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ANALYSIS OF GROUND WATER IN RAJASTHAN

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ABSTRACT
Water is the one of the most important constituents of over planet and most vital reason for existences of life on the earth water is essential for substances of life. It is essential for substances all form of life. it is also one of most manageable of the natural resources as it is capable of diversion, transport, storage, recycling . Ground water acts as reservoir by virtue of large pores in the earth material, as it percolates our large distance and as mechanical filter which improves water quality. Inspire to poor scenario in Rajasthan the quality of water study area is continuous deteriorate. Few area affiliated by various chemicals than WHO and Indian standard. Ground water sources are not suitable for supply poor recharging for aquifers and excessive en traction of ground water are two main factors which may be held responsible for such a situation of the district.
KEYWORDS: Water, quality, excessive

INTRODUCTION
Water is prime natural resources, basic resources, a basic human need and a precious asset of the city. Planning, development, operation and maintenance of all water resources to support response to the growing the growth of city economy and the wellbeing of the population, in -need for drinking water, agriculture products, industrial production and electricity, a general improvement of living conditions and employment is of almost importance. Water not only makes from 70% to 90 % of weight of life but also represents the continuous phase of living organisms. Water maintains the body fuel and regulates the body temperature. It helps in removing the body's waste in the form of sweet, bathing and washing laundering .ablution domestic sanitation, animals and industries. This is the important point to note that in early time habitation used to be nearby rivers, lakes, and springs because without water there would have been no life.

Water is chemical compound consisting of two volumes of hydrogen are one volume of oxygen. On the earth 97.61 % water is massed in ocean. 2.08 % is located up in polar ice and glaciers leaving only 0.31 % in lakes, surface rocks and soils, rivers and atmosphere. However, the availability of fresh water is virtually tremendous. Because of this rapid renewal time" for example, the renewal time is just 12-20 days for rivers 300 years for ground water lakes Kayastha S.L. 1981.0n earth the availability of fresh water through precipitation is 105000 Sq. km. Out of this, one third reaches the ocean through rivers, 2/3 rd is returned back to atmosphere by evaporation and transpiration of plants.

The availability of water per capita in developing countries would come grossly low. If we ignore the water availability of advanced countries with this Capita water availability in developing countries. The contamination of drinking water is a common phenomenon especially in the wake of unmanaged industrialization, 'wide use of inorganic fertilizers, industrial and domestic pollution. The unhygienic practices, social and religious customs and rituals, all contribute to the contamination. If there are living agents of the carriers of communicable disease the situation gets greatly accentuated. The present days contamination of drinking water are chemical and metallic ingredients of industrial effluents, inorganic fertilizers which percolate through the soil to reach the water table: Several salts of organic reducing gases resulting from the degradation of organic matter etc. also pollute our drinking water resources In addition to the bacteria 'flora is also polluting our drinking water resources.

The quality of water from these sources various greatly. Surface water generally contains larger quantities of turgidity and bacteria than ground water, but ground water contains higher concentrations of dissolved chemicals. Polluted water includes variety of microorganisms like Bacteria, viruses, spirochetes, psotogue, Helminthes etc. Some common species of microorganisms found in water bodies are hepatitis virus type A&B, Polio virus, custridium, welchial Escherichiacoli, Salmoneustyphi, shigeels sp. etc. Their occurrence is related to microbial diseases such as viral Hepatitis, Poliomyelitis, Gas gangrene, Typhoid; Bacillary etc. other organisms naturally present in the environment and not normal mode of the transmission of bacterial pathogens is the ingestion of contaminated water. There is a wide range of minimum infections level to cause a disease.

Water is usually classified as "Hard and Soft" according to the concentration of calcium and magnesium ions. These ions when present in high concentration, the capacity of water to lather with soap is reduced and such water are generally termed as "Hard Water". A Soft water is one which produces lather easily with the soap. The degree of hardness, however, is indicated by the term, moderately hard.

