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Short Communication

Drinking Water Quality of the Ground Water at the Maraimalai Nagar Estate at South Chennai, India

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Abstract

Water is the essential natural source for our drinking purpose. Due to industrialization the purity of water is critically affected. To estimate the water quality parameters of eight places at the SIDCO Industrial Estate near at the South of the Chennai City of the state of Tamil Nadu is undertaken in the present study. The standard methods of sampling and estimation are done for the ground water samples. The quality of water shows high values of total hardness and total dissolved solids.

Keywords: Physical parameters, Chemical Parameter.

Introduction

In the late years, the expanding danger to the ground water quality because of human exercises has accepted of extraordinary significance. The antagonistic impacts on ground water quality are the aftereffects of man's movement on the ground surface, on account of agrarian, residential and mechanical effluents, and in addition sub-surface or surface transfer of sewage and modern squanders[1]. The nature of ground water is of extraordinary significance in deciding the suitability of a specific ground water for a sure utilize (open water supply, watering system, modern applications, power era and so forth)[2]. The nature of ground water is the resultant of the considerable number of procedures and responses that have followed up on the water from the minute it consolidated in the environment to the time it is released through a well. Along these lines, the nature of ground water shifts from spot to put, and from season to season with the profundity of the water table, and is basically represented by the degree and organization of the broke up solids.

Sources for Ground Water Pollution: The following table shows a list of the potential groundwater contamination sources: Groundwater contains a few polluting influences, regardless of the fact that it is unaffected by human exercises. The sorts and centralizations of characteristic pollutions rely on upon the way of the land material through which the groundwater moves, and the nature of the energize water[3]. Groundwater traveling through sedimentary shakes and soils may get an extensive variety of mixes, for example, magnesium, calcium, and chlorides. A few aquifers have high regular convergences.

Agricultural Sources: Pesticides, manures, herbicides and creature waste are farming wellsprings of groundwater tainting. The horticultural defilement sources are shifted and various: spillage of manures and pesticides amid taking care of, spillover from the stacking and washing of pesticide sprayers or other application gear, and utilizing chemicals tough from or inside of a couple of hundred feet of a well.

Industrial Sources: Assembling and administration businesses have levels of popularity for cooling water, preparing water and water for cleaning purposes. Groundwater contamination happens when utilized water is come back to the hydrological cycle. Current monetary movement requires the transportation and capacity of material utilized as a part of assembling, handling, and development. Along the route, some of these materials can be lost through spillage, spillage, or disgraceful taking care of. The transfer of squanders connected with the above exercises adds to another wellspring of groundwater defilement.

A few organizations, more often than not without access to sewer frameworks, depend on shallow underground transfer. They utilize cesspools or dry openings, or send the wastewater into septic tanks.

Residential Sources: Private wastewater frameworks can be a wellspring of numerous classes of contaminants, including microbes, infections, nitrates from human waste, and natural mixes. Infusion wells utilized for local waste water transfer (septic frameworks, cesspools, seepage wells for tempest water overflow, and groundwater revive wells) are of specific worry to groundwater quality if found near drinking water wells. Shamefully putting away or discarding family unit chemicals, for example, paints, manufactured cleansers, solvents, oils, meds, disinfectants, pool chemicals, pesticides, batteries, gas and diesel fuel can prompt groundwater defilement[3].

Sea Water Intrusion: At the point when managing the abuse, rebuilding and administration of crisp groundwater in beach front aquifers, the key issue is ocean water interruption. Saltwater interruption is a kind of characteristic groundwater pollution, where the regular harmony in the middle of freshwater and saltwater in beach front aquifers is aggravated by groundwater withdrawals and other human exercises that lower the groundwater levels, lessen crisp groundwater stream to waterfront waters, and at last make saltwater interfere into the seaside aquifers, making those aquifers no more accessible for use.saltwater interruption along the coasts, the bringing down of the water table by waste waterways can likewise prompt saltwater interruption[4].

Study Area: Chennai, earlier known as Madras, is the capital city of the condition of Tamilnadu, and India's fourth biggest metropolitan city. It is situated on the Coromandel bank of the Bay of Bengal. The scope of the city is 13.04o N and longitude 80.17o E. The city covers a zone of 174 Km2. It is 368 years of age and the 31st biggest metropolitan territory on the planet.

There are three water bodies viz., Adayar waterway, Cooum stream and the Buckingham Canal. The Chennai Metropolitan region comprises of three areas, to be specific, Chennai city and the regions of Kancheepuram and Thiruvallur. The city is isolated on the premise of its sythesis into four noteworthy parts, North, South, West and Central Chennai.

