Affiliation study of Tebewell depth with roof water harvesting awareness in Latur, Dist Latur[M.S] India

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Abstract:

The main objective of Affiliation survey is to study the tube well water availability, Roofwater harvesting facility and awareness among the people for harvesting the roofwater to increase the water table in Latur city. In this city water was supplied by train in 2016.To increase the awareness among the people for roof water harvesting this study was undertaken. For this 100 tubewells were selected from different areas of Latur city in four directions. The colonies were selected according the East, West, South and North directions for study. In the study the details regarding the tubewell depth, roof water hartvesting facility, water availability in summer months was collected and analyzed. It was found that only 17 % people are having the roofwater harvesting kit.

Key words: Tube well depth, Roofwater harvesting kit, Physicochemical parameters.

INTRODUCTION

A leaf stretched out from its branch ,catches a drop of rain channeling the water towards the ground as its base for millions of years ,this simple rain collection technique fueled the life in many reaches of this planet.Newman et.al 2007. Accordingly, roof-top rain water harvesting techniques are most simple, but neglected in the water harvesting programs. It requires two basic elements: a catchment, which is a broad surface to catch the rain and method or device for storing the captured rain (Thomas, and John, 1985).

The rain water harvesting system is useful mainly for drinking water purposes. In this system, rain water falling on roofs of houses and other buildings is collected through a system of pipes and semi-circular channels of galvanized iron or PVC and is stored in tanks suitably located on the ground or underground. The practice is in vogue at the individual household level in remote hilly areas with high rainfall and also in some semi-arid areas in the plains. This system can be seen in the northeastern states of Arunachal Pradesh, Assam, Meghalaya,Manipur and Nagaland. This is also in use in Bikaner, Jaisalmer and Jodhpur districts of Rajasthan. In recent years, at the initiative of the Central and State Governments, the practice has been increasingly adopted in many cities and towns in different parts of the country.

In the present study 100 tube wells in Latur were considered for study and all the data was collected then it was found that less than 10% people who have the tube wells have roof water harvesting system.This indicates the unawareness of the people regarding the roof water harvesting and water table recharging. Water covers about 71% of the Earth's surface out of which of 2.7 of the total is fresh water, of which 1% is ice free water in the rivers, lakes and atmosphere as biological water . It has been estimated that only 0.00192% of the total water on earth is available for human consumption. (Trivedy, R.K., 1988) Freshwater becomes a critical natural resource due to number of reasons.

The increasing Keeping in mind this view the present work was undertaken for knowing the Rain water equipped percentage for recharging the ground water level in Latur city and its relation with ground water availability quality and its potability by comparing with the WHO and ISI Permissible Standards.

2] MATERIALS AND METHODS

The present study was conducted for the rain water harvesting and its relation to bore well recharging in the selected area of Latur [Geographical location 18.43^0 N and $76.73^{0.}$ For study this samples were collected from different areas of Barshi Road[West]-Station A ,Ausa road [South] Station -B,Nanded Naka area[East]- in latur [100 -500 feets deep borwell sationsin city. During the collection samples were collected and some the questions were asked to the owners on depth water supply efficiency and existence of roof water harvesting unit. The data was tabulated along with bore well owner with their names and other details which was later on analyzed for results and conclusion. Three categories were done according the depth of borewell as 1] 100-200 feets.2] 201-350 feets and 3] 351-500 0rmore feets.

The different physico-chemical parameters were determined by APHA(1992), IAAB (1998). For results and discussions the sum mean values are taken. The work is conducted in Jan -March 2020 The samples were collected bet^n 1.00 pm to 2.00 pm.

The three sampling stations were selected in different directions of ring road Latur are as given below. The depth of borewell was selected for study was divided in three groups as 150-300 feets,301-500 and 501-700 feets.

1] West Station – Barshi Road ,100-700feets deep 33 stations [A] ,

2] South station- Ausa Road, 100-700 feets deep 33 stations [B]

3] East stations – Nanded Naka, 100-700 feets deep 34 Stations [C] ,

Keeping in mind this view the present work was undertaken for knowing the Rain water equipped percentage for recharging the ground water level in Latur city and its relation with ground water availability quality and its potability by comparing with the WHO and ISI Permissible Standards.

The parameters like temperature, P^H were noted at the stations, Do was fixed at the stations with the reagents and estimated at the laboratory. Then the left parameters were practically were carried out in the research laboratory of Rajarshi shahu College Latur.

