

Raw Water Sources and Water Supply Systems in the Udaipur City

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Abstract: Udaipur, a city renowned for its lakes, relies on both natural and artificial water sources to meet its water supply needs. The primary sources of raw water in Udaipur are its lakes, including Fatehsagar, Pichola, Jaisamand, and Badi Lake. Additionally, groundwater sources such as wells and borewells supplement the city's water supply. The water supply system in Udaipur is managed by the Public Health Engineering Department (PHED) and the Municipal Corporation, which ensure the treatment and distribution of water to urban and peri-urban areas. The water is collected, treated through filtration and chlorination processes, and then distributed via an extensive network of pipelines. However, challenges such as growing population demands, water pollution, and seasonal fluctuations in lake water levels affect the city's water management efforts. Sustainable practices, improved infrastructure, and efficient water management are critical for ensuring an uninterrupted and safe water supply to the city.

Keywords: Water resources, Water supply system, Udaipur, Water pollution, Water treatment

I. INTRODUCTION

Udaipur is dependent on its lake system, which is directly, or indirectly the life source of the city in terms of surface water resources, tourism, and the ecosystem at large. Most of the tourists come to the city primarily because of the placid beauty of the lakes. The lakes attract an increasing number of young adventurous tourists' especially foreign tourists' who provide foreign exchange, thus strengthening the local economy. The Udaipur lake system comprises Lake Pichola, Rang Sagar, Swaroop Sagar, Fateh Sagar, Badi, Madar and Udai Sagar. All the lakes of Udaipur form a chain in the saucer shaped Udaipur valley (1, 2). The main sources of surface water are the lakes surrounding the city, including Fateh Sagar Lake, Pichola Lake, Swaroop Sagar Lake, Rangasagar, and Doodh Talai Lake. The lakes were created by building dams to meet the city's drinking water and irrigation needs. Groundwater is extracted from tube wells and open (step) wells. Water is as essential for life as air. It has been estimated that two third of human body is constituted of water. Water is absolutely essential not only for survival of human being, but also for animals, plants and all other living beings. It is necessary that the water required for their needs must be good, and it should not contained unwanted impurities or harmful chemical compounds or bacteria in it. Therefore, in order to ensure the availability of sufficient quantity of good quality water, to plan and build suitable water supply schemes (3). The growing urbanization trend has directly given rise to contamination of fresh water and scarcity of water resources are the first and foremost issues that occur as a result of over-exploitation and mismanagement of the city's water resources. Surface water sources serve as major routes for the supply of raw water for processing into potable and general domestic purposes. Water treatment plant should be regularly analyzed the plant's water treatment performance and ensure systems are operating with the most efficient equipment and technology. When water treatment plants are not operating efficiently, it can be extremely costly. The combination of inefficient and older pumping and process equipment, combined with outdated water management practices can result in higher operating costs and lower revenue collected, which can negatively impact a treatment plant's bottom line. Although there was some routine quality assessment in tap water sources of different locations in city, little attention is being given to drinking water quality issues and quantity by water supply agencies.

II. STUDY AREA

Udaipur city lies between 24° 28' 49'' and 24° 42' 56'' N longitude and 73° 36' 51'' and 73° 49' 46'' E latitudes at a general elevation of about 598 meters above mean sea level in the Mewar region of Rajasthan. It is located in the southern region of Rajasthan and is close to Gujarat. The total geographical area of the city is 37 Sq. Km. the Udaipur district covers 14, 62,105 Hectares area with 28% of forest area. The total population of the city as per census 2011 city is 4, 51,735 including 2, 34,681 male & 2, 17,054 females with literacy of 90.66. It is expected to cross 8.0 Lac by 2022. It is bounded on the north by Rajasamand and Pali district, on the south by Dungarpur and Banswara, on the east by Bhilwara and Chittorgarh and on the west by Pali and Sirohi districts and Sabarkantha district (Gujarat).

The district covers an area of 13618 sq. km. The district is surrounded by Aravalli ranges from North to East. The southern part is covered with rocks, hills and dense forest (4, 5). The main sources of water in this area are river, drain, pond, lakes well and step wells, the main rivers are Banas, Bedach, Som, Sei, Wakel, Sabarmati, Ayad, Gomati and Jhakhm of these, Banas and Bedach joins the Chambal river flowing in the eastern regions. The rivers Sei, Mansi and Wakel flows into the Sabarmati flowing from the western and south western regions. The continuous flow of water in these rivers lasts till Februarymarch. Subsequently in the summer the water is filled in some pits and low places during this period, the water flows below the surface of the rivers remains below ground which is the main source of water for man, cattle and wild life.

The area comprises depressions in the form of lakes such as Pichola, Fateh sagar, Rang sagar, Swaroop sagar, Udai sagar, Jaisamand, Mansi Wakel, Jakhm, Tidi, Som-kamla-amba, Kagdar, Badi, Daya and other 234 water bodies are important source of drinking water and irrigation (6, 7, 8). 136 The depth of underground water ranges from 5-15 m below land surface. A city level monitoring committee, Jheel Samvardhan and Vikas Samiti, functions under the chairmanship of Divisional Commissioner Udaipur to monitor the progress of work done under the National Lake Conservation Project (NLCP). Works are carried out related to municipal solid waste management around the lakes, diversion of sewage away from the lakes by installation of new sewer lines & repairing of existing ones, proposal for plying of boats in the lakes which are solar operated to prevent pollution, beautification of parks in and around the lakes, action against unauthorized construction around the lakes, proposals related to developments of Ayar river and establishment of sewage system in entire

