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WATER QUALITY STUDY IN MORNI TOWN, PANCHKULA DISTRICT, HARYANA, INDIA

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Abstract
Water is necessary for survival of living beings. In the modern developmental activities water is one of the natural resource under pressure of anthropogenic activities. In hilly areas it is also polluted due to anthropogenic activities and direct mixing of polluted water with fresh water due to flow of polluted water through joints and fractures. In the present study water quality at Morni town located on Lower Siwalik hill has been studied. Five water samples have been collected during June 2018 and analysed using field water testing kit prepared by Tamilnadu Water Supply and Drainage Board, Chennai for twelve chemical parameters. The results of chemical analysis of water samples shows that pH varies 6.5 -7, alkalinity 100 mg/l to 150 mg/l, hardness 140 mg/l to 230mg/l, chloride 20mg/l to 50mg/l, total dissolved solids (TDS) 336 mg/l to 516 mg/l, fluoride 0.5 mg/l to 1.5mg/l, Iron 0 mg/l to 10mg/l, ammonia 0.5mg/l to 2.0 mg/l, nitrite 0.2 mg/l to 0.5 mg/l, nitrate 20 mg/l to 45 mg/l, phosphate nil in all water samples and residual chlorine 0 mg/l to 0.5 mg/l. The water quality is potable in three water samples and non-potable in two water samples (Kila Ghat and Handpump-2). The study is useful for monitoring the water quality for drinking purpose.

Keywords
Water, quality, potable, non-potable, Morni, Haryana.

INTRODUCTION

Water is prime requirement for survival of living beings. Suitability of water for different uses like drinking, agriculture and industrial purposes mainly depends on its quality. For all the different uses of water for drinking purpose its quality should be as per drinking water standards of Bureau of Indian Standards in India. The availability of good quality water in present context of developmental activities has become rare because of anthropogenic activities in all types of terrain whether plain or hills. Workers have done work on water quality in different types of terrains to understand the water quality status (Goel et al. (2018), Ismail (2015), Oiste (2014), Satyanarayana et al. (2013), Sujatha et al. (2012), Wali et al. (2018)).

Study area

Morni town is located on Lower Shiwalik Hills in Panchkula district of Haryana. The geo-coordinates of the town is latitude 30.7^0 N and longitude 77.08^0 E and located at an altitude of 1267m above mean sea level.

Objective

The main objective was to study water quality for drinking purpose in Morni town, Panchkula district, Haryana.

MATERIALS AND METHODS

Total five water samples were collected from different locations in Morni Town in the month of June 2018 in 120 ml plastic bottles. Water samples were analysed using Field Water Testing Kit prepared by Tamilnadu Water Supply and Drainage Board, Chennai for twelve chemical parameters-pH, alkalinity, hardness, chloride, total dissolved solids, fluoride, iron, ammonia, nitrite, nitrate, phosphate and residual chlorine (Table 1). Chemical analysis results of water samples were compared with BIS Drinking Water Standards (IS 10500:2012) (Table 2). The chemical analysis results were entered in the excel and prepared bar graphs for each chemical parameter.

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Table1: Water sample analysis results (in mg/l except pH).

Water Sample	Latitude	Longitude	pH	Alkalinity	Hardness	Chloride	TDS	Fluoride	Iron	Ammonia	Nitrite	Nitrate	Phos-phate	Resi-dual
Kila Ghat	30.689847	77.082847	6.5	100	150	30	336	1.5	2	0.5	0.5	20	0	0.5
Water Tank	30.689836	77.082807	6.5	130	150	30	372	1	0.3	0.5	0.5	45	0	0
Hand pump-1	30.688037	77.086669	6.5	150	200	30	456	1.5	1	0.5	0.2	20	0	0
Hand-2 pump	30.686457	77.088832	7	150	230	50	516	0.5	10	2	0.5	45	0	0.2
Jal Ghar	30.687817	77.087525	6.5	130	140	20	348	0.5	0	0.5	0.5	20	0	0

Table 2: Drinking water standards (IS 10500:2012).

