

A STUDY OF THE IMPACT OF SEWAGE AND TANNERY EFFLUENT IN PONMANDURAI PUDHUPATTY POND IN DINDIGUL DISTRICT

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ABSTRACT: The investigator has made an attempt to study the impact of untreated tannery effluent in the groundwater sources located at Ponmandurai pudhupatty. As the result the groundwater sources around different residential area like Ponmandurai pudhupatty reaches high degree of pollution. Ground water analysis at four different sites at four directions reveals that the water quality parameters are higher than the permitted level. As per CPHEEO standard specifically high turbidity, high TDS and higher Electrical conductivity values indicate that the water cannot be used for domestic purpose. The adjoining groundwater sources are mostly affected and the water becomes very salty with very high TDS. Hence the polluted water is suggested to water treatment using Reverse Osmosis System.

Keywords: Ground Water, Surface water, Tannery Effluent, Sewage, CPHEEO, R O System.

INTRODUCTION:

Industrial Effluent:

Industrial wastes are usually generated from different industrial processes, as a result the amount and toxicity of waste released from industrial activities varies with the industrial processes. Again, among all the industrial wastes tannery effluents are ranked as the highest pollutants (Shen, 1999). It involves many physical, chemical, and biological processes that take place in a variety of physiographic and climatic settings. For many decades, studies of the interaction of ground water and surface water were directed primarily at large alluvial stream and aquifer systems (A.pandia rajan et al., 2014).

Effluent irrigation has been practiced for centuries throughout the world (Shiva et al., 1986; Tripathi et al., 2011). It provides farmers with a nutrient enriched water supply and society with a reliable and inexpensive system for wastewater treatment and disposal (Feigin et al., 1991). In India also being a cheap source of irrigation

farmers are applying this water to their fields. Rapid industrialization, population explosion and more urbanization in India have created enormous problems of environmental pollution in terms of generating the variable quantity and quality of solid and liquid wastes. In developing countries, there has not been much emphasis on the installation of sewage treatment plants and all the tannery effluents are generally discharged into the sewage system. The sewage waters are used as potential source irrigation for raising vegetables and fodder crops around the sewage disposal sites which are directly or indirectly consumed by human beings.

Soil contamination by sewage and tannery effluents has affected adversely both soil health and crop productivity. Sewage and tannery effluents are the rich sources of both beneficial as well as harmful elements. Since some of these effluents are a rich source of plant nutrients, therefore soil provides the logical sink for their disposal. But much untreated and contaminated sewage and tannery effluents may have a high concentration of several heavy metals such Cd, Ni, Pb and Cr (Arora et al., 1985).

Their continuous disposal on agricultural soils has resulted in soil sickness (Narwal et al., 1988) and accumulation of some of the toxic metals in soil (Adhikari et al., 1993; Antil 2005, Gupta et al. 2002, 1998; Kharche et al., 2011) which may pose serious human and animal health. Several studies have been carried out for the treatment of industrial effluents through coagulation and flocculation process (Shouli et al., 1992).

SCOPE AND OBJECTIVES OF THE STUDY:

The volume of sewage and tannery effluents discharged is increasing day by day. The sewage water and the tannery effluent from the tannery units discharge the polluted water into the pond without any treatment. The option of treatment plant to treat the sewage water and the tannery effluent may lead to spoilage of environment.

Objectives:

- To assess the physico-chemical parameters of the water in Ponmandurai pudhupatty pond, Dindigul.

- To evaluate the physico-chemical parameter of the ground water present in the well and bore wells around Ponmandurai pudhupatty, Dindigul
- To suggest suitable remedial measures to treat the groundwater using RO system.

MATERIALS AND METHODS:

The Pond Ponmandurai pudhupatty has become a collection of sewage water and tannery effluent from various units of tannery industries, Dindigul town. Hence the water in the pond as well as the ground water sources in and around the pond at a radius of 2 km is completely polluted due to the continuous discharge and percolations of the sewage water and tannery effluents to the ground water. An attempt has been made to analyse the extent of water pollution by analyzing various water quality parameters for four sites. The water sample was analysed and compared with the guideline of Bureau of Indian Standards (BIS) limit for drinking water standards. Analysis of physico-chemical characteristics of water samples were undertaken to find the water quality.

