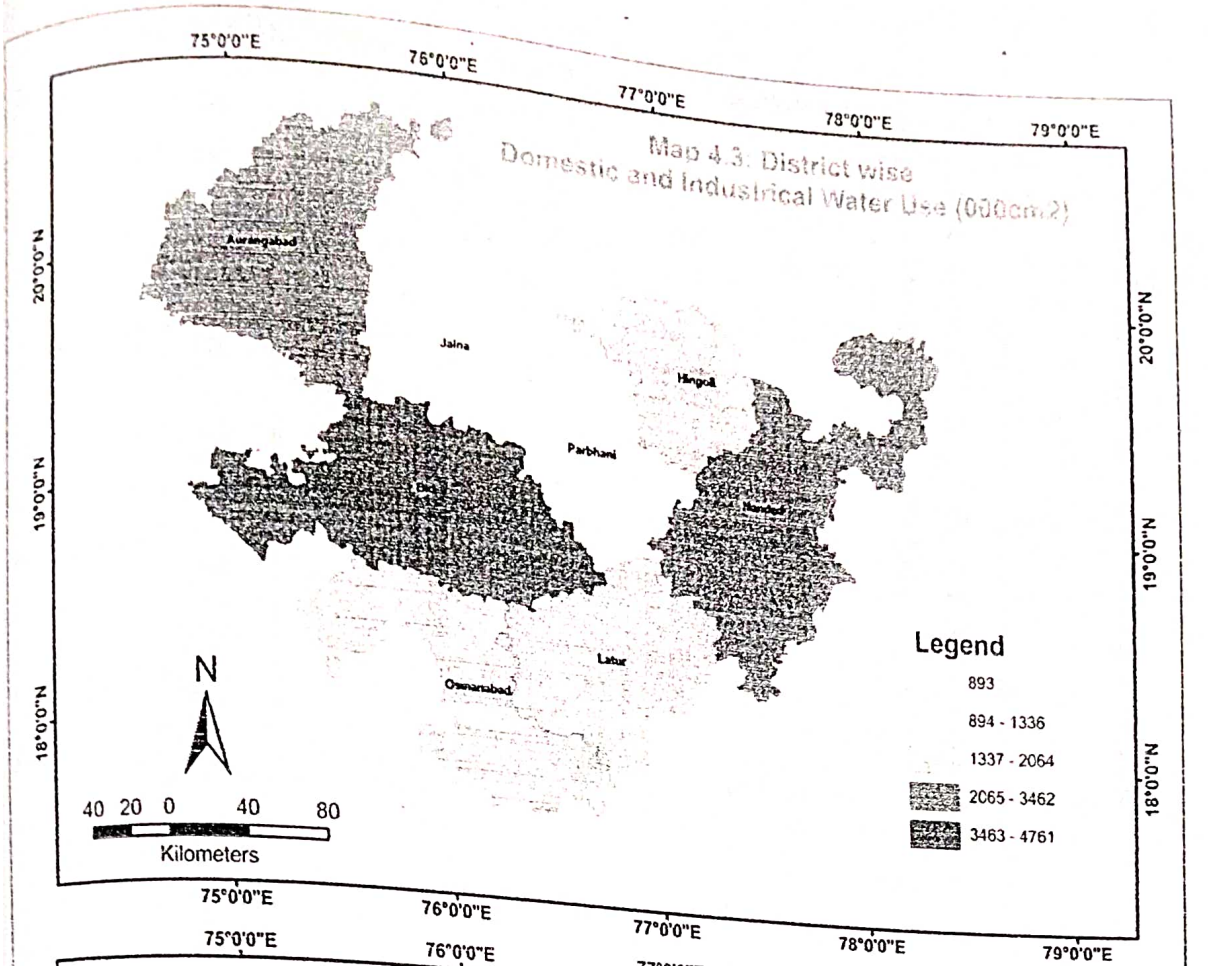
District	Net annual g/water	Irri	Dom /Indu	Total	Projected Demand for next 25 yrs.	Allocation for proj. demand	Stage of G/W Devp. %	Status
Aurangabad	120823	70131	3462	73593	7526	7082	544	Safe
Jalna	200967	44264	893	45160	1787	228	414	Safe
Beed	133768	63778	4761	68537	9520	9520	557	Safe
Osmanabad	114767	71555	1972	73826	3897	3897	505	Safe
Latur	120016	91618	2064	93641	4630	3395	741	Safe
Nanded	139378	37182	2655	41835	5311	5311	609	Safe
Hingoli	101106	36244	1762	38008	3526	3526	517	Safe
Parbhani	87371	31844	1336	29389	2672	55508	299	Safe
Total	1018196	446616	18905	463989	38869	88467	4186	Safe