Maraimalai Nagar Town: Maraimalai Nagar Town is arranged in the south at a separation of 40 km from Chennai city. It is the listen quarters of Maraimalai Nagar or Taluk in Kancheepuram area. It is arranged at 12'41'30" scope and 74'58'00: longitude and 28m lifted from M.S.L. This town is named as Maraimalai Nagar in memory of Maraimalai Adigalar and has no legacy back-ground. The Municipality involved Kattankulathur, Potheri and Thirukatchur, Peramanur Villages and was constituted as a Third Grade Municipality in 2004. According to the GO (MS) No.154 dated 19.08.2010 it was up reviewed as an uncommon evaluation Municipality. It is situated on the National Highway No : 45.

The town is isolated into 21 wards. The degree of the city range is 58.08 Sq.Km. There are around two hundred and twenty commercial ventures in the SIDCO Industrical Estate of the Town. The popular Ford (India) Ltd., and India Pistons, are arranged in the Industrial Estate. Eight Sampling stations were chosen from the study range, 1 each from diverse wards of the town. The number of inhabitants in the town is 81,361 as per 2011 registration.

Methodology

Criteria for the selection of Bore Wells / Tube Wells / Hand pumps. For the choice of the groundwater quality study area, the accompanying criteria were remembered: i. Drinking water wells ells closer to the contaminating sources, similar to commercial enterprises, urban wastewater channels, trash, dumpsites and so forth. ii. Wells associated with regular contaminants like fluoride, iron, arsenic or such toxins. iii. Test accumulation, transport, protection and examination.

Tests were gathered from one of the follo0wing three sorts of wells: i. Open delved wells being used for household or watering system water supply, ii. Tube wells fitted with a hand-pump or a force driven pump for local water supply or watering system, iii. Hand Pumps, utilized for drinking[5].

Open burrowed wells, which are not being used or have been surrendered, were not utilized for testing. For the accumulation of tests, a weighted specimen jug or sampler was utilized to gather the example from an open well. Tests from the creation tube were gathered subsequent to running the well for around 5 minutes.

For bacteriological specimens, when gathered from tube wells/hand pump, the spout/outlet of the source was sanitized under fire by a soul light, before the accumulation of the example in the compartment. From open wells the specimens were gathered straightforwardly into pre-cleaned glass bottles). The specimens were transported to the research center. The specimens were dissected instantly for parameters like Coliform, BOD, COD and supplements.

Different parameters were broke down inside of a week's chance[6]. The water tests for the follow component investigation were gathered in corrosive filtered polyethylene bottles, and safeguarded by including ultra immaculate nitric corrosive (2 mL/lit.). Tests for the pesticides examination were gathered in glass bottles, while tests for bacteriological investigations were gathered in disinfected high-thickness polypropylene/Glass jugs secured with aluminum foils. Every one of the specimens was put away in inspecting units kept up at 4^{o}C and conveyed to the lab for definite concoction and bacteriological examinations[7].

Table-1
Methods used for Estimation of Physical Parameter

Parameter	Method
Colour	Visible Comparison Method (Only Potable water)
Electrical conductivity	Conductivity Meter
pH Value	pH Meter
Suspended solids (Total Number Filterable)	Gooch crucible
Temperature	Thermometer
Total Dissolved solids	Gravimetric
Turbidity	Nephelometric

Table-2
Water Quality Standards as Per IS 10500

Parameter	Unit	IS0500 Norms
Alkalinity to methyl orange	mg/l	200
Biochemical Oxygen Demand	mg/l	
Calcium	mg/l	75
Chemical oxygen demand	mg/l	-
Chloride	mg/l	250
Chromium	mg/l	0.05
Colour	Hazen units	10
Conductivity	µmhos/cm	-
Fluoride	mg/l	1.0
Handness total	mg/l	300
Iron	mg/l	0.3
Total Dissolved solids	mg/l	500
Magnesium	mg/l	30
Turbidity	mg/l	10

Table-3
Methods used for the Estimation of Chemical Parameters

Parameter	Method
Alkalinity	Colour Indicator Titration
Biochemical Oxygen Demand	Five day BOD at 20°C, Three day BOD at 27°C.
Cadmium	Atomic Absorption Spectrophotometer
Calcium	Titrimetic (EDTA)
Chemical Oxygen Demand	Dichromate reflux
Chloride	Titrimetic (Argentomatric or Mercuric Nitrate)
Chromium	Colorimetric (Diphenyl Carbazide) (for hexavalent, trivalent and total)
Fluoride	Distillation followed by colorimetric
Handiness total	Titrimetic (EDTA)
Iron	Colorimetric Phenanthroline
Magnesium	By difference (between total hardness and calcium determined titrimetrically)
Total dissolved solids	Gravimetric

