International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 8 Issue 3, May-June 2024 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Surface Water Analysis and Chemical Treatment of Water in Narnaul Block District Mahendergarh, Haryana

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ABSTRACT
The physical environment, biodiversity, and water resources are among the negatively impacted areas of the climate change. These changes have a substantial negative impact on the productivity, spirit, and makeup of managed and natural ecosystems as well as on the functioning of socioeconomic systems and the health and welfare of people. The most significant effects of climate change that the Narnaul Block will experience are changes to the monsoonal patterns in the study region. In the south-western region of Haryana, ground water is not only a vital component for life, but it also plays a significant role in economic growth. The bulk of the Indian subcontinent's dry and semi-dry regions have high groundwater fluoride concentrations. The Geological Survey of India (GSI) has classified the Mahendergarh district in the state of Haryana as a Red Alert zone with elevated fluoride levels. The majority of people living in the Mahendergarh district use groundwater for irrigation and drinking. The current state of climate change is placing stress on food security, and in certain areas of the country, further depletion of water resources may portend hunger and drought. The strain on the few resources has been immense due to the population's constant growth. We'll talk about in this paper. In the Narnaul block district of Mahendergarh, Haryana, surface water analysis and chemical water treatment are conducted.

KEYWORDS: *Surface Water Analysis, Chemical Treatment, Climate Change, Biodiversity, Water Resources, Composition, Ground Water, High Fluoride Concentration, Rainfall, Hand Pumps*

How to cite this paper: Manju Kumari | Gaytri Jonwal | Dr. Anil Bansal "Surface Water Analysis and Chemical Treatment of Water in Narnaul Block District Mahendergarh, Haryana" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-8 | Issue-3, June 2024, pp.1229-1235, URL: www.ijtsrd.com/papers/ijtsrd67103.pdf

IJTSRD67103

INTRODUCTION
The landlocked state of Chandigarh serves as the capital of the State of Haryana, which is located in northern India. With a total size of 44,212 square kilometers, the Haryana State is situated between 27°39' and 30°35' N latitude and between 74°28' and 77°36' E longitude. The Ghaggar and Yamuna rivers drain the state, which is further divided into nine physiographic units. On October 1, 1966, it was divided from the erstwhile state of Punjab based on the distribution of languages. The writer Vibudh Shridhar (VS 1189–1230), an Apabhramsha, wrote in the 12th century AD and used the name Haryana. Rajasthan borders it to the west and south, and Punjab and Himachal Pradesh to the north. Its eastern boundary with Uttar Pradesh is defined by the Yamuna river. The borders of Delhi, the capital of the nation, are formed by Haryana on the north, west, and south. As a result, for development planning reasons, a sizable portion of south Haryana is included in the National Capital Region. [1]

Development and existence themselves depend on water, the "elixir of life." Yet a number of issues are endangering this invaluable and essential resource, and the availability of water is turning into a serious issue. Future water resource availability for irrigation, including for agriculture, is probably going to be limited because of the rise in other uses, such as drinking, livestock, industries, power generation, environmental health, etc. Conversely, the increasing demand from a growing population makes it impossible to disregard the need for more water to produce food and fiber. Haryana depends on its share of different interstate agreements since it lacks a consistent source of surface water and has limited groundwater resources.

In the rural areas of Haryana, there are 7655 habitations that receive their water supply from canal-based schemes, tube well-based schemes, and other sources like spring- and ranney-based schemes. All of the rural communities in the state have access to piped water. [2]