Map 4.1: District wise Net Annual Ground Water (000cm2)



Map 4.2: District wise Total Irrigation (000cm2)


Map 4.3: District wise
Domestic and Industrical Water Use (000cm2)
75°0'0"E
76°0'0"E
77°0'0"E
78°0'0"E
79°0'0"E
20°0'0"N
19°0'0"N
18°0'0"N
Aurangabad
Jalna
Hingoli
Parbhani
Beed
Nanded
Latur
Osmanabad
N
40 20 0 40 80
Kilometers
Legend
893
894 - 1336
1337 - 2064
2065 - 3462
3463 - 4761

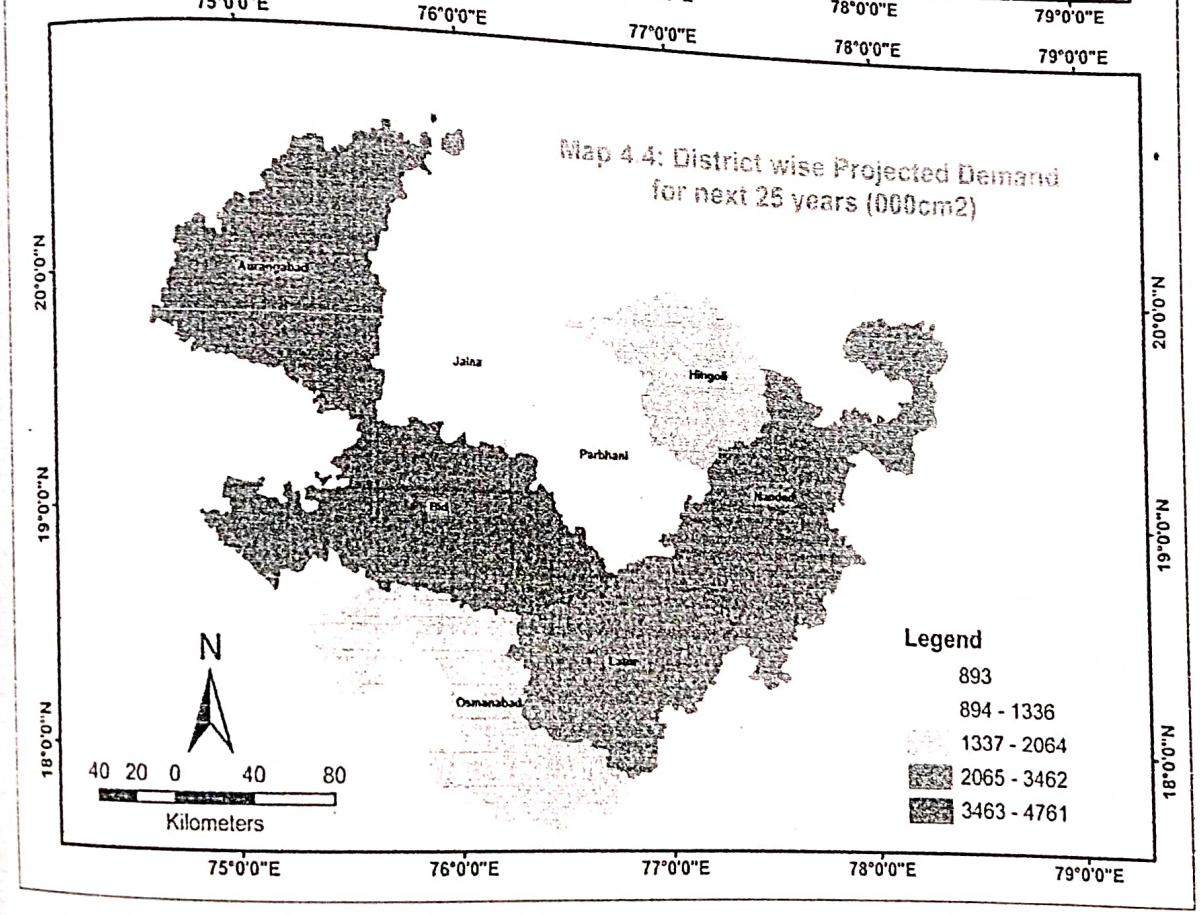
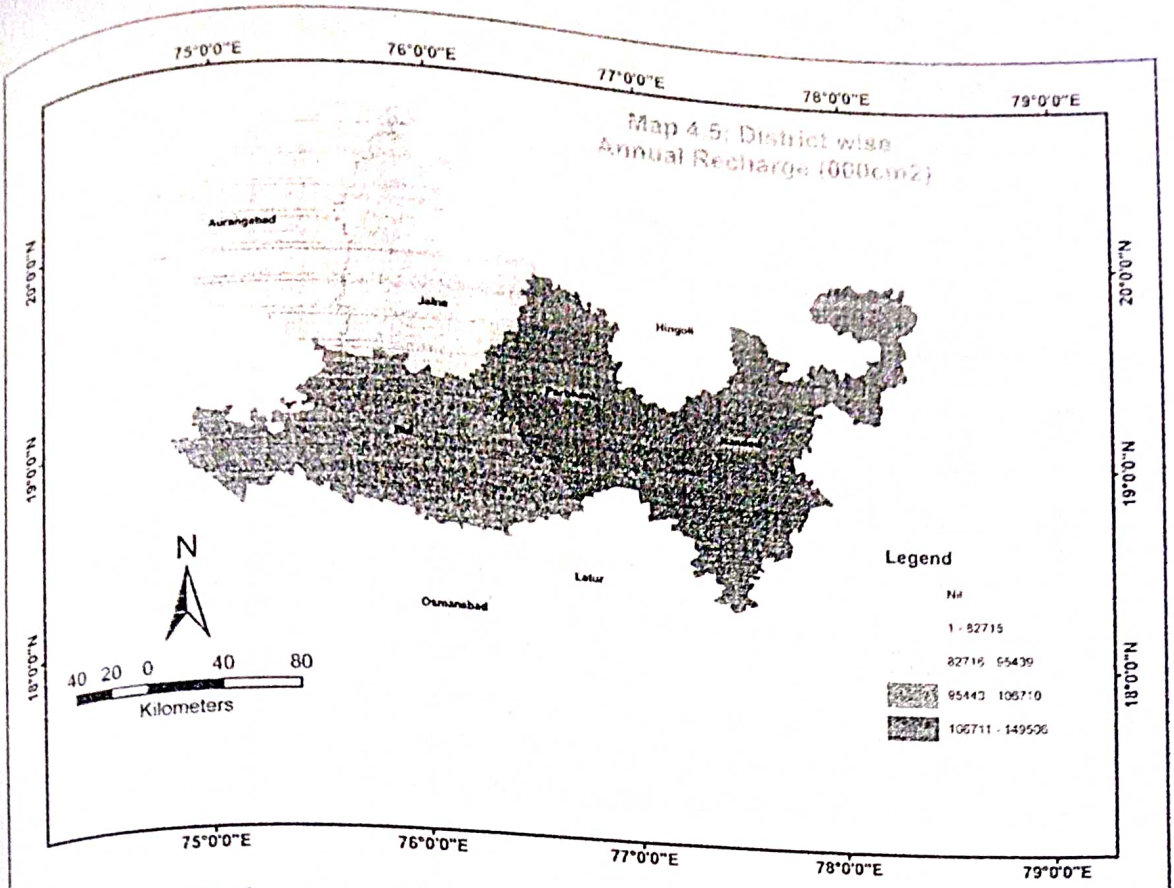
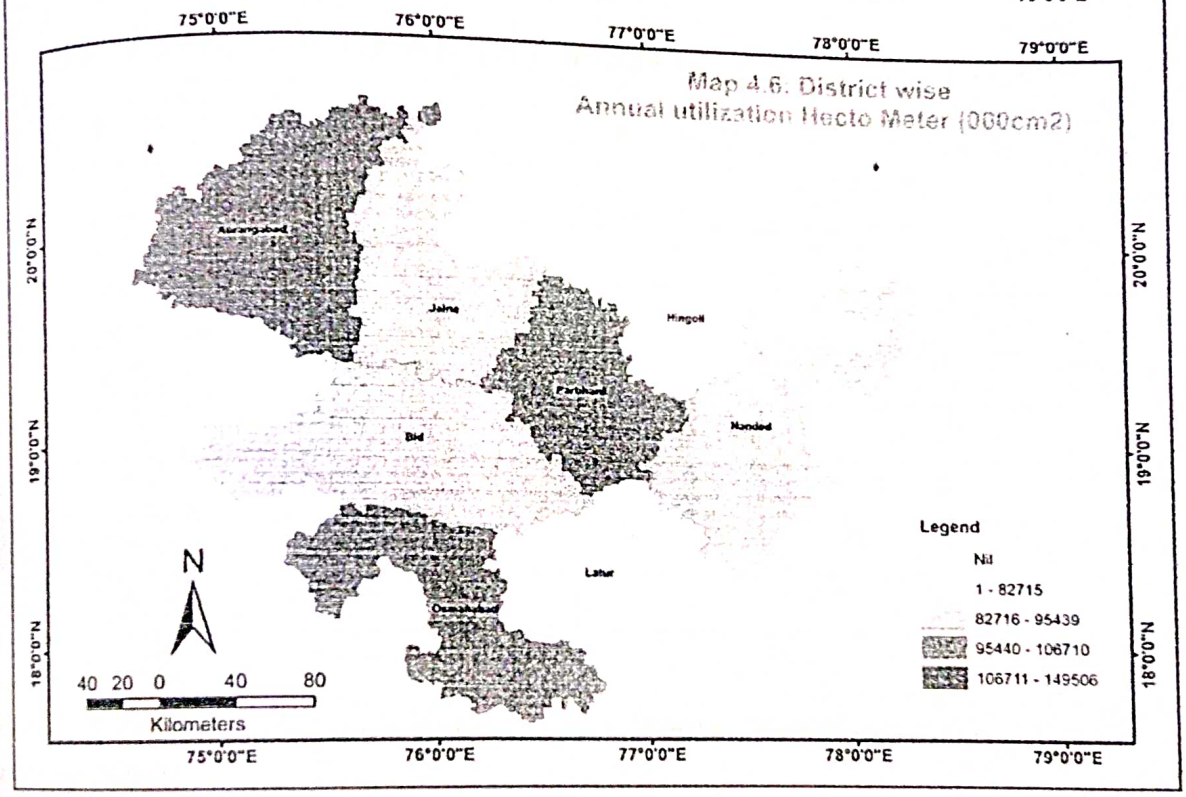