WATER SCENARIO IN RAJASTHAN

Rajasthan has about 50 million possibility of harvesting and hectares of undulating terrain. Over the meters (MCM) of runoff annually existing storage, it offers the conserving 95-155 additional sites million cubic by developing suitable rainwater harvesting requirements of large populations systems throughout structures. Many have been identified harvesting when developed for traditional the state and, proposed water harvesting rainwater, they can satisfy the water.

A case study in Jodhpur water , which may suffice to will be available district structures, over has shown that with the existing nearly 69 percent of the and 68 MCM of even during severe drought meet drinking water requirement of areas. Rajasthan is the largest state Most of the state (60-75%) is arid the country's geographical in agrarian as the, i.e., 10.5 percent India covering an area of 34.22 million or semiarid of its people depends only hectares predominantly of area, but state is on The activities.. agriculture-based sharing livelihood of 70 percent 1.15 percent of its water resources.

In the last 40 years, a threefold human population western part of the state is populations have put doubling of the prolonged droughts tremendous increase in the arid and a Rajasthan. Recurring, particularly livestock pressure on the fragile water and land shortages. The estimated annual resources of and in the common against 1,140 m^3 by 2050. Groundwater is state the national average during 2001 was 840 m^3 and phenomenon exacerbating overexploited in many districts of the water, per capita water availability in the state 050. The state has 210 cities, potential of 285 MCM of runoff which generate 542 MCM of utilizable available from urban catchments roof runoff annually. Excluding losses, underground cisterns or for recharging a from roof surfaces is for harvesting and mitigate drought. This could conservation in groundwater aquifer through requirements of nearly 9 million people bore wells, to meet the domestic water. High flash floods, though bring as much as 52.8 -24billion cubic meters (BCM) of additional water occurring once in about 10 years, can.8 in one year. This is comparable to 53.7 BCM due to groundwater exploitation of free underground storage, accumulated water to rejuvenate the in the state during the last 25 years.

Taming the excess financial and technological flood water Gandhi depleted aquifer of the Indira is a major depleted aquifer. In-situ water challenge. Surplus Canal may also be soil profile, runoff harvesting utilized to recharge the conservation on vast arable lands sprinkler or conservation, recharging of the and its efficient and economic estimated that one year's drought utilization through drip, irrigation are vital for harvesting structures to drought mitigation. It is -relief funds may be in rural areas of western meet drinking water requirement sufficient to develop rainwater Rajasthan.

Western Rajasthan is arid to humidity and high-velocity wind semi arid with low and erratic rainfall, high evapotranspiration of 2,000 mm, a negative summer temperatures, low causing part of the state, the an average potential water balance and acute better rainfall, low velocity water deficit. In the eastern climate is semi-arid driest state in India with scarce to sub-humid wind and higher with relatively availability of water in the humidity. Rajasthan is the water resources. In the year 2001, annual the scarcity will increase further per capita state was only 840 m3. With expected to be as low increasing population, and the per capita average of 1,246 m3 by the year water availability in the state is as water is to increase from 3.436 Plan, BCM per year (the 1995 level) to the projected nonagricultural m^3 by 2050, against the national 2050. According to the it is estimated to reach State Water demand for 26 5.05 BCM per year in the hectares of cultivable land year 2015, and 8.04 2045. If the entire water requirement will 13.6 million of Rajasthan are used for not available. However, the State irrigation, the agricultural be nearly the irrigation potential for about 95 BCM per year, which obviously is Water Plan million hectares (Vision 2006). has been prepared to create 42 percent the There are eight major Chambal and Mahi river state but of the cultivable water from catchments located land of 5.325 basins in are the only simulated for each basin suggest perennial rivers that receive outside the state. Water during normal rainfall resources data that the internal surface water resources surface water is utilizable in the state years amount to 48.01 BCM. However, from other states only 16 BCM of (Vision 2006).Besides, inter-basin during the last 50 years, the currently with water transfer amounts to 17.9 BCM annually a cropping intensity of stands at 57.20 million. Human the same or in a higher is 20,496,261 hectares 122 percent population has for water in proportion increased threefold and. The cultivated are which leads to an increasing demand. All this calls for an exploration of to withstand growing demand the, its of population and total conservation and efficient utilization, especially during highest per capita water availability droughts. Basin wise analysis water by the Sabarmati (1629 availability shows that the of 1,798 m3 is in lowest (196 m3) is in the Chambal basin, followed m3) and the Mahi availability in the Chambal (1,420 m3), whereas the Banganga basin. The higher river and inter-basin water input per capita water basin is Lower water availability mainly due to the perennial nature ephemeral (monsoonal) river during the of the from outside the state mainly in receiving flow from. is monsoon basins, such as Gambhir, Luni, etc., high-intensity rainfall Banganga.