Due to geogenic activities, ground water quality is generally sensitive to chemical contamination. As a result, continuous monitoring of chemical contamination is necessary, and ground water quality deteriorates gradually. If there is a chemical contamination, the best course of action is to provide a safe alternative supply, particularly one that is based on surface water. If no other safe source is available, a treatment plant is provided to remove one or more contaminants. However, these plants have certain drawbacks, including the fact that they require a great deal of technical expertise to operate, produce very little treated water, waste a significant amount of water, have high capital and operating expenses, and produce waste, byproducts, and slag that contain a high concentration of contaminants that can be removed only through the necessary chemical treatment. Reverse osmosis, arsenic removal, and defluoridation facilities are a few examples of these types of treatment plants. The likelihood of bacterial contamination is higher in surface water. After a suitable filtration procedure, this contamination was usually eliminated. Furthermore, even after filtering, chlorination is carried out to oxidize or eliminate any organic matter or pathogen present in the water. Additionally, the dose of 2PPM is maintained to guarantee that the water that is delivered to the customer is pathogen-free. Sewage is also tested to make sure that the organic load of treated sewage is within the acceptable bounds according to the STP's design capacity. [3]

Ground Water Quality in Haryana

Determining whether groundwater is suitable for its intended purpose requires evaluating its quality by concentrating its physical, chemical, and biological properties. It assists not just in determining its legitimacy but also in implementing practical corrective actions to advance it along scientific lines. Ground water is a vital resource for drinking, irrigation, and industrial uses in the majority of Haryana State's rural and semi-urban areas, particularly in places where surface water is insufficient or nonexistent. Given the significance of this element of ground water, the Central Ground Water Board, North Western Region (CGWB, NWR) in Chandigarh regularly analyzes the quality of the ground water using specially designed ground water monitoring stations that are made up of shallow-depth hand pumps, dug wells, and/or tube wells.

Rainfall and Climate

The Mahendragarh district has a tropical steppe climate, which is semi-arid and hot. It is primarily dry with scorching summers and chilly winters, with the exception of the monsoon season, when the district receives moist air from the ocean. A year consists of four distinct seasons. The south-west monsoon, which lasts till September, comes after the hot weather season, which runs from mid-March to the last week of June. The post-monsoon season is the period of transition from September to October. The winter season lasts from the end of November to the first week of March. The district typically receives 500 mm of rain each year, spread irregularly over 26 days. The last week of June marks the arrival of the south west monsoon, which ends at the end of September and accounts for around 84% of the yearly rainfall. The wettest months are July and August. The remaining 16% of rainfall falls during the non-monsoon season as a result of thunderstorms and western disturbances. In the district, rainfall typically rises from the southwest to the northeast. [4]

Review of Literature:

A potentially valuable resource for humans, water is one of the most valuable and limitless resources found in the world. Typically, it comprises between 55 and 78 percent of the body. The earth's surface is covered in water to a degree of around 71%; however, only freshwater, or 3% of the total amount of water accessible (mostly in the form of glaciers), is appropriate for supporting life (Kurunthachalam, 2014). The primary source of water needed to sustain human life on Earth is groundwater. However, over the past few decades, a number of anthropogenic and natural processes have caused these environmental components to deteriorate extremely quickly. Man entered the industrial stage after discovering fire and the wheel, however the industrial revolution has led to an increase in the amount of toxins in the environment. [5]

Fluoride contamination in drinking water can arise from both natural and human-caused sources. The primary natural sources of fluoride in the environment are minerals found in fluoride-bearing rocks, volcanic eruptions, marine aerosols, and certain geothermal activity. In addition to these anthropogenic sources, there are also natural sources that raise the environmental fluoride concentration. The primary human-caused sources of high fluoride concentrations in soil and water are industrial aerosols, phosphate fertilizers, plants, sewage sledges, and pesticides (Walna et al. 2007). Aside from these minor effects, the fluoride content of groundwater is also influenced by temperature, soil and water pH, soil sorption capacity, well depth, and local climate conditions. [6]

Objectives:
- To examine the intra-village variation in the depth of ground water level.
- To Study the Surface Water Analysis and Chemical Treatment of Water
- Ground Water Quality in Haryana

Research Methodology:
Present study is based on secondary sources of data which taken from:
- Ground water cell, at Narnaul.
- Census of India 2001, Block Census Report, New Delhi.
- Regional Division of a Cartography Analysis, Series 1, Vol. VI, Census of India. D.R.D.O., Narnaul.
- In order to show the depth of ground water choropleth method has been used.
- In order to show the declining level of ground water line graph is drawn.

