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Study of water management and scarcity of drinking water in Alwar City (Rajasthan)

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ABSTRACT

A detailed study has been carried out for water management and its scarcity in Alwar city (India) by authors in this paper.The drinking water supply requirement of Alwar city is expected to increased many folds in the future with the population growth. The demand for water in Alwar city is increasing due to increase in population and other reasons. There are many hand pumps, dug wells and tube wells in the Alwar city though which water is being continuously extracted on a large-scale. Drought simply aggravates the problem of over exploitation of these sources. The rate of decline of water level is increased from 0.19 to 1.70 meter per year in the Alwar. The authors have incorporated some suggestions to improve water management system and find out reasons of scarcity of drinking water in Alwar city. Therefore, urgent steps must be taken by Alwar administration otherwise drinking water will become be a big problem in Alwar city.

Key words : *Scarcity, Ground water, Tube-wells, Demand and Supply, Lack of rain*

Introduction

Water is nature's most wonderful, abundant and useful compound. Of the many essential factors for the existence of human beings, animals and plants (viz. air, soil, water, food, shelter etc.), water is rated to be of greatest importance next to air. Water is a prime natural resource, a basic biological necessity and an obligatory condition for the sustenance of life. It constitutes about 65% of human body and about 95% of by weight of some plants for fruits. Water is not only essential for the lives of animals and plants but also occupies a unique position in industries. It is used for drinking, washing, bathing, irrigation, sanitation, power and steam generation. Air-conditioning, fish farming, fire-fighting, navigation, ecological and afforestation needs and recreation etc.Water is also used as a coolant in power and chemical plants. In addition to it, water is widely used in other fields at production of Steel, rayon, paper, atomic energy, textile chemicals and ice. In India water demands are increasing rapidly and despite painstaking efforts on various fronts a substantial proportion of people are still without access to a safe drinking water supply. Many areas are finding that they are imposing overdrafts on existing supplies. Looking to the emergency of meeting the requirement of potable water it has become necessary to recommend safe, planned, systematic and judicious withdrawal of utilizable reserves from static ground water resources. Solution demands the latest development buzzword: "integrated water resources management (iwrm)". It is assumed that the minimum average per capita per day intake of drinking water is about two litres. However, there is considerable variation among the individuals. Alwar suffers from a severe water crisis due to multiple reasons, including lack of water supply management, the

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continuous degradation of Aravalli hills, growth of population, low rainfall. Similarly, in Alwar population growth and reduction in water resources and uneven water distribution continues, then by 2025 about 30% of the population will have to be left without water. In view of these realities, Rajasthan government will have to connect with any canal project for water supply in Alwar city and PHED should also be directed those efforts should be made to supply by equitable distribution at the right time. Finally, we have to understand that there are limited reserves of useful water, so awareness has to be brought to stop the wastage of water. There is an urgent need to emphasize the importance of correct estimates and proper developments, regulation, protection and management of water supplies. Ground water legislation requires immediate attention in order to ensure the continued availability of this key life supporting natural resources.

Experimental

Study Area

Alwar city is located between North latitude 27^0 30′ 20′′ and $27^0$36′ 30″ and East longitude 76^0 35′ and 76^0 40′ and is covered in the survey of India G.T. Sheet No. A10. Height is 270 meters above sea level. Cradled by several small hills, Alwar was founded by Rao Pratap Singh in 1775. According to Cunningham Alwar derived its name from the Salwar tribe and was originally Solapur, later on known as Salwar, Halwar and eventually Alwar. The central part of the district is covered by the Aravali hills which run North-South ranging in height from 450 meters to 700 metres. The region has more or less flat-topped hills, which become more prominent in the south- western part of the district. They enclose between them beautiful fertile valleys which have provided the world known wildlife sanctuary for tigers in the forest of Sariska. Alwar is fairly rich in mineral wealth; it produces marble, granite, feldspar, dolomite, quartz, limestone, soap stone, barites, copper clay, copper ore and pyrophyllite.