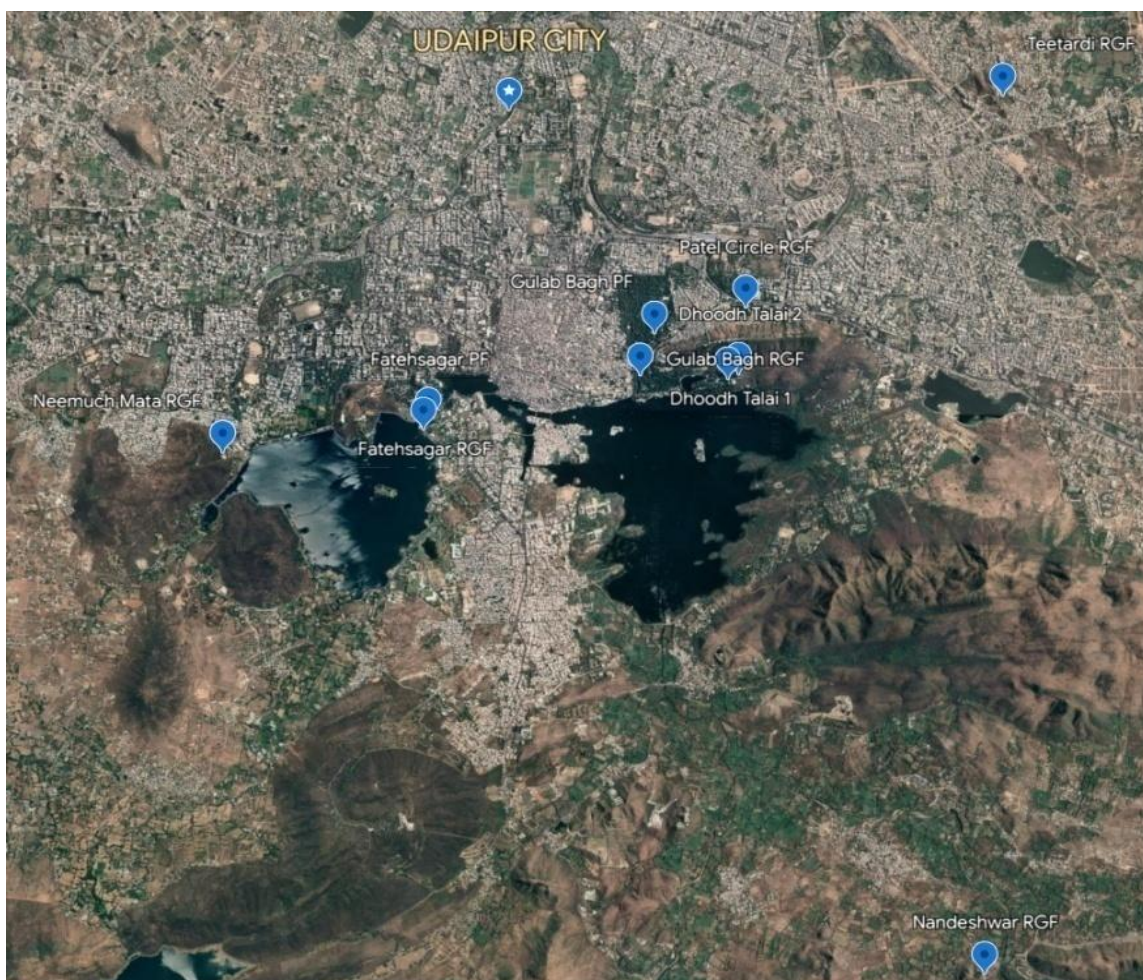


Figure 1: Study Area – Locations of WTP and Raw Water Sources

Table 1: Details of Water Treatment Plants in Udaipur City

S. No.	Name of WTP	Capacity (MLD)	Year of Construction	Raw Water Source
1	Teetardi RGF	13.5	2007	Jaisamand Lake
2	Patel Circle RGF	7.57	1997	Pichola Lake
3	Doodhtalai RGF	13.62	1976	
4	Doodhtalai RGF	2.85	1996	
5	Gulab Bagh RGF	4.54	1968	
6	Gulab Bagh PF	2.27	1968	
7	Fatehsagar RGF	2.27	1970	Mansi Wakal
8	Fatehsagar PF	1.72	1968	
9	Nandeshwar RGF	23.35	2007-08	Fateh Sagar Lake
10	Neemuch Mata RGF	11.35	1996	
11	WTP Smart City	23.7	2023	Pichola Lake

city of Udaipur, cleaning of lakes manually and through de weeding machine, installation of floating fountain in Pichola lake and forestation in its catchments, monitoring water quality of lakes, functioning of Lake Patrol team 22 (inter departmental) for enforcing ban on plastic carry bags and lake pollution control (9) and soliciting public participation for keeping the lakes clean.

III. CONCLUSION

Due to availability of limited underground sewerage network and treatment facilities, sewage is discharged into lakes, leading to an increase in bacterial and organic load in lake water (10). 73 Ghats situated on the banks of lakes are traditionally used for bathing and washing purposes.

This releases a large amount of detergents into the lakes, which increases phosphate content. Similarly, increased commercial activity, especially hotels in the vicinity of lakes, is also contributing considerably to water pollution (11). In the catchment area of Fateh Sagar Lake, chemical effluents from synthetic fiber mills are discharged.

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