Result and Discussion:
The current probe will focus on the Narnaul block in the Mahendergarh district of Haryana. The area of the Narnaul block is 3 17.75 sq. km. As of 2011, there are 517707 people living in the study area. The literacy rate in the study area is 57.39 percent. The Narnaul block covers the latitudes of 270 47' 12" to 280 10' 48" North and the longitudes of 75□ 54' 46" to 76□ 09' 03" East. The state of Rajasthan borders the Narnaul block on the west and southwest, while Mahendergarh tehsil borders it on the north. C.D. block Ateli Nangal and C.D. block Nangal Choudhary, respectively, border the block on the east and southeast. The 67 communities that make up the Narnaul block were all included in the current inquiry. [7]

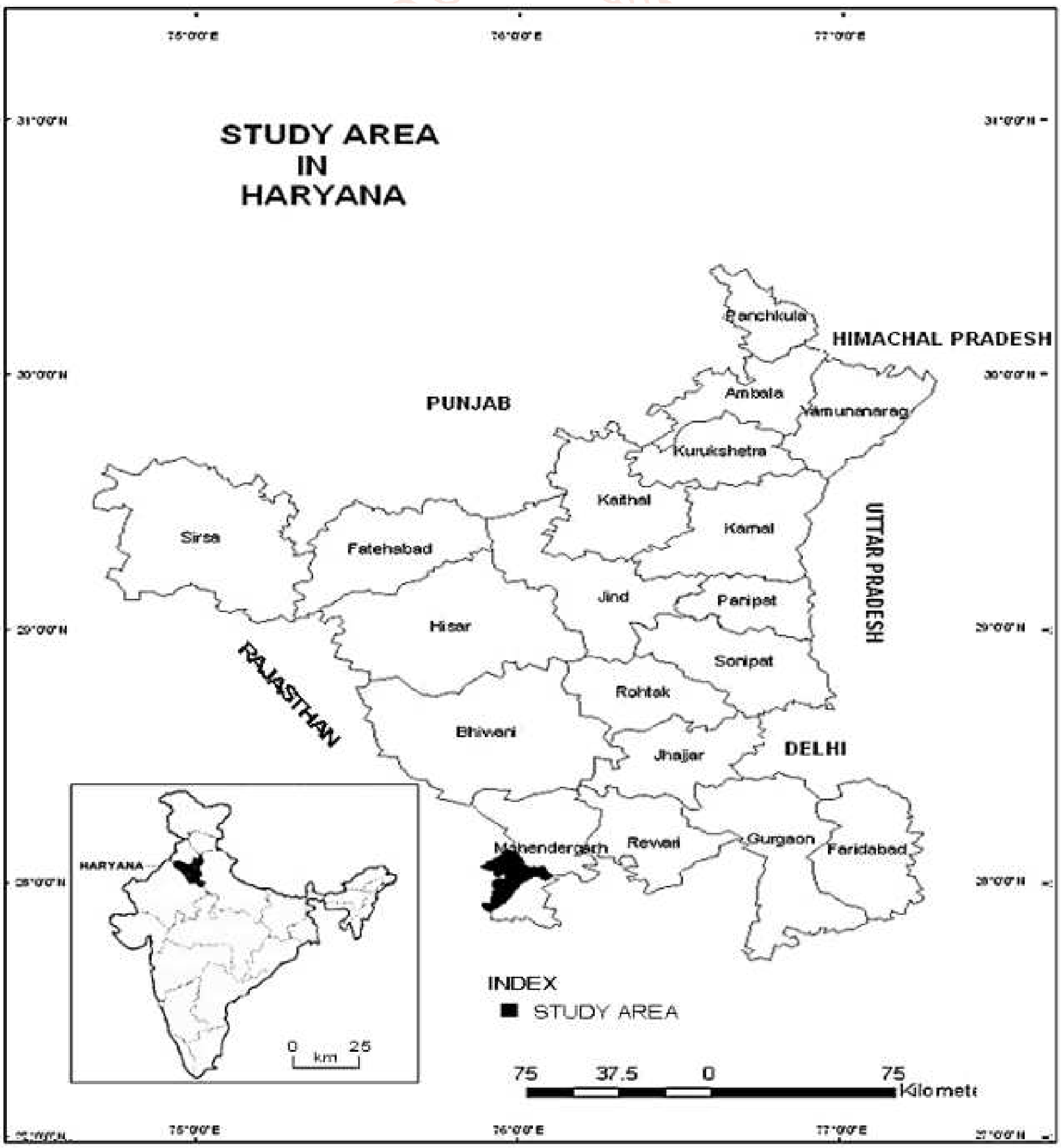

Figure 1: Location Map of Narnaul Block Source: Census of India 2011 [8]

Depth of Ground Water in Narnaul

The depth of groundwater levels varies noticeably throughout the area. In order to determine the depth of ground water, a study is conducted village-by-village. The groundwater depth varies significantly within the research area. The block is divided into the following categories:

Table 1: The Block falling in difference categories as follows

Categories	Villages
High depth area Above 60 M.	Baproli, Nagal Katha, Chindalia, Mohammadpur, Jailab, Dohar Kalan Goad, Balaha Kalan, Balaha Khurd, Dochana, Badopur, Jadupur, Bhankhri, Khatoti Khurd, Khatoli Sultanpur, Dohar Khurd, Jakhni, Khodma
(Moderately high depth area) 50 – 60 M	Thana, Raghunathpura, Kultajpur, Kanwariwas, Hasanpur, Rambas, Maroli, Basirpur, Karoli, Amarpur Jorasi, Tajpur
(Moderately low depth area) 40 – 50 M	Danchali, Dhanota, Talot, Chhilro, Nizampur, Bamanwas, Mukhuta, Narheri Nepla, Pawere, Ghataser, Hudina, Mayee, Ajam Nagar, Hazipur, Baskirarod, Mehrampur, Abdulla Nagar, Dharsoon, Gehli, Makhauspur