Present Management of Water Supply in Alwar City

PHED (Public Health Engineering Department) is

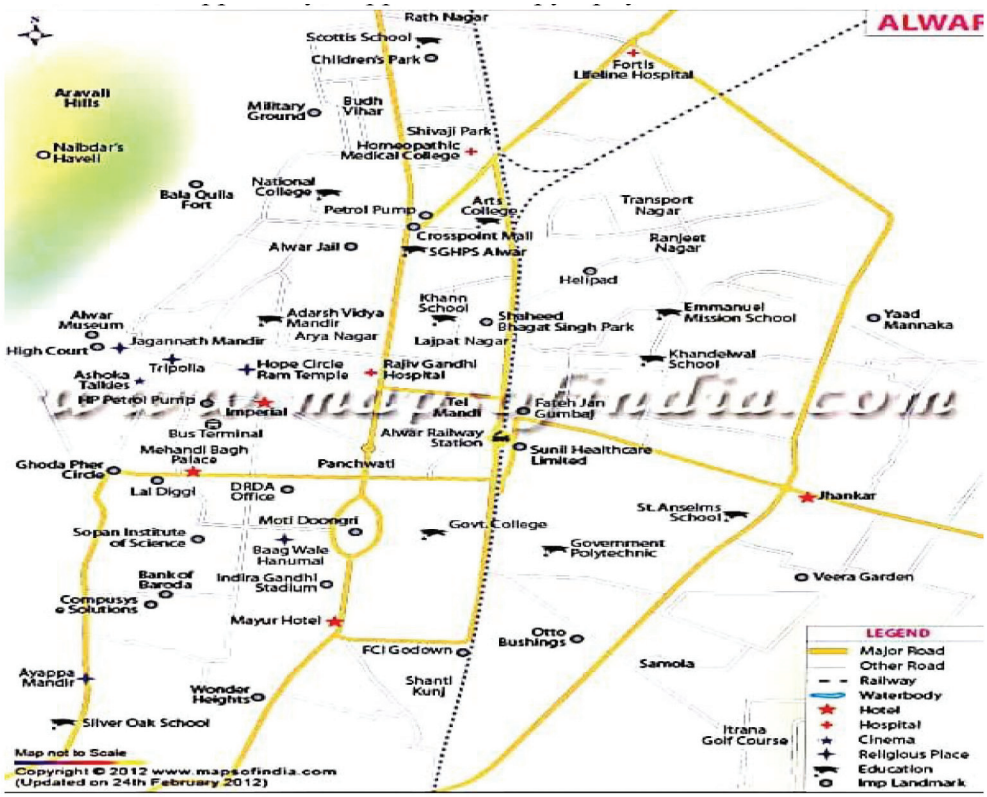

Fig. 1. Map of Study Area

constantly trying to supply water in Alwar city. The main water supply in the city is done by tube wells; water from tube wells is filled by CWR (Clear Water Reservoirs). The total No. of CWR in the city is 49 which are located at various different locations. Water from CWR is fed to OHSR (Over Head Service Reservoirs) by pump house. Total No. of OHSR is 57 which are located at every zone in Alwar city. Water is supplied to all colonies for about 20-40 minutes from each OHSR.

Requirement and Projection for Drinking Water Supply

The drinking water supply requirement of Alwar city is expected to increased many folds in the future with the population growth. The projected population drinking water demands of Alwar city and supply of groundwater by tube wells (2018-2025) are given in Table 1.

The demand for water in Alwar city is increasing due to increase in population and other regions. There are hand pumps, dug wells and tube wells in the district though which water is being continuously extracted on large-scale. Drought simply aggravates the problem of over exploitation of these sources. Therefore, in Alwar city the rate of decline of water level is also accepted to the increase from 0.19 to 1.70 metre per year.

Tulera-Vijay Mandir area of water supply has shown sharp decline in water level. The maximum declination in near Tulera head works while it is less towards Roopawas area. Similarly, all groundwater aquifers have shown depletion to different extent in the city. There have been wells, head pumps and tube wells running dry in some area from past few months or years. Per day discharge in all tube well

Fig. 2. Water Supply Systems in Alwar city

Table 1. Prospective demand of drinking water in Alwar by 2025 AD.