S. No.	Parameter	Potable		Non-Potable
		Desirable	Permissible	
1.	pH	6.5 to 8.5	--	< 6.5 to > 8.5
2.	Total Hardness (mg/l)	<200	200-600	> 600
3.	Iron (Fe) (mg/l)	<0.3	--	> 0.3
4.	Chlorides (Cl) (mg/l)	<250	250-1000	> 1000
5.	Total Dissolved Solids (TDS) (mg/l)	<500	500-2000	> 2000
6.	Nitrate (NO3) (mg/l)	< 45	--	> 45
7.	Fluoride (F) (mg/l)	< 1.0	1.0-1.5	> 1.5
8.	Residual Chlorine (RC) (mg/l)	< 0.2	0.2-1	> 1.0
9.	Ammonia (mg/l)	< 0.5	--	> 0.5
10.	Alkalinity (mg/l)	< 200	200-600	> 600
11.	Nitrite (mg/l)	<1.0 mg/l	-	>1.0 mg/l
12.	Phosphate (mg/l)	<1.0 mg/l	-	>1.0 mg/l

RESULTS AND DISCUSSION

pH

pH in the water samples varies 6.5 to 7. In all the five water samples pH is desirable as per drinking water standards (Figure 1, Table1 and Table2).

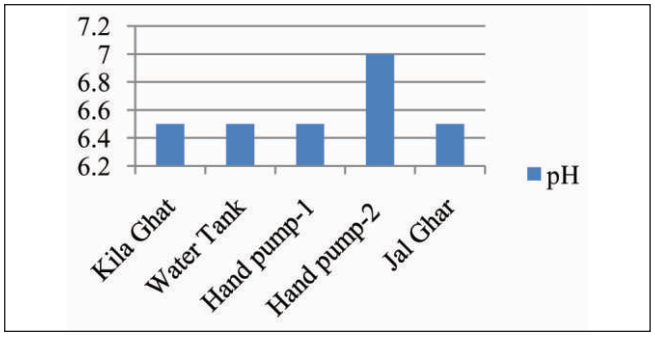

Figure 1: pH in water samples.

Alkalinity

Alkalinity in the water samples varies 100 mg/l to 150 mg/l. In all the five water samples alkalinity is desirable category as per drinking water standards (Figure 2, Table1 and Table2).

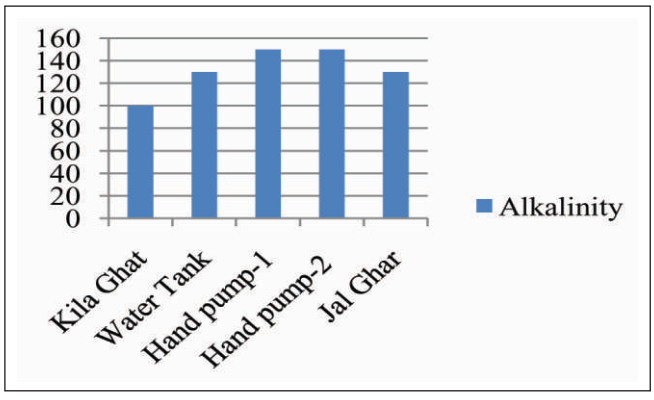

Figure 2: Alkalinity (mg/l) in water samples

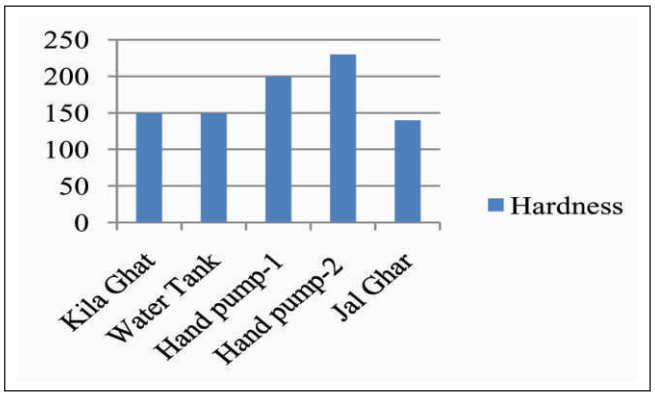

Figure 3: Hardness (mg/l)in water samples.