Map 4.4: District wise Projected Demand
for next 25 years (000cm2)
75°0'0"E
76°0'0"E
77°0'0"E
78°0'0"E
79°0'0"E
20°0'0"N
19°0'0"N
18°0'0"N
Aurangabad
Jalna
Hingoli
Parbhani
Beed
Nanded
Latur
Osmanabad
N
40 20 0 40 80
Kilometers
Legend
893
894 - 1336
1337 - 2064
2065 - 3462
3463 - 4761

Table 7. District wise Ground water state in Marathwada (2011)

Sr. No	Districts	Geog. Area 00km2	Annual Recharge	Annual utilization			Non-usable capacity			Total irri capacity
				Hecto meter	No. of wells	Irri.Capa. (Hect)	Hecto meter	No. of wells	Irri. Capa. (Hect)	
1	A'bad	10107	87226	35355	23569	47138	51871	34578	69156	116294
2	Jalna	7718	95439	19895	13130	26260	75744	50496	100912	127252
3	Beed	10793	106710	20089	13392	26784	86628	57752	115504	142288
4	Parbhani	6355	146715	27096	18064	36128	119619	79796	159492	195620
5	Nanded	10528	149506	20986	13990	27980	128514	85676	171352	199322
6	Osmanabad	7569	82715	26039	17359	34718	56676	34784	75568	110286
7	Latur	7157	73880	16674	11116	22232	57206	38137	76274	98526
8	Hingoli	4686	-	-	-	-	-	-	-	-
Total		64913	742192	165934	110622	221244	576258	384172	768344	989588



Map 4.5: District wise
Annual Recharge (000cm2)



Map 4.6: District wise
Annual utilization Hecto Meter (000cm2)

Table 8: Average Water Level in Command Area of Marathwada-2011 (mbgl)