Year	Population	Daily demand (ML)	Daily Local supply (ML)	Short supply (ML)	No. of T/W at present time	Proposed no. of T/W to meet short supply
2018	367459	49.6	36.0	13.6	230	310
2019	373872	50.4	36.8	13.6	234	315
2020	380285	51.3	36.5	14.8	266	320
2021	386707	52.2	36.5	15.7	290	326
2022	393120	53.0	-	16.5	-	331
2023	399533	53.9	-	17.4	-	337
2024	405946	54.8	-	18.3	-	342
2025	412359	55.6	-	19.1	-	348

has gone down by 25-30%. In these conditions even the mining of groundwater cannot full fill the demand of Alwar city up to the year 2025.

Results and Discussion

There is a huge problem of drinking water for domestic use in Alwar district, due to many reasons like population growth, forest degradation, lack of rain, falling of ground water level, drying of the main rivers Gazuki and Ruparail that recharge ground water, continuous exploitation of Aravalli hills and surface water run-off. A large amount of groundwater is wasted due to mining and once reserves and exposed during excess mining, ground water prone to evaporation, contamination and leading to falling water level at an alarming rate.

The main reason for water shortage of drinking water in Alwar has also been found to be the distribution of water in unequal quantity by a PHED department Alwar and not distribution of water at the right time.

Effect of the water crisis

Globally billions of people and animals are facing water scarcity, which indicates a major failure of government. Due to lack of water, the lives of cores of people who are dependent on livestock wealth and crops are in danger. Human culture and civilization are vitally linked with water resources. Recently, due to the scarcity of water in Alwar city, the opposition party along with the general public staged a sit-in against the government which resulted wastage of money and time. The general public of the city has to arrange water tankers, which shows the failure of PHED and government. Due to the movement of tankers, there is a traffic jam on the roads of the city and at the same time our roads are also getting damaged due to which there is lot of trouble for the general public. Due to lack of water, people use polluted water for drinking as well as for works, which invites many serious diseases like- *Water-based:* this category includes diseases such as malaria and intestinal worm diseases (schistosomiasis). *Water-borne:* this category includes diseases such as typhoid fever, cholera, diarrhea and dysentery. *Water-washed:*this category includes diseases such as eye infections and skin diseases.

Conclusion

Today it is not enough to emphasize the protection of the environment. Viable and long-term drought mitigation efforts should aim at sustaining and recharg-

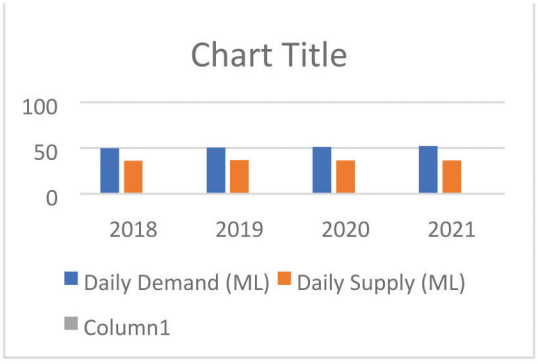

Fig. 3. Comparison between Daily Demand

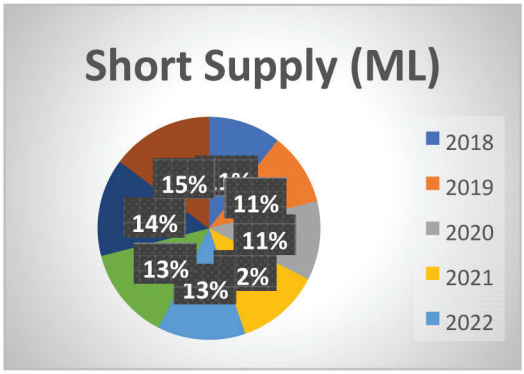

Fig. 4. Short Supply of water in Alwar city and Daily Supply

Fig. 5. People hesitation for drinking water

ing the groundwater level. It is necessary to catch the water by all means if that is of any use for the thirsting millions or for an extra gram of crop. Some suggestions for mitigation the water crisis in Alwar city is given below:

(i) Rain water harvesting

Water conservation through rainwater harvesting, artificial recharge and recycling waste water are the only ways to combat the prevailing drought like conditions and to control the increasing problem of deterioration in chemical quality of drinking water. Good combination of rainwater harvesting and ground water recharging can increase and stabilize the productivity of the rain fed land. Groundwater is not an endless resource. It has to be replenished through watershed management and community efforts.