Table 1. Analysis of the Contaminated Water:

S.No	Parameter	Method of Analysis
1	Colour	Visual comparison
2	Turbidity	Neplo turbidity meter
3	TDS	Conductivity method
4	Electrical conductivity	Conductivity meter
5	pH	pH Meter
6	Total hardness	EDTA Titrimetric method
7	Calcium	EDTA Titrimetric method
8	Magnesium	Calculation from Total Hardness
9	Iron	Spectrophotometer
10	Ammonia	Nessler's Method
11	Nitrite	Spectrophotometer
12	Nitrate	Spectrophotometer
13	Chloride	Silver nitrate
14	Fluoride	Colorimetric meter
15	Sulphate	Turbidity method
16	Phosphate	Spectrophotometer

RESULTS AND DISCUSSIONS:

Drinking Water Standards:

Raw water quality and standards depend upon the use. The four main uses are municipal, industrial, agricultural and recreational (fish and

wildlife). As water quality is degraded day by day, so, it becomes very important to set the drinking water standards for the safety of water of our limited resources. Different agencies have set environment standards for safe drinking water as

Bureau of Indian Standards (BIS), World Health Organization (WHO), and European Economic Community (EEC) etc. Drinking water standards are regulation that Bureau of Indian Standards (BIS) set to control the level of contamination in

the drinking water. Bureau of Indian Standard considers the inputs from several organization i.e. Central, State, Semi Government, Municipal Corporation, Public Health Organization, etc. throughout the standard setting process.

Table 2.Comprehensive Table Water Quality Analysis:

Sample collection	BIS Limit	S1	S2	S3	S4
Appearance	-	Turbid	Clear	Clear	Clear
Colour (Pt.Co-Scale)	<u>5</u>	Blackish	Colourless	Colourless	Colourless
Turbidity NT units	<u>5</u>	60	7	6	3
Total dissolved solids mg/L	<u>500</u>	1309	908	904	743
Electrical conductivity in Micro mhos/cm	-	1972	1289	1429	960
P ^H	<u>7.0-8.5</u>	7.49	7.69	8.03	7.63
Total hardness as CaCO ₃ (mg/L)	<u>300</u>	700	268	340	272
Calcium as Ca mg/L	<u>75</u>	144	64	74	61
Magnesium as Mg mg/L	<u>30</u>	82	26	37	29
Sodium as Na	-	120	124	112	78
Iron as Fe mg/L	<u>0.3</u>	2.31	1.52	1.59	0.86
Ammonia as NH ₃ mg/L	-	4.34	1.29	1.76	0.59
Nitrate as NO ₃ mg/L	<u>45</u>	16	13	6	5
Chloride as Cl mg/L	<u>250</u>	540	156	374	162
Fluoride as F mg/L	<u>1</u>	1.2	0.4	0.8	0.4
Sulphate as SO ₄ mg/L	<u>200</u>	117	116	76	62
Phosphate as PO ₄ mg/L	-	2.50	0.90	0.72	0.63

Sensitive Parameters:

Parameters like TDS, EC, hardness, calcium, magnesium, Iron, fluoride and Sulphate are taken as sensitive parameters to indicate the water pollution by tannery effluent from different sources. It is observed that the values are higher compared the BIS Standards.

CONCLUSION:

An attempt has been made to study the impact of untreated sewage water and tannery effluent in the ground water sources. The pond has become a collection of sewage and tannery effluent water. Hence the water in the pond as well as the ground water sources around the different residential area like Kottapatty, due to the high degree of pollution many sources has to be abandoned ground water analysis at four different sites at four directions reveals that the water quality parameters are higher than the permitted level. As per CPHEEO standard specifically high turbidity high TDS and higher Electrical conductivity values indicate that the water cannot be used for human consumption or any other use. People have to depend only on municipal water sources from Athoor village. For other uses the groundwater can be treated using RO system. The adjoining groundwater sources are mostly affected and the water becomes very salty with very high TDS. Hence the polluted water is suggested to water treatment using Reverse Osmosis System.

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