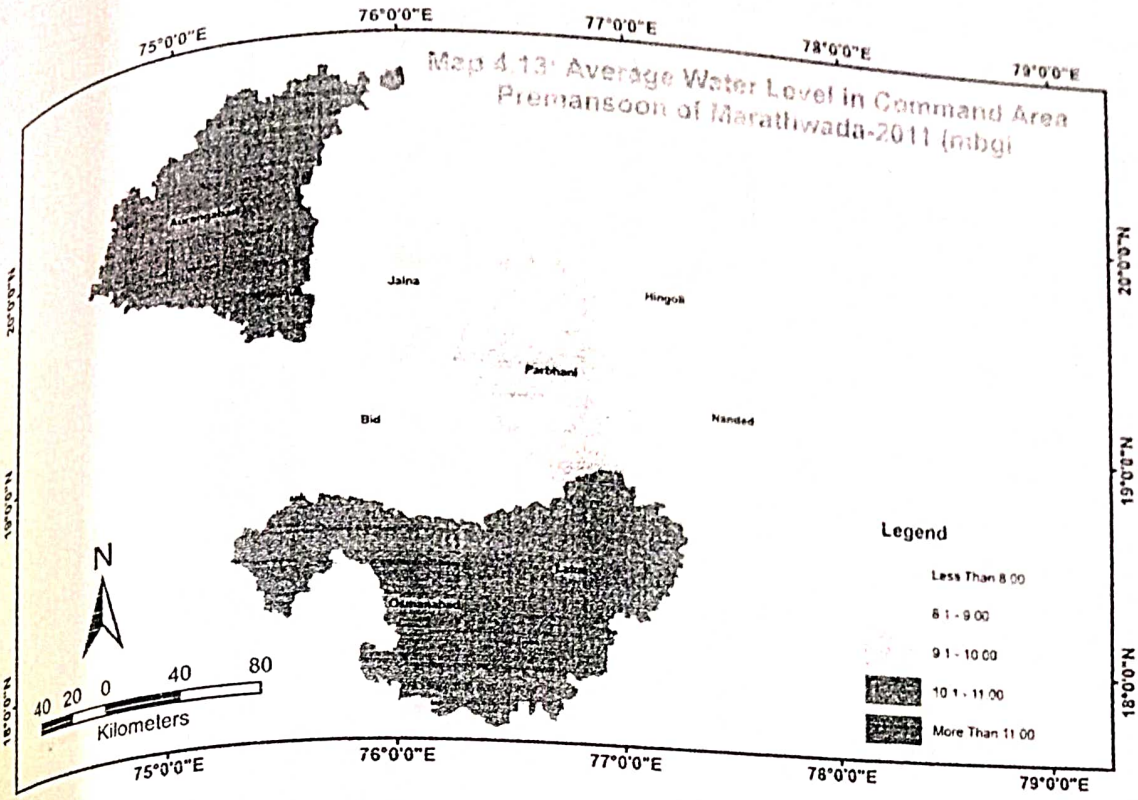
Sr. no	Districts	Premansoon	Post mansoon
1	Aurangabad	11.01	6.05
2	Jalna	8.68	3.94
3	Beed	8.79	4.82
4	Osmanabad	10.19	4.73
5	Latur	10.47	3.95
6	Nanded	7.93	3.73
7	Parbhani	9.12	4.52
8	Hingoli	7.83	3.42

Above table clearly shows that, Average Water Level in Command Area ofAurangabad observed 11.01 in premanson, whereas 6.05 in post mansoon. Hence, the growth of water table level has increased in Osmanabad, latur nanded and Parbhani district.

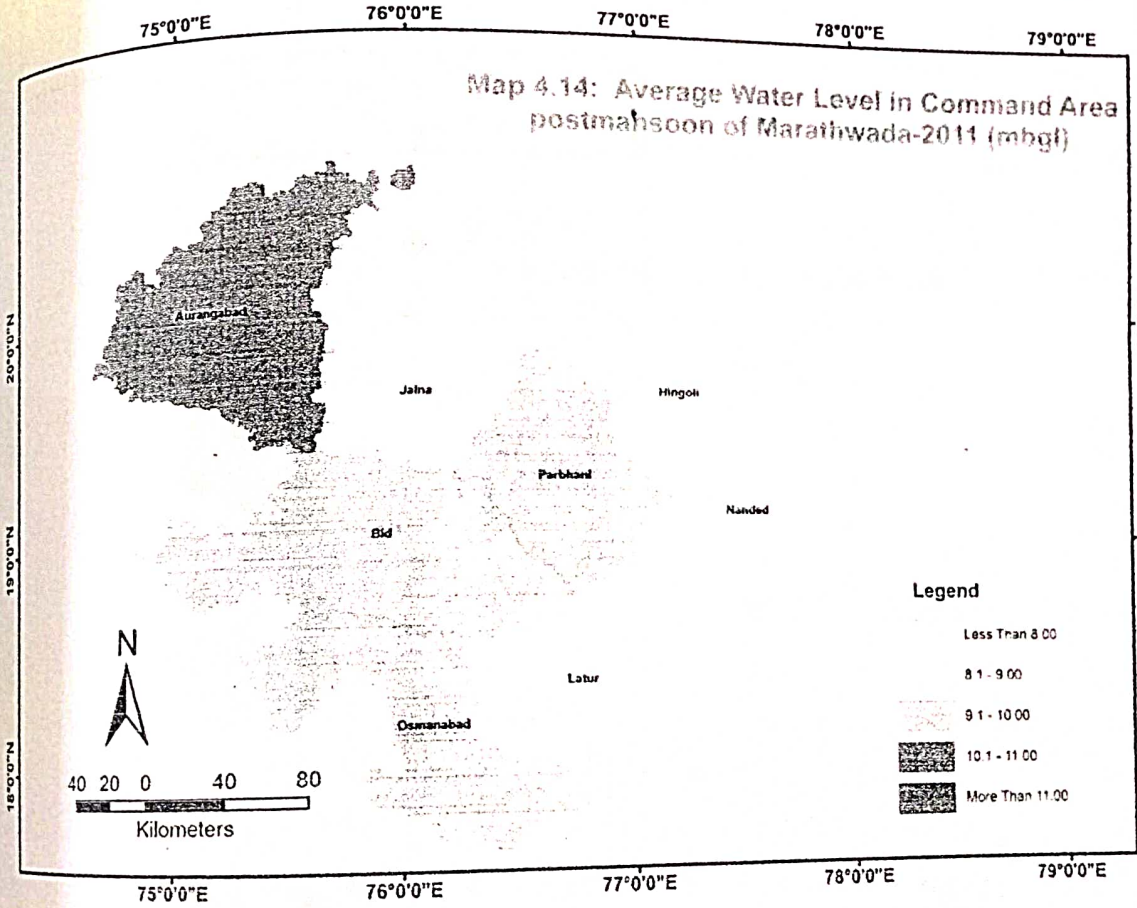
Table 9. Average Water Level in Non-Command Area of Marathwada-2011 (mbgl)

