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Alteration In Surface Water Quality Near Textile Industrial Area In Panipat Region

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Abstract
Mostly the water is used for industrial, municipal and agricultural purposes. In the last two decades, the rapid growth of industrialization and urbanization have created negative impacts on the environment. The industrial, municipal and agricultural wastes containing pesticides, insecticides, fertilizers residues, organic pollutants and heavy metals in their effluents have polluted surface and ground water. So, water resources must be managed and conserve on sustainable basis for the most beneficial uses in the future. The present study is aimed for an assessment of water quality affected by textile industrial effluents.

Key words: *Surface water quality, industrial pollution, textile effluent, water characteristics*

Introduction
In the modern industrialization period, the most of water resources have been affected enormously by seepage, leaching and intermixing of industrial effluents in maximum metropolitan cities and industrial townships. The textile effluents consists of high concentrations of heavy metals, organic pollutants and toxic colours that may alter the surface water quality of the region and ultimately causes the health hazards among livestock and human being.

In India, the industrial effluents have contributed a major source of pollution. Different industries of the country contribute to generate about 16% of the total waste water. The treatment facilities have been installed in less than one third of the polluting industries (Gopal, 1994). Most of effluent treatment plants (ETP) have not performed physical and chemical treatment processes satisfactory due to economic reasons on commercial scales.

About 6,34,900 metric tons of dyes are used worldwide each year in textile dyeing industries and nearly 10-15% of them are discharged as effluents. The colours affect the nature of water, inhibit sunlight penetration and reduce the photosynthetic action and may cause toxic effect to living organisms. The contaminated waste water without any treatment may cause adverse effect on the health of human, domestic animals, wildlife and environment (Sharma *et al.*, 1999). Thus, contaminated ground water have deteriorated immensely the post agriculture irrigation, drinking utilities & impacts on soil systems. So, it is very much essential to treat dye contaminated wastewater before discharging it to the surface water and to develop simple and economical methods to treat the waste at point sources suitable for developing countries.

Materials and Method
Panipat city is situated on GT road in Haryana, which is well known for textile handloom and dye industries. The effluent samples were collected from the common effluent outlet of dye houses (S1) and large pond (S2), where the effluent drain ends up and analyzed by the Standard methods (APHA, 1995).

Results and Discussion

Colours of the waste water were found varying from pinkish red to brownish yellow. Hence, colour from the textile waste can cause significant health problem among public living in surrounding. Odour is often associated with oil mists or solvent vapours and is removed by removal of the mist or by recovery of vapours. Sources of odour are Sulphur dyeing on cotton. Odour of the textile effluent was existed from Threshold level to Strong level of the odour table. Velocity of the effluents were totally dependent on the production output, amount of residual solids and amount of water used by the industry. The velocity was found low 0.35 m/s in effluent drain because of the solids load. And it was found nil at the pond site because ponds are itself the stagnant ecosystems.

Temperature may vary from 22ºC to 24ºC in the common effluent drain and polluted pond, having not much fluctuation in industrial area. In this study it was recorded that the pH of the effluent of all the sampling station were found alkaline (7.2-8.2). Alkalinity is caused by strong bases and the salts of strong alkalies and weak acids. Extreme pH or rapid pH change can exert stresses conditions or kill biotic life in aquatic system. Malik *et al*. (2004) observed the alkaline value of pH in textile effluent and found creating the sodative nature in ground water as well as agricultural soil nearby the textile industrial area of Panipat.

The dissolved solids in wastewater are mainly inorganic salts. They are particularly important as they are relatively unaffected by biological treatment processes and can accumulate in water recirculation system. Failure to remove them may lead to an increase in total solids content of surface water sources (341-370 mg/l). The dissolved solids in wastewater, if not controlled, may be harmful to vegetation and also preclude use in various irrigation processes. T.D.S. in the effluent were observed (308-336.3 mg/l) very high than the prescribed limits of C.P.C.B. and B.I.S. Residual is the solid matter present in water, with high solids is harmful to organism. Welch (1952) stated that dissolved solids vary qualitatively and quantitatively in different water depending upon the season, location and other factors.