It is imperative that every drop of rain is used for recharging the aquifer. The gap between the demand and supply of water can be bridged if rainwater is preserved from going down the drains. Possibilities of harnessing run-off water during monsoon period for conservation should be explored. Well stocked reserves are more useful in trying times. The tradition of rainwater harvesting thought 'tanks', 'borys', 'drinks', 'ahars' and 'johads' in Rajasthan got neglected due to urbanisation and introduction of hand pumps and piped water schemes by the government. There is a need to promote or to revive the traditional practice of rainwater harvesting in the drought prone area to meet its basic water needs and to raise water level substantially.

Water harvesting structures (WHSs) essentially are conceptualized to hold flowing water from upland and create water bodies in areas marked with slope to increase the moisture content of the earth. Even the modern water management system suggests WHS as the "last step" after rigorous soil conservation treatment so that the reservoir does not get silted up quickly. People should be encouraged for roof top rain harvesting / Ferro-cement water tanks / underground water tanks in every house to ensure drinking water security in the long run. Tanks should be constructed by government agencies at suitable palaces for rain water collection. Water stored in such bodies should be kept free from pollution so that the quality of rainwater is not affected.

(ii) Artificial Recharge

Artificial recharge is helpful in increasing the natural supply of ground water. It occurs from excess irrigation and seepage from canals. Groundwater supplies may be augmented by some method of construction, spreading of water or by artificially changing natural conditions i.e., recharging through pits, excavation, wells, shafts and pumping down from surface water bodies. Construction of 'check dams' and 'underground dams' are useful for recharging of dry wells. Artificial recharge project should be prepared in the area of Gazuki River and other possible places to check the declining water level trends in the area.

(iii) Proper use type of water

In India we do not have the concept of secondary or tertiary water. We use the same water for drinking, toilet, flushes, car washes etc. It is necessary to use recycled water for the purposes other than drinking. This will meet our large demand of water for domestic consumption. The reuse of water is one of the means of meeting future water demands. Waste water treatment technology should be developed and implemented area wise.

Indiscriminate digging of tube wells should be prohibited. Safe well spacing of 300 m. in ground water zone should be maintained. Digging of Wells should be made illegal in areas, once declared as "dark zones" or regions with little underground water by the Government. Mining should not be permitted in Aravali Hills (i.e., rain water catchment area) for this has threatened groundwater resources. The NGO's and other civil society actors need to participate pro-actively, to evolve a long-term solution to the recurrent problem of deterioration in quality and quantity of drinking water. Some kind of responsibility and a discipline should be conferred upon everyone to check any wastage of water. Awareness camps may help to a large extent to assist public participation in executing the water management and indirect use practices. To encourage house holders to use an already existing treatment methods for making quality constant campaigns are needed. The state level consultation groups should be strengthened to tackle the problem of water shortage.

Recommendations

Alwar suffers from a severe water crisis due to multiple reasons, including lack of water supply management, the continuous degradation of Aravalli hills, growth of population, low rainfall. Similarly, in Alwar population growth and reduction in water

resources and uneven water distribution continues, then by 2025 about 30% of the population will have to be left without water. In view of these realities, Rajasthan government will have to connect with any canal project for water supply in Alwar city and PHED should also be directed those efforts should be made to supply by equitable distribution at the right time. Finally, we have to understand that there are limited reserves of useful water, so awareness has to be brought to stop the wastage of water.

(a) Alternative surface water resources should be explored to mitigate water scarcity. Surface water supply from the siliserh or Jaisamand lakes and Chambal River should be given priority to avoid declination of water level in the area.
(b) Strengthen the water supply system.
(c) Continuous monitoring of water supply management

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