Sr. no	Districts	Premansoon	Post mansoon
1	Aurangabad	10.77	6.05
2	Jalna	9.32	4.54
3	Beed	8.96	4.26
4	Osmanabad	10.33	4.45
5	Latur	10.18	4.33
6	Nanded	8.3	3.98
7	Parbhani	9.68	4.62
8	Hingoli	9.83	4.38

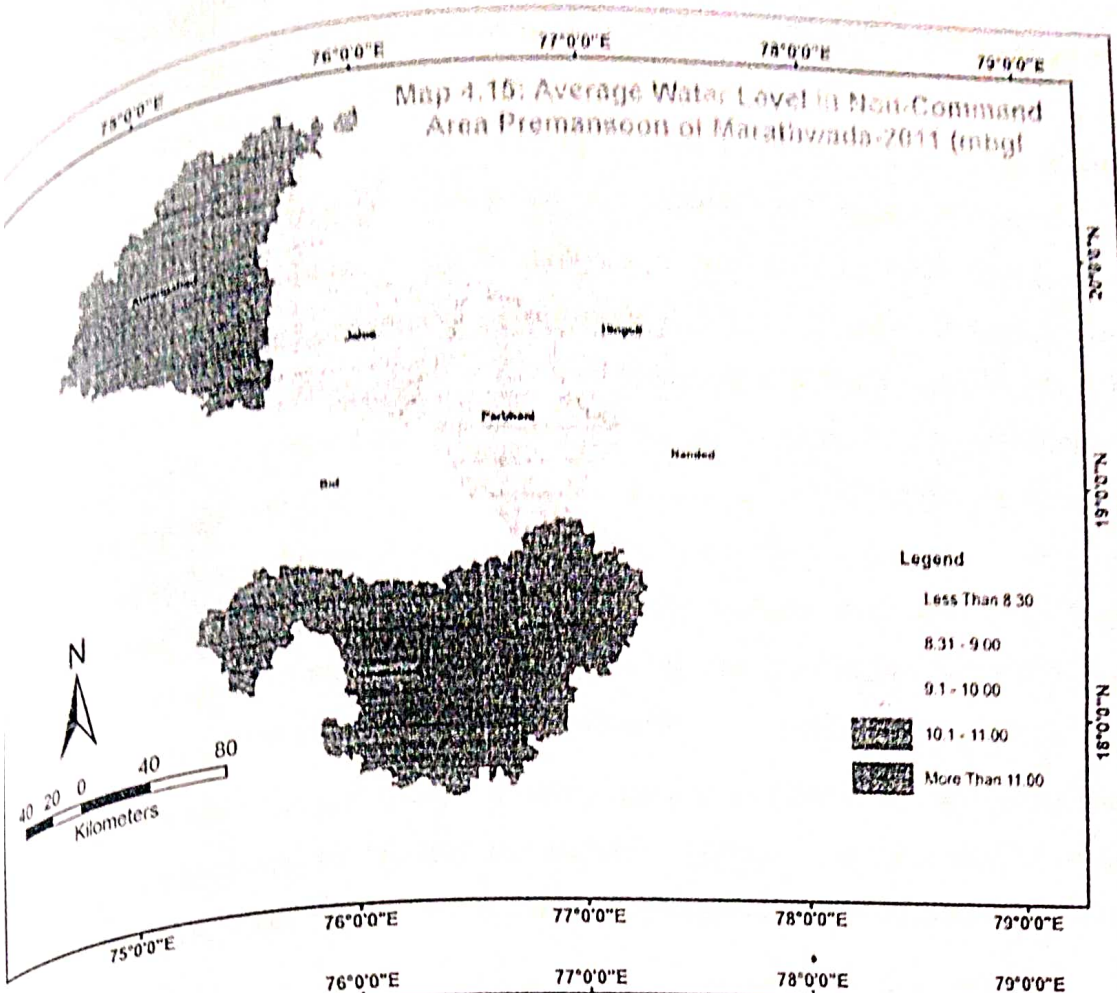
Table no.9 shows that, Average Water Level in Non-Command Area of study region is analyses in pre and postmansoon.