Hardness

Hardness in the water samples varies 140 mg/l to 230 mg/l. In Handpum-2 hardness is permissible (230 mg/l) and in other four water samples hardness is desirable as per drinking water standards (Figure 3, Table1 and Table2).

Chloride

Chloride in the water samples varies 20 mg/l to 50 mg/l. In all the five water samples chloride is desirable as per drinking water standards (Figure 4, Table1 and Table2).

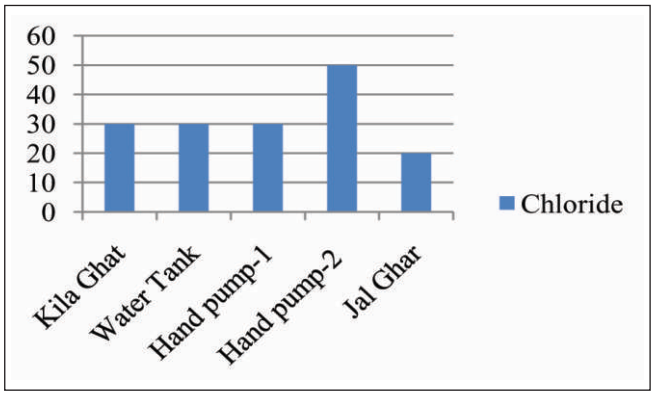

Figure 4: Chloride (mg/l)in water samples.

Total Dissolved Solids (TDS)

Total Dissolved Solids (TDS) in the water samples varies 336 mg/l to 516 mg/l. In Handpum-2 TDS is permissible (516 mg/l) and in other four samples Total Dissolved Solids is desirable as per drinking water standards (Figure 5, Table1 and Table2).

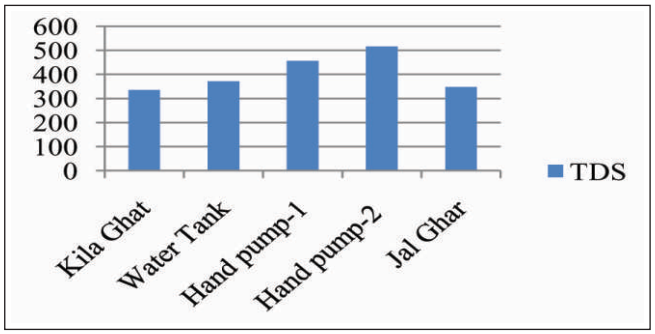

Figure 5: Total Dissolved Solids (TDS) (mg/l) in water samples

Fluoride

Fluoride in the water samples varies 0.5 mg/l to 1.5 mg/l. In all the five water samples fluoride is desirable as per drinking water standards (Figure 6, Table1 and Table2).

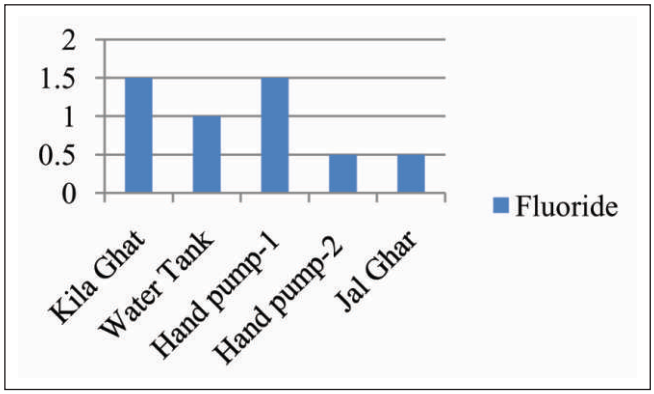

Figure 6: Fluoride (mg/l)in water samples.