As compared to per availability in areas state during located capita water availability due to reduced by 46 to 64 percent ephemeral river basins, the per capita water population density. Overall in outside of the basin is high their low drought years of water resources gets severe causing serious the was during moderate and 835 m^3. The water scarcity in the availability affected regions.

At present, there about harvesting structures with 12.72 BCM of water at are 203 major and medium store their full capacity tanks and reservoirs 12.51 BCM during dry years increasing the total storage in the state, which and a reduced volume of. Besides capacity of 2.38 BCM, thus, there are large at full-numbers of minor droughts, the water, the financial, geographical increased many times rainwater reduced to 12.88 BCM.12 BCM. During a storage capacity level to 16 BCM. However area has sector has taken and it, during creating a shortfall of estimated total surface substantial development availability is the last 50 years, the present. Thus in the water considering and resources irrigated land is 2.81 million hectares at place hydrological constraints.

Besides, the ongoing water will cannot keep pace create water storage capacity. However resources projects still with population requirements remain only and increasing and reservoirs water projects when completed an additional 1.65 the tanks receive low runoff from BCM, the existing water partially becoming issue during droughts their catchments filled and dry. Water scarcity growth is, out a serious as most of much earlier than their normal utility period. Rajasthan's economic groundwater. 71% of the irrigation and growth is largely dependent on water, more specifically tremendous pressure on 90% of the drinking water supply source and private users, i.e. by is groundwater. Presently, there is to exploit groundwater over this limited resource by State those who have access and control.

The resulting consequences only 20.8% were categorized as safe. are also well known in 2001, out categorized as semi-critical (8.9%), of 236 groundwater zones, The rest reached causes of groundwater the stage of being critical (33.9%) economic expansion, decline in and over-exploited (36.4%). The depletion and over- abstraction caused by pollution are rooted in population growth, groundwater the progress in pumping recharge and the rapid increase in the number of wells and tube wells and technology.

HYDROGEOLOGY OF RAJASTHAN

The groundwater is Dholpur, Jaipur, Jalore overexploited in karauli, Ajmer, Alwar, Barmer, Bhilwara, Chittorgarh on average, over the, Dausa, , Jhunjhunu, Jodhpur, Nagaur, of safe blocks decreased from, out of the total 236 Sikar and Udaipur districts depletion was very, and, the state, the number entire state (table 3). In the last Rajsam and, Dungarpur, Bhilwara administrative zones) districts, which have a limited 10 years blocks (in 155 to 49. The impact of droughts Chittorgarh, Ajmer, Sirohi and Pali on groundwater spectacular in the hard rock regions have moved into the of Udaipur, aquifer thickness. In these districts geologically, the water, nearly 60 blocks semi-critical, critical and overexploited rock), semi-consolidated to aquifers of Rajasthan, stages. Hydro consolidated and unconsolidated formations bearing formations with freshwater, consolidated (hard consolidated, semi designated as potential could be divided into. The consolidated formations have negligible primary secondary porosity due to formation group consolidated porosity and significant weathering and Rajasthan weathering and fracturing. The semi- consolidated to occupies groundwater resources. Overall occupy about 14.3 percent of fracturing. and has valley fills, formations with significant primary porosity 22 percent of Rajasthan and significant, the estimated younger and virtue of Unconsolidated limited due to deep aquifers secondary porosity by formations are older groundwater resources alluvium and blown sand aquifers. These aquifers are productive in Rajasthan are and low recharge recharged to different made to quantify the possible quantum of flood water, is made available that could be geographical area of area for potential aquifers of Rajasthan if additional by of the state groundwater older alluvium (16.1%), sandstone water area limestone (3.86%), tertiary formation of potential aquifers, say. Out is Deccan alluvium (5.9%), (3.05%), ((0.59%) lite 217,947 km2 (63.7%). The maximum is under meta-sediments (16.8%) followed (11.6%), and ultra basic rock (0.02%). During m to 10.3 m in 29 out of 32 1984-2003, the average level ranged from 0decline in groundwater.18 districts.

