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ORIGINAL ARTICLE

A STUDY ON ASSESSMENT OF WATER POLLUTION IN VISAKHAPATNAM CITY- A CASE STUDY

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Abstract:

Pure water is not found in nature. Water is considered absolutely essential to sustain life. Pure water is a colour less pure water does not exist in nature. These unique properties of water make it to get polluted. As a result of human activities water becomes less suitable for drinking, domestic, agricultural, industrial, recreational, wild life and for other uses. The main reason for fresh water pollution can be attributed to discharge of untreated waste, dumping of industrial affluent and run-off fertilizer applied in the agricultural fields, Industrial growth, urbanization and the increasing use of synthetic organic substances have serious and adverse impacts on fresh water bodies. Another important problem is the seawater intrusion. Such intrusion results in decrease in fresh water recharge. As the seawater moves in, the inland groundwater aquifers become contaminated with salt and other elements causing permanent damage to the groundwater quality Visakhapatnam city, which forms the present area of investigation, presents such situation.

KEY WORDS:

Ground Water quality, City suburbans, Water quality standards, Physical –Chemical parameters.

INTRODUCTION

Water is the most precious gift of nature and vital for human survival. The earth without water is difficult the imagnes. Human body itself consists of 80% of water and it is impossible for than to survive without water. Water required for the satisfactory performance of physical organisms, as a circulatory fluid as a carrier of nourishing food, and for the removal of products of wastes. Water that may be considered absolutely pure is not to be found in nature. The freshwater provides to thirsty cities and parched crops and is used in industries. Most of the biochemical reactions which occur in metabolism and growth of living cells involves the medium of water. Colour in water may come from natural minerals such as caused by iron and manganese compound from other sources such as Peat, Algae, Weeds, Protozava. Early people recognized the importance of water from the quantity view point only civilization developed around water from the quantity view point only civilization developed around water bodies that could support agriculture and transportation as well as provide drinking water. Recognition of the importance of water quality developed more slowly. Early humans could judge water quality only through the physical senses of sight, taste and smell. Not until the biological, chemical and medical sciences developed were methods available to measure water quality and to determine its effects on human health and well-being. Till now none of the metropolitian cities of India is being supplied water for 24 hrs of the day. Only 16% of Indian town and 5%

population are being served at present by modern water supply schemes. Habits of rural people are mostly depends upon their existence in surrounding area. Basically people living in rural area depend on agriculture. They had not the adequate knowledge regarding water borne diseases (or) Sanitation aspects. Hence water born diseases prevailing in rural areas are more than urban areas. Distribution of population in rural areas is uneven. Some regions are over populated and some are not. Basically in rural areas of India population was existed where the resources are plenty such as water, fertilesoils for irrigation and good climate to live. Areas which are favorable for human occupance are called Ecumen areas and non Ecumen areas are harsh climate too hot too cold or too humid. In the rural areas water pollution is more they do not know how to utilize the water. Because of ignorance, lack of information, lack of media. Now days, all over the India, water borne diseases like cholera, typhoid, and jaundice are prevalent in urban and rural areas. Due to water contamination hence there is a need to supply protected water. The increased industrial installations in turn lead to mass concentrations of effluents around them and the cities and towns around these industrial complexes are posing a variety of environmental problems, which sometimes have far-reaching consequences. The growth of population in an area imposes a huge pressure on available water resources. The groundwater regime of any given area is generally a sensitive part of the ecosystem and will be the immediate victim to environmental degradation, resulting due to industrialization and urbanization. The main reason for fresh water pollution can be attributed to discharge of untreated waste, dumping of industrial affluent and run-off form fertilizer applied in the agricultural fields, Industrial growth, urbanization and the increasing use of synthetic organic substances have serious and adverse impacts on fresh water bodies. Usually, the developed countries suffer from problems of chemical discharges into the fresh water sources, while the developing countries face problems of agriculture run-off in water sources. Polluted water like chemicals in drinking water causes problems to health and leads to water borne diseases that can be prevented by taking appropriate and timely measures even at the household level.

METHODOLOGY:

Standard scientific methods have been followed for field and laboratory work as well as in the process of analyzing and interpreting the findings. The study area has been subdivided into 140 sub areas of 3.7 cm X 3.7 cm size from 14 grids with the help of a Toposheet. This procedure is used for identifying the areas for water sample collection and for making further study of the groundwater quality and also for eliciting information relating to water level fluctuations etc.Methods employed in the present investigation mainly include:Field methods, laboratory methods, remote sensing methods. Field methods include principally, collection of water samples from the identified areas from the selected grid points. Procedures suggested by Brown et al. (1974) and Hem (1970) were followed for collection of groundwater samples. The laboratory work is mainly based on the GIS information and techniques. These techniques were used in the investigation of groundwater regime for occurrence, quality and pollution as influenced by lithology, geomorphology, pH and lineament pattern etc. For studying the surface geology, hydrogemorphology, linements and land use/land cover aspects of the study area the Remote Sensing Techniques have been utilized.