3] RESULT AND DISCUSSION

1] **pH: -** pH is the negative logarithm of the hydrogen ion concentration. pH change is accompanied by changes in the physico-chemical aspects of the aquatic medium. pH is also an important parameter for determining the acid-base balance of river water. An adverse concentration of hydrogen ion is difficult to treat by biological means. pH range between 7 to 8 has been indicated good for fish culture (Jhingran, 1977). In the present study, pH ranges between 7 to 10 in borewells with different depths were ranged from 100 feets to 700 feets Comparatively less value of pH 7 was recorded at unpolluted area in Latur and Maximum value was also recorded 10 at station ,B and C in Latur. The values were in between given range. (Table 1 to Table no. 3 with the permissible limits of WHO and ISI and relevance) and photographs are on page no 15 to 17. The tabulated data informs about the depth of borewells, water force and percentage of rain water harvesting units.

2] **Dissolved Oxygen :-** Dissolved oxygen analysis measures the amount of gaseous oxygen (O_2) dissolved in an aqueous solution. Oxygen gets into water by diffusion from the surrounding air, by aeration (rapid movement) and as a waste product of photosynthesis. Environmental impact of total dissolved solids gas concentration in water should not exceed 110% (above 13-14 mg/l). Concentration above this level can be harmful to aquatic life.Dissolved oxygen (DO) is not only an important for indicator of pollution (NEERI, 1988) but it also indicates the physical, chemical and biological activities of water body. In the present study the values of DO ranged between 0.35 to 1.45 mg/l. The values of D.O were less in Latur, which were below the given limit by WHO and ISI.

So it can be concluded that in all three stations the DO were below the permissible limit so water of is not potable . Generaly the high values are recorded in Winter and low values are recorded in summer same type results were recorded by Kumar (1993) but here it was not **5** found. The data is tabulated in Table 1 to Table no. 3 with the permissible limits of WHO and ISI and relevance) and photographs of sampling stations are on page no 15 to 17. The tabulated data informs about the depth of borewells, water force and percentage of rain water harvesting units.

3] **Carbon Dioxide**:- **Carbon Dioxide** is present in **water** in the form of a dissolved gas. Surface waters normally **contain** less than 10 ppm free **carbon dioxide**, while some ground waters may easily exceed that concentration. **Carbon dioxide** is readily soluble in **water**

4] Alkalinity :-Alkalinity is primarily due to carbonate, bicarbonate and hydroxide contents. It is used in the interpretations and control of water and waste water processes.

Public drinking water standards require chloride level not to exceed 250 mg/l. Chlorides may get into surface water from several sources including: rocks contain chlorides, agricultural run-off, waste water from industries, oil well wastes, and effluent waste water from waste water treatment plants.

In the present study the Co2 level ranged between 10 mg/l to 50 mg/l which is under the permissible limit of WHO. The data is tabulated in Table 1 to Table no. 3 with the permissible limits of WHO and ISI and relevance) and photographs of sampling stations are on page no 15 to 17. The tabulated data informs about the depth of borewells, water force and percentage of rain water harvesting units.

4] **Chlorides:-** Chlorides are the inorganic compound resulting from the combination of the chlorine gas with metal. Some common chlorides include sodium chloride (NaCl) and magnesium chloride ($MgCl_2$). Chlorine alone as (Cl_2) highly toxic, and it is often used a disinfectant. In combination with a metal such as sodium, it becomes essential for life. Small amounts of chlorides are required for normal cell functions in plant and animal life. **6**

Increasing concentration of chloride in fresh water bodies acts as an indicator of pollution (Dhanapakiyam *et al.,*). The mean values of chlorides are found to be in bet^{n} 203 mg/l to 715 mg/l in the bore wells. Chlorides in waste water affected region were high. The high values of chlorides are due to pollution of ground water samples from chloride rich effluents. The data is tabulated in (Table 1 to Table no. 3 with the permissible limits of WHO and ISI and relevance). Karnath (1989) also recorded same results. Venkata Mohan *etal* (1995).

In the present study the chloride level in some tubewells found was above the given limit of WHO and ISI which alarms towards the un-potable condition of the borewells in Latur.The minimum value recorded was 148.89 mg/l and Maximum value recorded was 354.5 mg/l.

The data is tabulated in Table 1 to Table no. 3 with the permissible limits of WHO and ISI and relevance).

The tabulated data informs about the depth of borewells, water force and percentage of rain water harvesting units. The values of Chlorides were above the permissible limit of WHO and ISI so this water is non potable.

5] **Salinity: -**

The mean values of salinity are recorded the mean values of salinity were found to be in bet^{n} 273.2 g/l to649.7 g/l in the values of salinity .The high values of salinity levels can make water

unfit to use for any purpose and even low levels can create health problems for individuals who may suffer from high blood pressure.

High salinity values were also recorded by Prakash (1996) Vijaykumar *et.al* (1996). The data is tabulated in Table 1 to Table no.3 , values were above the permissible limits of WHO and ISI and relevance). The tabulated data informs about the depth of borewells, water force and percentage of rain water harvesting units. **7**

7] **Chemical Oxygen Demand Chemical oxygen demand (COD):-** is the capacity of water to consume oxygen during the decomposition of organic matter. The mean values of

COD were recorded ranged between 4.8 to 32.4 mg/l .The recorded values of COD are between the permissible limits given by ISI and WHO

COD helps to indicate the pollution status of water body (WQM, 1999).