Therefore, the void of groundwater could be refilled if column created by depletion additional receptive yield of the aquifer water has been computed as the product is available. District wise The latter space depletion and specific for groundwater recharge space available percent, depending varies average groundwater of the area of the total net in recharging aquifer the groundwater aquifer for, from 1.5 to period prior to 1984 8 on the aquifer type. The is 55,748 MCM, and to a limited extent, the depleted could be even higher if the is considered. There is years high variability within when good is available. Based scope to Rajasthan is 10,960 MCM occurrence rejuvenate, aquifers during flood excess storable flood water in 10 years in with districts rainwater on frequency of to 1477.22 MCM in Jodhpur of floods, the estimated net ranging from 17.78 MCM in Jaisalmer

Table 1 Groundwater resources potential of Rajasthan

District	Net annual groundwater availability (MCM)	annual groundwater availability exploitation MCM)	Present groundwater balance (MCM)	Stage of Ground water development (MCM)
Ajmer	314.42	348.82	-34.40	110.94
Alwar	912.30	1112.07	-199.77	121.9
Banswara	162.50	39.21	123.30	24.13
Baran	495.31	321.99	173.31	65.01
Barmer	49.80	255.91	-6.10	102.44
Bharatpur	514.	79.66	34.60	93.27
Bhilwara	426.79	450.38	-23.59	105.53
Bikaner	197.61	144.52	53.09	73.13
Bundi	55.70	232.12	123.58	65.26
Chittorgarh	460.11	519.48	-59.37	112.9

Churu	197.69	117.35	80.34	59.36
Dausa	268.01	295.30	-26.29	109.77
Dholpur	237.21	245.80	-8.58	103.62
Dungarpur	92.78	76.53	16.26	82.48
Ganganagar	198.83	133.51	65.28	67.17
Hanumangarh	194.61	166.67	27.94	85.64
Jaipur	684.41	1015.99	-331.58	148.45
Jaisalmer	52.59	39.60	13.00	75.29
Jalor	423.61	827.48	-403.86	195.34
Jhalawar	397.70	381.24	16.46	95.86
Jhunjhunu	243.04	419.68	-176.64	172.68
Jodhpur	393.13	660.87	-267.74	168.1
Karauli	412.66	340.81	71.85	82.59
Kota	404.10	220.80	183.30	54.64
Nagaur	628.16	842.14	-213.98	134.07
Pali	413.39	330.34	83.05	79.91
Rajsamand	154.19	143.62	10.56	93.15
S. Madhopur	384.70	311.54	73.17	80.98
Sikar	324.52	344.70	-20.17	106.22
Sirohi	265.65	247.37	18.28	93.12
Tonk	414.53	270.67	143.86	65.3
Udaipur	283.63	298.58	-14.95	105.27

In this table shows the ground water resource potential of different districts of Rajasthan According to table in Jaipur , Alwar , Baran, Chittorgarh and nagaur having the highest amount of ground water availability but due to over exploitation scenario change vigoursly. Hydro geologically, the water-bearing designated of Rajasthan, could be as potential divided into consolidated aquifers formations with freshwater, and unconsolidated consolidated (hard rock), semi- formations have negligible primary consolidated to consolidated, semi formations.