Iron

Iron in the water samples varies 0 mg/l to 10 mg/l. In two water samples-Kila Ghat (2mg/l) and Handpum-2 (10 mg/l) iron is non-potable and in other three water samples iron is desirable as per drinking water standards (Figure 7, Table1 and Table2).

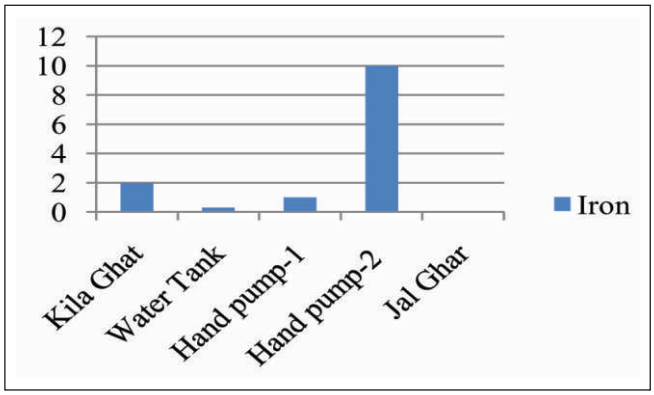

Figure 7: Iron (mg/l)in water samples.

Ammonia

Ammonia in the water samples varies 0.5 mg/l to 2 mg/l. In one water sample-Handpum-2 (2 mg/l) ammonia is non-potable and in other four water samples ammonia is desirable as per drinking water standards (Figure 8, Table1 and Table2).

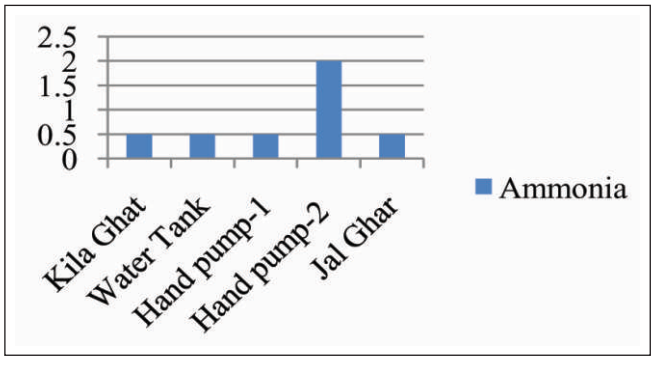

Figure 8: Ammonia (mg/l)in water samples.

Nitrite

Nitrite in the water samples varies 0.2 mg/l to 0.5 mg/l. In all the five water samples nitrite is desirable as per drinking water standards (Figure 9, Table1 and Table2).

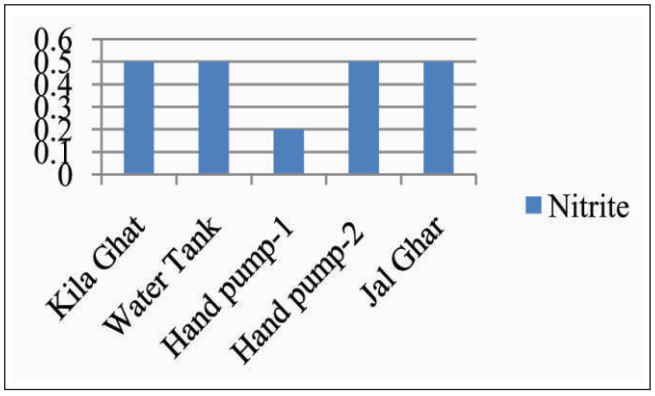

Figure 9: Nitrite(mg/l) in sample locations.