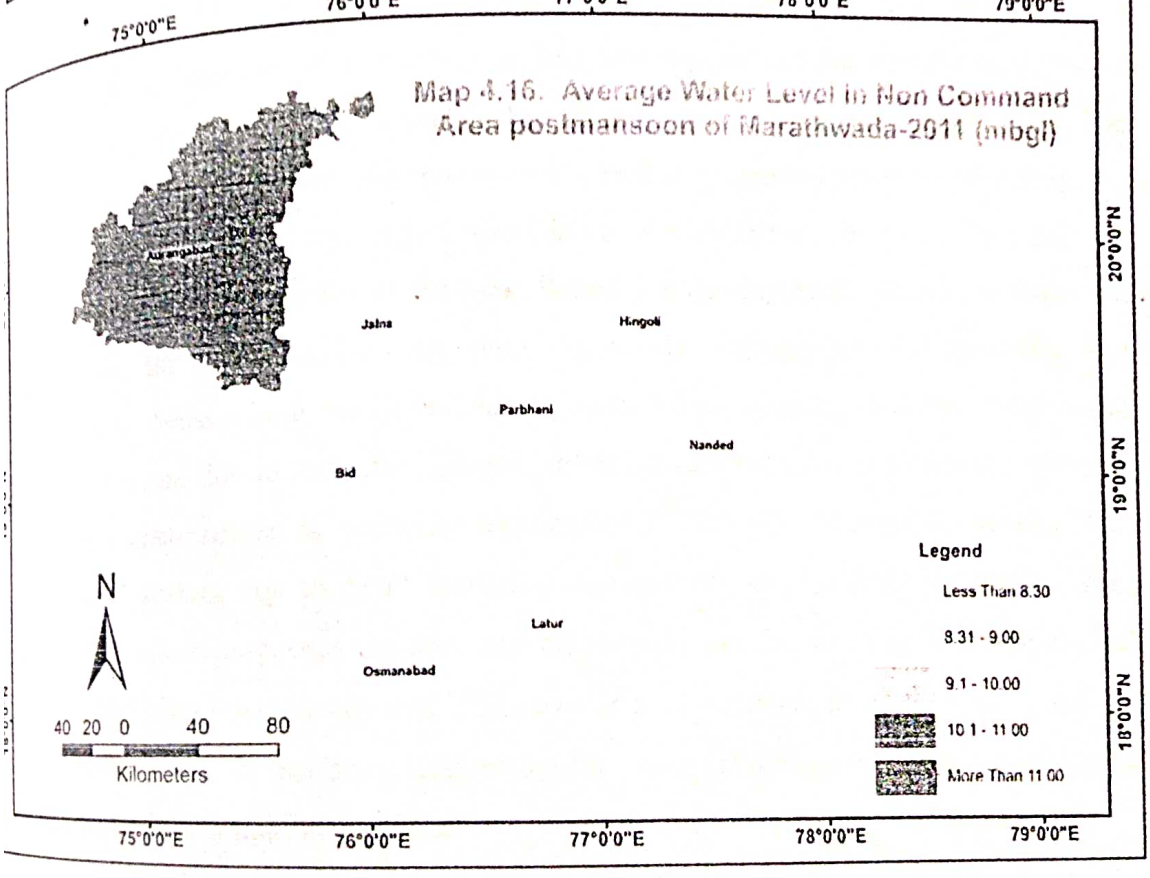


Map 4.13: Average Water Level in Command Area Premansoon of Marathwada-2011 (mbgl



Map 4.14: Average Water Level in Command Area postmahsoon of Marathwada-2011 (mbgl)


Map 4.15: Average Water Level in Non-Command Area Premansoon of Marathwada-2011 (mbgl
76°0'0"E
77°0'0"E
78°0'0"E
79°0'0"E
75°0'0"E
Jalna
Hingoli
Parbhani
Nanded
Bid
Legend
Less Than 8.30
8.31 - 9.00
9.1 - 10.00
10.1 - 11.00
More Than 11.00
N
40 20 0 40 80
Kilometers