Table no 1:- Physico-chemical Nature of Borewells in Latur and relivence to ISI and WHO.

Sr.No	Parameter	Low range	High range	**Permissible limit by ISI/ WHO**	Relivence
1.	pH	7	10	6.5 to 8.5	Acceptable/ unacceptable
2.	Dissolvd oxygen	0.35 mg/l	1.45 mg/l	6 mg/l	unacceptable
3.	Dissolved Carbondioxide	12 mg/l	50mg/l		
4.	Chloride	148.89mg/l	354.5mg/l	250mg/lit desireble	Acceptable/ unacceptable
5.	Salinity	273.2 mg/l	649.7mg/l	500 mg/l	unacceptable
6.	Alkalinity	14 mg/l	54 mg/l		Acceptable
7.	Chemical oxygen demand	4.8 mg/l	32.4mg/l	250 mg/lit	Acceptable

The data is tabulated in **Table no. 2** The Tube well details in Latur with respect to depth ,water availability and Rain water harvesting kit/facility.

No. given to sample from Tubewell holder	**Depth in feets**	**Water force in Inch**
1	270	1.5
2	320	2.5
3	380	2
4	230	1.2
5	320	2.4
6	300	4.5
7	450	1.6
8	420	2.3
9	280	3.1
10	250	3.5
11	470	1.1
12	320	0.8
13	260	1.5
14	510	2.7
15	450	3.2
16	410	3.8
17	320	1.7
18	250	1.4
19	270	2.3
20	460	2.2
21	450	4.1
22	270	2.5
23	380	1.7
624	100	2
25	300	2.5
26	300	3
27	235	3
28	400	1
29	500	2
30	130	1
31	200	1
32	630	3
33	140	2.5
34	160	2
35	230	1
36	100	2
37	150	2.5
38	300	2
39	400	1
40	500	2
41	500	1
42	520	3
43	530	2
44	230	1
45	500	2
46	140	1
47	500	2
48	250	2
49	500	1
50	350	1
51	470	2.5
52	420	3.9
53	190	1
54	270	2

55	530	3.2
56	370	2.9
57	590	3.2
58	250	1.2
59	430	1.6
60	500	1.5
61	450	2
62	200	3
63	740	3.5
64	700	2.5
65	200	1.5
66	300	2
67	350	1.5
68	400	3
69	350	2
70	400	1.5
71	400	2.5
72	600	2.5
73	350	3
74	300	1.5
75	250	2
76	400	3.5
77	350	2
78	400	3
79	600	2.5
80	270	2.5
81	470	1.1
82	380	2
83	200	1.5
84	180	1
85	280	2
86	340	3
87	100	1
88	200	2
89	300	2
90	328	1
91	300	3
92	350	2
93	400	3
94	250	1.5
95	450	3
96	350	1
97	430	1.5
98	450	3
99	370	2.5
100	200	1.5

Table no. 3 Percentage of Residents with harvesting system

Sr.No	Total number of bores surveyed	Depth	Water out flow in inch	Total of Rain water equipped Residents.
1.	33	350	2	1
2.		600	2.5	1
3.		400	2.5	1
4.		350	3	1

5.		600	2.5	1
6.		200	1.5	1
7.		370	2.5	1
8.		250	2	1
9.	33	320	2.5	1
10.		280	3.1	1
11.		410	3.8	1
12.		460	2.2	1
13.		530	3.2	1
14.	34	300	2.5	1
15.		630	3	1
16.		400	1	1
17.		200	2	1
18.			**Total**	**17**

CONCLUSIONS :-

The present study deals with the relation of bore wells with rain water harvesting unit. In this study the 100 tubewells were studied for depth, water force in inch , Water availability during the summer and existence of rain water harvesting unit. Its outcomes show that only 17 residents have Rain water harvesting unit means only 17% people have unit while 83% people in Latur city don't have rain water harvesting unit their homes are without rain water roof water harvesting system. This indicates the unawareness in the citizens in Latur towards the roofwater harvesting system. By rain water harvesting unit we can solve the problem of water supply which is the main solution on the water scarcity.

The physico-chemical characteristics and quality of Latur City at different bore wells with

different depths from 100 feets to 740 feets in Latur in the summer months Feb and March ,**11**

shows different seasonal fluctuations in various physico-chemical parameters according to the depth profile. Some of the parameters showed the acceptable condition while some showed unacceptable condition .By this study it can be concluded that there is a need for 100% rain water units in every house and municipal corporation should be strict for this unit. It will be the solution on water scarcity, water table recharge and Load on water supply by Municipal Coorporation.

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