Nitrate

Nitrate in the water samples varies 20 mg/l to 45 mg/l. In all the five water samples nitrate is desirable as per drinking water standards (Figure 10, Table1 and Table2).

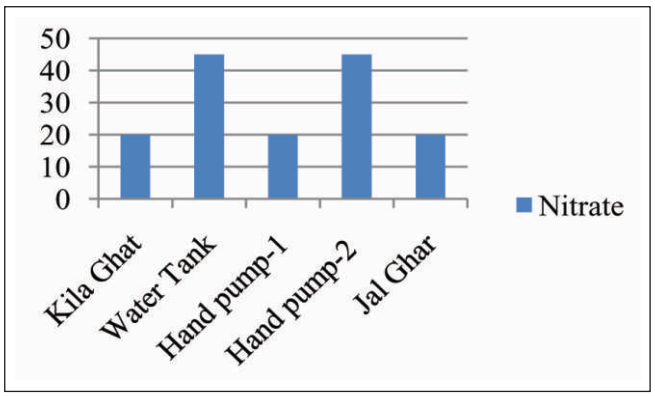

Figure 10: Nitrate (mg/l)in sample locations.

Phosphate

Phosphate in all the five water samples is nil. In all the five water samples phosphate is desirable as per drinking water standards (Figure 11, Table1 and Table2).

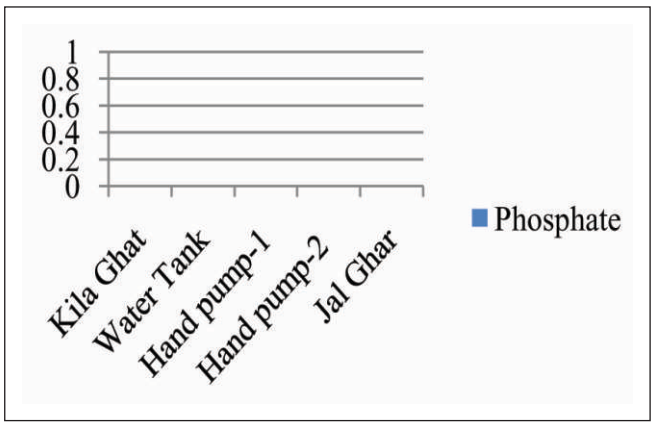

Figure 11: Phosphate (mg/l)inwater samples.

Residual Chlorine

Residual Chlorine in the water samples varies 0mg/l to 0.5 mg/l. In all the five water samples residual chlorine is desirable as per drinking water standards (Figure 12, Table1 and Table2).

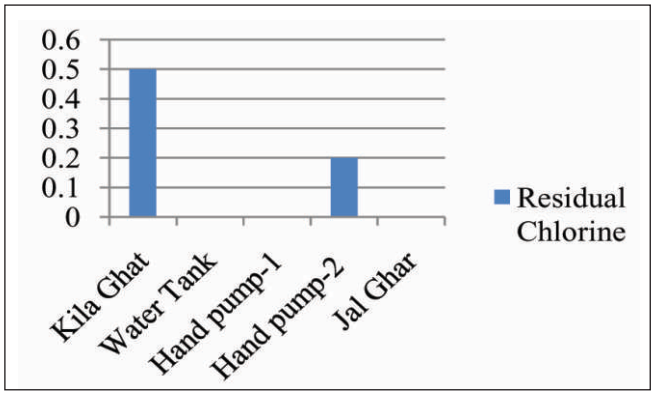

Figure 12: Residual Chlorine (mg/l) at water samples.

CONCLUSIONS

In the study area water quality is non-potable in water samples Kila Ghat (iron 2 mg/l), Handpump-2 (iron 10 mg/l; ammonia 2 mg/l) and potable in water samples Water Tank, Handpump-1, Jal Ghar. The study is highly useful for monitoring the water quality for drinking purpose in the study area.

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