(Low depth area) Below 40 M	Lehroda, Faizabad, Rampur, Niwaz Nagar, Salarpur Mehta, Mandlana, Rasulpur, Kirarod Afagan, Buchakpur, Lutalpur, Tehla, Mukandpura, Narnaul, Patikara, Shahpur Doyam, Faizalipur

It has been noted that the ground water level in the North West and West parts of Narnaul is higher than in the North and South, while the North East has lower ground water levels. due to the flow of groundwater in this region, which is directed from west to east. Additionally, there are more tube wells in the block's west to east section, which is a big factor in the ground water level dropping. This region no longer has drainage.

Dohan and Krishnawati, the two primary seasonal streams in this region, have vanished. Due to minimal rainfall and consequently less recharge, it has been noted that there is very little ground water in this area. The Dohan and Krishanawati streams stopped receiving water during the monsoon season in 1995. The groundwater table is lowest in certain villages. It has been noted that there is no ground water, and that drinking water is brought in from neighboring communities. [9]

Declining Ground Water Level in Narnaul Block

From 1995 to 2015, the depth of Narnaul's groundwater has consistently increased. Because of the area's low rainfall and thus reduced monsoon season recharging, the ground water potential is extremely low. About 48 meters is the average depth of the ground water table in. It has been noted that recent years have shown an increase in the rate at which groundwater levels are falling. The ground water table is said to drop 1.04 M year on average (Ground Water Cell, Narnaul).