RESULTS:

The data relating to the physicochemical parameters reported in the work are an average of live samples and is presented in Table. The observed values of the samples were compared with below mentioned Water Quality Standards WHO, ICMR,ISI .The samples collected showed considerable variations in the quality of groundwater. This might be due to their proximity to the industrial activity or may be due to variation in the depth of sample points. In general, the quality of ground drawn from deep installations is better than the shallow installations, since the latter is prone for contamination by various materials.

Table
Water Quality Standards

Constituents (mg/l)	WHO(1971)		ICMR(1975)		ISI(1983)	
	Maximum Acceptable	Maximum Allowable	Highest Desirable	Maximum permissible	Highest desirable	Maximum permissible
TDS	500	1500	500	1500	500	1500
TH	100	500	300	600	300	600
Ca	75	200	75	200	75	200
Mg	50	150	50	100	30	100
Cl	200	600	250	1000	250	1000
Cu	--	--	0.05	1.5	0.05	1.5
Pb	--	--	0.1	0.1	0.1	0.1
Zn	--	--	5	--	--	--
Fe	--	--	0.1	1	0.1	1

Chemical parameters in the study area (based on WHO, ISI, ICMR)

Samples	Village name	Chemical parameters		
		Within highest desirable limits	Within permissible limits	Within Exceeding maximum permissible limits
S_1	China Waltair	TH,Mg,Ca, Cl,Fe,Zn	TDS,Fe	-----
S_2	M.V.P.Colony	Ca,Zn	TDS,TH,Mg,Cl,Fe	------
S_3	P.M.Palem	Ca,Cl,Fe,Zn	TH,Mg	TDS
S_4	Rushikonda	Ca,Cl,Fe,Zn	TDS	TH,Mg
S_5	Lawsonsbay Colony	TH,Ca,Mg,Cl,Fe,Zn	TDS	----
S_6	Yendada	Mg,Cl,Zn	TDS,TH,Fe	Ca
S_7	Nakkavani Palem	TDS,TH,Ca,Mg,Cl,Fe,Zn	------	---------
S_8	Pedda Waltair	Ca,Cl,Zn	TDS,TH,Mg,Fe	---------
S_9	Simha Chalam	Ca,Cl,Zn	TDS,Fe	TH,MG
S_{10}	Mudasarlova	Ca,Cl,Zn	TDS,TH,Mg	----------

Physico-Chemical parameters of the Ten study locations along with WHO,ISI,ICMR

Parameter	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}
P^H	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL
TDS	MPL	MPL	EL	MPL	MPL	MPL	HDL	MPL	MPL	MPL
Chlorides	HDL	HDL	MPL	MPL	HDL	HDL	HDL	HDL	MPL	HDL
Sulphates(So4)	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL
Total Hardness	HDL	MPL	MPL	EL	HDL	MPL	HDL	MPL	EL	MPL
Nitrates	HDL	HDL	MPL	HDL	MPL	HDL	HDL	HDL	HDL	HDL
Fluorides	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL
Zinc(Zn)	MPL	MPL	MPL	MPL	MPL	MPL	MPL	MPL	MPL	MPL
Iron(Fe)	MPL	MPL	MPL	MPL	MPL	MPL	MPL	MPL	MPL	MPL
Calicuim(CA)	HDL	HDL	HDL	HDL	HDL	MPL	HDL	HDL	HDL	HDL
Potasium(K)	HDL	HDL	MPL	MPL	HDL	HDL	HDL	HDL	MPL	HDL
Sodium(NA)	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL	HDL
Magniseum(MG)	MPL	MPL	MPL	EL	MPL	MPL	HDL	MPL	EL	MPL

*HDL-Highly Desirable Limit   *MPL- Maximum Permissible Limit
* EL- Exceeding Limit

CONCLUSION:

Today, there is a great threat to the fresh water resources as well as the fresh water quality all over the world. The main reason for fresh water pollution can be attributed to the discharge of untreated waste, dumping of industrial affluent and run-off from agricultural fields. Polluted water causes problems to health leading to water-borne diseases. Another important problem in the study area is the sea-water

intrusion which decreases fresh water recharge. Visakhapatnam city, which forms the present area of investigation presents such situation and has been witnessing a serious burden on land and ground water resources for the last couple of decades besides witnessing a remarkable decrease in rainfall. Under the water pollution control approach attempts to protect the environment have relied on isolating contaminants from the environment and using end-of-pipe filters and scrubbers. Application of appropriate technologies is based on a systematic analysis of the source and nature of the emission or discharge in question and its interaction with the ecosystem. Supplies should be drawn from the best available source. If the source cannot be adequately protection against pollution the water must be treated to ensure its safety. Possible health hazards should be identified by sanitary surveys and eliminated.

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