Table-4
Observed Phycico-Chemical Parameters of the Stations 1, 2, 3 and 4

Parameter	Unit	Station 1	Station 2	Station 3	Station 4
Alkalinity to methyl orange	mg/l	272	362	274	232
BOD – 3 days at 27°C	mg/l	-	-	-	-
Calcium (as Ca)	mg/l	96	96	104	65
Chloride (as CI)	mg/l	194	304	258	128
Chromium (as Cr)	mg/l	<0.01	<0.01	<0.01	<0.01
COD	mg/l	14	15	14	14
Colour	Hazen Units	7	5	6	6
Electrical Conductivity	µmhos/cm	1351	1500	1240	995
Flouride (as F)	mg/l	0.11	0.04	0.14	0.04
Iron	mg/l	0.08	0.09	0.07	0.11
Magnesium (as Mg)	mg/l	17	15	28	20
pH	-	6.94	7.44	6.88	7.18
Temperature	°C	24.0	24.0	25.0	25.0
Total dissolved solids	mg/l	896	1100	896	688
Total Hardness	mg/l	312	304	368	258
Turidity	mgl/l	9	10	8	8

Results and Discussion

Every one of the estimations of pH lie beneath as far as possible and the shade of the water: the water is drab, unscented the stations, the temperature of the station 1 is 24^{o}C and whatever is left of alternate stations is 23^{o}C, 25^{o}C and the conductivity of water is lowest in stations 4 cadmium the convergence of cadmium in every one of the stations is beneath as far as possible. The estimation of calcium is very low in station 4.

The centralization of chloride is higher in station 2 and the estimations of chromium in every one of the stations are beneath as far as possible the estimations of Chemical Oxygen Demand are normal. Every one of the estimations of fluoride is beneath the cutoff and the estimations of aggregate hardness is over as far as possible in station 6 and 2 Iron in very one of the qualities are beneath as far as possible and the convergence of magnesium is most noteworthy in station 3 and the estimations of potassium is within the limit and the turbidity, values fall within the normal range.

Conclusion

The values of TDS are highest gives skin irritation to the users and hence proper treatment is required. Recommendations of the central pollution control board for water quality management: The CPCB has given the accompanying suggestions to forestall ground water contamination, after a point by point overview in different metros in India. All the ground water extraction structures ought to be enlisted and directed to maintain a strategic distance from over misuse and weakening of ground water quality[8]. The water got starting from the earliest stage structures ought to be tried and examined to guarantee the suitability of ground water for human utilization. The ground water deliberation sources and their environment ought to be legitimately kept up to guarantee hygienic conditions and no sewage or dirtied water ought to be permitted to permeate specifically to the ground water aquifer. Proper concrete stages ought to be developed encompassing the ground water reflection sources to dodge[9].

References

1. Ground Water Quality Survey in Bollaram-Patancheru (2007). Status of groundwater quality in India-Part I. CPCB, Ministry of Environment & Forest, Govt. of India, Delhi, India.

2. Senthilnathan T. and Parthavarthinin K.V. and Shanthi M. George (2011). Assessment of ground water quality of Maraimalai Nagar Town, near Chennai, India. *Journal of Environment Research and Development*, 5(4), 943-947.

3. Ground Water Quality Survey in Ankleshwar (2007). Status of groundwater quality in India –Part –I. CPCB, Ministry of Environment & Forest, Govt. of India, Delhi, India

4. Ground Water Quality Survey in Kochi (2007). Status of groundwater quality in India –Part –I. CPCB, Ministry of Environment & Forest, Govt. of India, Delhi, India

5. Ground Water Quality Survey in Agra Metropolitan City (2007). Status of groundwater quality in India –Part –I. CPCB, Ministry of Environment & Forest, Govt. of India, Delhi, India

6. Senthilnathan and Parvathavarthini K.V. (2010). Analysis of water quality characteristics in selected areas of Chennai city. National Conference on Green Chemistry (NCGC).

7. Ground Water Quality Survey in Chennai Metropolitan City (2007). Status of groundwater quality in India –Part –I. CPCB, Ministry of Environment & Forest, Govt. of India, Delhi, India

8. Senthilnathan T. and Parvathavarthini K.V. and George Santhi M. (2010). Assessment of ground water quality of Maraimalai Nagar Town, Near Chennai, India. *Journal of Environmental Research and Development*, 5(4), 943-947.

9. Senthilnathan T. and Parvathavarthini K.V. (2010). Assessment of water quality in Chennai city of Tamilnadu. International Conference on Environment Challenges A Global concern, Kanya Maha Vidyalaya.