Table 2: show Declining Ground Water Level in Narnaul Block

	Depth in Metres											
Year Name of Village	95	96	97	98	99	2K	2011	2012	2013	2014	2015	2016
Basirpur	39.19				35.75	37	39.1			53.55	57.5	60.9
Chillro (Talot)	40		42.35	38	38.8	41.66			39.8		47	48.7
Dhancholi	27.1	24.8	20.8	18.9	18.95	23.75	26.25	28.33	35.05	33.1	35.35	32
Dhanota	35.08	24	29.35	34	35	36.45	37	34.65	36.58	36.4	37.25	31.2
Dohar Kalan									60	60.9	61.5	60.9
Faizabad	15.4	13.55	12.21	13.27	13.65	14.78	15.8	15.7	16.9	17.85	18.2	17.3
God (Balaha Kl)	51.3	51.2	50.88	52.1	52.1	53.16	54.2	55.63	62.7	68	59.9	56.35
Hudina	32.1	30.25	27.98	25.25	25.62	27.93	34.7	31.55	43	40.1	39.54	36.9
Khodma	44.7	45.7	41.08	41.5	44.8	45.8			54.7	70	73.17	73.75
Koriawas			42.5	40.15		42.3			48	50	54	55.4
Mehrampur	30.3	25.5	21.93	22.8	23.45	27.35	1.45	31.35	34.1	35.2	36.81	32.7
Kultazpur		46.65	50.65	48.75	47.2				45.06	50.3	53.5	54.8
Narnaul	24.4	19.5	12.18	11.55	12.12	15.66	18.55	19.2	22.08	22.87	24.98	21.8
Pavera	36	36.75	31.85	31.1	31.55	36.25	40.65	39.2	43.65	44.65	43.2	35.8
Raghunathpura	32.5	20.55	16.48	17.45	18.65	22.91	25.05	27.2	23	33	59	59.45
Thana	47.6	46.2	42.85	42.55	44.7	48.65	55.3	32.7	58	46	52.4	53
Bhakhari KI											66	67
Average	34.36	32.22	31.64	31.2	31.59	33.83	34.36	31.55	42.56	45.16	48.2	46.92
Rainfall in mm	940	1289	838	521	285	352	548	209	427.8	333.7	765	433

Tube wells are the primary source of ground water for the district's water supply. The villages' water needs are satisfied by installing hand pumps and having their own wells drilled and constructed. Ground water is also the district's primary source of irrigation water. A total of 1190 sq km of the 1210 sq km irrigated area is dependent on ground water irrigation. Canal irrigation is only used in 20 square kilometers. In the district, a significant number of tube wells and drilled wells are used to extract ground water. [10]

In the district, ground water development is at a 107% stage. This indicates that there is very little room for ground water development in the district and that the district's ground water resources are stressed. In the district, two artificial recharge programs were put into place in association with state authorities with the goal of raising awareness. There cannot be life without water. Water management is therefore crucial. Water scarcity may cause problems for future generations. Water management requires the involvement of the government, society, and the individual.