The consolidated porosity and groundwater is overexploited significant secondary porosity due to Dausa, Dholpur, Jaipur weathering and fracturing The in Ajmer, Alwar Sikar and Udaipur districts, Barmer, Bhilwara, Chittorgarh, Jalore, Jhunjhunu, Jodhpur, Nagaur). In the last 10 years, average, over the entire state (out of the total 236 blocks (administrative zones Udaipur, state droughts on) in the regions of groundwater depletion, the rock number of safe blocks spectacular in the hard decreased from 155 to 49. The Sirohi and Pali districts impact of was very Rajsamand, Dungarpur, Bhilwara, districts, nearly 60 blocks have Chittorgarh, Ajmer, which have a limited overexploited stages. An assessment aquifer thickness. In these moved quantum of groundwater that into the semi-critical, critical and has been made aquifers of Rajasthan if additional water to quantify the possible could be state geographical area recharged to different potential, say flood water, is for groundwater is 217,947 km2 made available. Out of the of 342,226 km2 aquifers is under meta-sediments (the potential aquifer area (63.7%). The maximum area of potential 16.8%) followed by older alluvium (5.9%), limestone (16.1%), sandstone (11.6%), (3.86%), shale (1.28%), hyalitestertiary formation (3.05%), Deccan Trap(0.02%). During 1984- (2.52%), from 0.18 m to 10.3 m granite (2.03%), (0.59%) and ultra basic rock 2003, the average decline in groundwater level.

CONCLUSION

To verify and correlate the distribution of drinking water quality and its impacts on human health, a interview schedule was prepared covering 600 hundred respondents from 6 villages, one from each tehsil of Churu district. All the aspects related to drinking water quality and health is covered in this interview schedule. The relationship between water quality and human health is the focus of this research. There are various sources of drinking water available to the respondents due to which they are able to manage the peak demand of water in summers. It is observed that the traditional rain water harvesting structures are of phenomenal importance in this area. These structures also supply drinking water to the respondents. Due to

these rainwater harvesting structures, drinking water is available all the year round. Respondents do not need to travel far away to get the drinking water as most of (91 %) the sources of drinking water are less than 1 km of distance. The availability of drinking water seems to be adequate as 91.5 % of respondents answered positively about the availability of drinking water. Most of the respondents are aware of water quality. The view of the respondents about the quality of water leads to the conclusion that the water available for drinking purpose is of good quality as 49.3 % of them have rated it as good. The human health aspect was also taken in to consideration because it is highly affected by poor quality of water. The respondents are also aware of this fact as 88.8 % of them have answered in yes. The impact of drinking water on human health is not yet severe. There are no areas which show severe health problems in relation to water quality. General ailments like teeth problems, problems related to bone and stomach are perceptible in the area. More than 50% of the respondents do not have any perceptible ailments which can be specifically related to water quality. This shows that there is no direct relationship between water quality and human health in the study area. The research also indicates the decreasing trends of ground water table. The average water table has gone down in most of the zones in the study area. It is an established fact that decreasing water table has adverse impact on the quality of water. The lesser impact on human health in the study area is due to availability of surface drinking water in the form of rain water harvesting structures. The few areas are facing the water related health problems must be due to ground water use. So the importance of rainwater harvesting techniques is established. The water quality related simple health ailments can become severe in future, so we need to take precautionary measures to manage our water resources sustainably. This piece of research also gives several suggestive measures for the sustainable management of water resources of the study area.

In the present scenario, it has, therefore, become essential that the available resources of ground water are used very conservatively so that these can be used for a considerable long time spell. The people should be made acquainted with the worseness of present/existing situation, adoption of appropriate methods of conservative use, and the future planning of existing resources of ground water. Poor recharging of aquifers and excessive extraction of ground water are the two main factors, which may be held responsible for such a situation of the district. The first one is beyond the control of human efforts, but the second factor can be minimized by sincere efforts.

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