Total suspended solids include both organic and inorganic materials. They adversely affect fishes and bottom fauna of pond ecosystem. They produce carbon dioxide, hydrogen sulphide, methane and other noxious gases. They increase the turbidity of water, reduce light penetration and impair photosynthetic activity of aquatic plants. T.S.S. in the effluent of all the sampling station was (30.9-33.6 mg/l) . Similar observation has been recorded by Chavan and Wagh (2005) in the industrial effluent near Sukhna river at Midc area, Aurangabad. The value of dissolved oxygen in the sampling stations were found fluctuating from 1.28-1.64 mg/l. As the matter of the fact that the effluents were highly toxic in nature which, could not allow any fauna to survive in this condition. The value of dissolved oxygen was even less in the summer month this trend was stated by Khanna *et al.* (1992).

Waste water with high BOD/COD indicates presence of decomposing organic matter and subsequent high bacterial counts that degrade the quality and potential uses in terms of domestic and even agriculture irrigation. BOD of the effluent of the sampling station is high (272.5-465 mg/l).COD of the effluents and pond water were found very high (791.5-1245 mg/l). Sevimli and Sarikaya (2005) also observed the similar trend while performing an experiment on decolorization of textile effluent and dye solution by ozonation. Senthinathan and Azeez (1999) and Groff (1993) reported that textile wastewater may cause problem if used as untreated effluent that consist of higher COD, pH, temperature, phosphorous and absorbable organic halogen. COD shows a positive relationship with BOD as observed by Chopra and Patric (1994) in Ganga river of Rishikesh.

The value of Alkalinity in the effluent is very high (550-880 mg/l) as compared to the standards of C.P.C.B. Bhat and Kulkarni (2005) also observed the increase in alkalinity of textile effluent and concluded the research on reducing the COD of textile wastewater.

Chloride is one of the most conservative constituents in wastewater, being affected very little either by vegetative growth or other biological processes, or by precipitation or anion exchange reaction. Chloride concentration in the effluent was also observed high (369.2-340.8 mg/l). Similar trend of increased in chloride

concentration stated by Aboulhassan *et al.* (2005), while conducting a work on the effect of natural flocculants on textile wastewater. In area where discharge of industrial wastes containing high concentration of chlorides must be controlled to safeguard the receiving waters

Conclusion

Having discussed all the physico-chemical characteristics of effluent drain and pond water, we conclude that the pond water became very toxic to deteriorate the ground water quality of area. The flora and fauna of this pond is almost in dying stage due to the toxic pollutants of textile industries. The effluent may also cause various health problems such as skin allergies, lung infection, carcino-mutagenic disorders among the human being through contaminated ground water supply by municipal tube wells water scheme. In order to achieve the standards it is suggested to install the effluent treatment plants (ETP) by the small scale textile industries.

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Table 1 : Quality characteristics of effluent and pond water in Panipat region.

Parameters	Unit	Effluent drain (S1)	Polluted pond (S2)	Standards (BIS)
Odour	-	Threshold	Strong	-
Colour	-	Pinkish red	Brownish yellow	0.0
Velocity	m/s	035±.005	Stagnant	-
pH	-	8.2 ± 0.14	7.2±0.60	5.5-9.0
Temperature	ºC	22.5±1.5	20.0±2.0	40.0
TS	mg/l	370.0±90.0	341±81.0	-
TDS	mg/l	336.3±81.89	308±73.8	-
TSS	mg/l	33.6±8.21	30.9±7.28	100
DO	mg/l	1.64±0.21	1.28±0.01	-
BOD	mg/l	272.5±42.5	465.0±55.0	30.0
COD	mg/l	791.5±51.5	1245.0±65.0	250
Cl	mg/l	340.8±28.4	369.2±28.4	600
Alkalinity	mg/l	590±60	880±20	-