Map 4.16. Average Water Level in Non Command Area postmansoon of Marathwada-2011 (mbgl)
76°0'0"E
77°0'0"E
78°0'0"E
79°0'0"E
75°0'0"E
Jalna
Hingoli
Parbhani
Nanded
Bid
Latur
Osmanabad
Legend
Less Than 8.30
8.31 - 9.00
9.1 - 10.00
10.1 - 11.00
More Than 11.00
N
40 20 0 40 80
Kilometers

Water in both urban and rural Maharashtra and also an important source of water for agricultural and the industrial sectors. Water utilization projections for the year 2011 put groundwater usage at about 50 per cent. Being an important and integral part of the ological cycle, its availability depends on the rainfall and recharge conditions. ndwater is used as an important supplementary source of water in study area have a number of wells, which supply water for domestic as well as irrigation purposes. The growth of urban development in this region and inadequacy of piped water supply has o over abstraction of water from these wells. This has resulted in the intrusion of ater into the underground reservoir affecting the quality of the well water. Analysis of dwater in nanded and Aurangabad district indicates that the water at most places is When compared with the WHO and ISI guidelines for drinking water, most of the tube water is contaminated, hence, unsuitable for drinking. The groundwater in most of the strial and residential areas of Aurangabad is moderately polluted.

udy region water table has gown down in many areas as a recent of indiscriminate and withdrawal ground water for drinking and sanitation purposes, with lowering of water the cost of ground water extraction has not only increased but also affected the quality ater.

Tremendous increase of population in last two decade has put extra trace in water ce in any area .The ground water quality directly depends upon geology of the area .The ge water released from city contributes to the pollutant ground water surrounding the . Therefore, detail study of hydro geological and hydro chemical condition of the area. To rstand the groundwater quality of the hour. Water is most important natural resource. We nd on water for irrigation, industry, domestic needs, shipping and for sanitation and osal of waste. Most of our water bodies as ponds, lakes, streams, river, sea, and ocean become polluted due to industrial growth, urbanization and other man made problems. nd water contamination is generally irreversible (Chatterji). Ground water has been oited natural system due to over increasing demand of man for drinking, agricultural, strial and domestic purposes. Calcium and magnesium are the major cations responsible ardness. The high concentration of TDS, hardness is observed in ground water and its cts on human being. In the present investigation the relationship between ground water ity and health effects has been studied.

...ntration of nitrate in ground water, a result of excessive use of chemical
... already reported in Beed, Osmanabad and Parbhani district.

...ecreasing completion of ground water, the water table has dropped by over 300
...ved in many villages in Osmanabad, Beed and Latur district.

...some part of this study area is affected by several water scarcities. Mostly
...affected taluka observed in major part of Marathawada.

...alysis of groundwater in Nanded and Aurangabad district indicates that the water at most
...ted. When compared with the WHO and ISI guidelines for drinking water, most of the
...water is contaminated, hence, unsuitable for drinking. The groundwater in most of the
...ial and residential areas of Aurangabad is moderatelypolluted.Calcium and magnesium are
...ations responsible for hardness. The high concentration of TDS, hardness is observed in
...water and its effects on human being. In the present investigation the relationship between
...water quality and health effects has been studied.

RENCES:

APHA (1992) Standard Methods for the Examination of Water and Waste Water,18th edition, USA.

Arnold, Craig Anthony (Tony). 2009. "Water Privatization Trends in the United States: Human Rights, National Security, and Public Stewardship." William and Mary Environmental Law and Policy Review 33: 785. Available from SSRN at http://ssrn.com/abstract=1407720.

Mathur A.(1987)Study of River Ganga at Varanasi with special emphasis on heavy Metal pollution, Pollution Research,6(1)Pag37-44

Anujkumar Parawar (2009, GIS based water quality mapping for Allahabad city, Journal of Indian Water Works Association, Kanpur.

M.Y. Kulkarni,S.V. Shivanikar(2015), Physiochemical analysis of Godavari River at Nav Ghat, Nanded. Proceeding of National Conference on Water Management: Need of Future,Org.by Vaijnathnath College,Parali,ISBN978-93-84451-42-4,feb.2015,Page 58-60

M.G.Lange,S.S.Badade,B.V.Kendre,Rathod R.D.Suresh Dhage(2015), Ground water Pollution Near the Industrial area at Jalgaon District of Maharashtra, Proceeding of National Conference on Water Management: Need of Future, Org.by Vaijnathnath College,Parali,ISBN978-93-84451-42-4,feb.2015,Pag 52-65.

Rao K.L. (1979) India's Water Wealth, Orient Longman Ltd. New Delhi

Shafike N. G. Dickstein L. And Maddock T. 199, Multi – criterion analysis of ground water contamination mgt. Water Resource Bulletin 28 (1), P. 33 – 43.