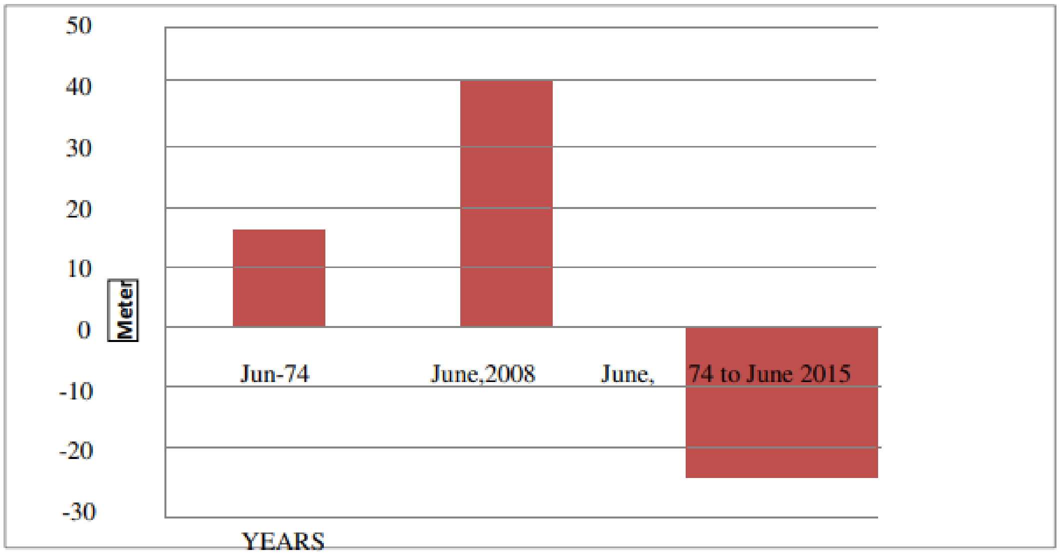

Figure 3: Changes in Ground Water Level in Mahendergarh (1974-2015)

Analysis:
Underground water is created when rainwater seeps through the earth's surface. Additionally, percolation occurs from the surface water. Water gathers in large quantities beneath the surface of the Earth. We refer to this as subterranean water. Renewable underground water capacity in India (1994–1995) was around 4310 billion cubic meters annually, according to the Central Underground Water Board. There are roughly 3960 billion cubic meters of usable water out of this. Not all subterranean water distributions are the same. The amount and kind of rainfall, as well as the terrain and slope, all affect the availability of subsurface water. Water percolates easily in locations with high rainfall because the terrain is nearly plain and contains porous rocks. [11]

Consequently, these regions have an abundance of shallow-depth subsurface water. Because there isn't as much rainfall in places like Nangal Choudhary, where the soil is porous and the land is plain, there is less subsurface water available at deeper depths. As a result, there is less subsurface water accessible in these places at deeper depths.

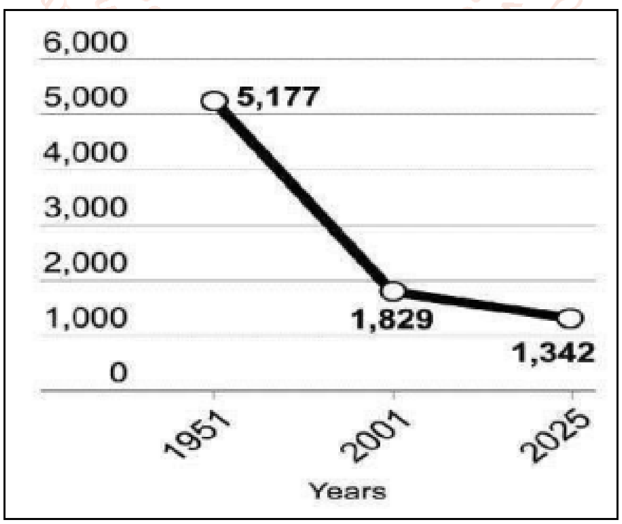

Figure 4: Decreasing availability of water annually [12]

Conclusion:
In conclusion, both surface and ground water resources are scarce in the district. The lack of rainfall is the main factor contributing to the shortage of water resources. Among the other notable factors causing this issue are the high rate of transpiration and the stony surface, which impedes the process of water recharging. Rainfall is not controllable by humans, however it can be lessened and resource sustainability maintained by adopting some sensible, appropriate action. The block communities of Narnaul were determined to have the highest fluoride levels. The Mahendergarh, Sihma, Narnaul, and Nangal Chaudhary blocks continue to have the primary fluoride problem. The district of Mahendergarh is an industrial free zone. The people's primary source of income is agriculture. It is located in a semi-arid zone with a very low water table.

Because fluoride-bearing mineral rocks are present, groundwater has a higher fluoride range. Through the implementation of programs by the government and NGO, the current study will help ameliorate the problem of high fluoride levels in order to realize the aim of health for all.

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