

Impact of heavy metals from sewage effluent on fresh water quality, Solapur

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Abstract

Textile industries are principal sector of Solapur city it require large quantity of water for different uses like dyeing, bleaching, fibre washing, printing etc. Hence these industries produce large amount of waste water that is effluent. present study assess the physical parameters and chemical parameters of sewage effluent because this sewage water is drained in to Sina river without proper treatment and also used for the agriculture purpose physical and chemical parameters like pH, temperature, dissolved oxygen, biological oxygen demand, chemical oxygen demand, total dissolved solids etc. Were analyzed during monsoon season in 2015. In present study all results were above the permissible limit according to WHO.

Keywords: Water pollution, effluents, BOD, TDS, Solapur, waste effluent

1. Introduction

Importance of water quality is developed slowly as early humans judge quality of water through physical sense like taste, smell etc. Adewoye S.O. (2013) [13]. Life is first arise in water that means water is basic need of every organism. Major consideration for industrial and technological development, drinking water used for aquaculture irrigation, fish culture, hydropower generation but water elixir of life becoming more unfit due to mismanagement. Magardev, *et al.* (2009) [12]. Water resources have been utilized natural system. Pollution of river, lake is increased due to the industrialization, agricultural use, rapid population and anthropogenic activities of human being waste water is disposed into the natural systems without proper treatment and it results into the huge pollution of natural ecosystem.

Sewage water is containing more than 80% of industrial waste run off through rainfall, agricultural runoff etc. And it is poured or drained in to Sina River. Major problem of Sina river is pollution from industries situated near bank of river like sugar factories and textile industries from Solapur city which are not well established sewage treatment plants due to this the waste effluents from these industries are carried through sewage system and inflow of sewage from all city and adjoining areas from where the new colonies are developed without proper network of sewage system and sewage generated from these areas are directly discharged into Sina river it results in to the depletion of oxygen concentration and biological oxygen demand and chemical oxygen demand is resulted very high. Siltation of the agricultural activities is also responsible for the pollution

In India mostly industries are situated along river bank for availability of water and disposal of waste water Lokhande, *et al.* (2011) [9] and Kumar A. (1996) [11]. For the industrial waste water disposal main source is surface water, these untreated waste water may increase the pollution level of surface water 20 times than safe level almost all rivers are get polluted by industrial waste, sewage water. Modak, *et al.* (1990) [8] and Lokhande, *et al.* (2011) [10]. Indian industries function under the guidelines of CPCB (Central Pollution Control Board) different norms and guidelines are given for

all industries depending upon their pollutants most industries have treatment plants but small scale industries do not have treatment facilities for their effluents because they cannot afford investment in pollution control equipment. As result in India there are sufficient evidence present related with mismanagement of industrial waste Rajaram and Das (2008) [6] and Singare, *et al.* (2010) [7].

Problem of water pollution is present in all over. Water pollution problem is occur in developed countries as well as developing countries. Sewage disposal is major concern in most urban areas of Zimbabwe, waste water from industries and sewage released into streams and rivers which finally discharged in to dams. Dube Trevor, *et al.* (2010).

2. Material and method

The present study was conducted in sewage nala of Solapur city. Nala runs throughout city with different name like Sheligi nala, Lendaki nala, Chwoda Kaman nala etc. City nala is passes Akkalkot road MIDC where most of textile industries are situated and their waste water drained into sewage. In many places sewage water is used for cattle washing, for agricultural purposes. for the analysis of physical parameters and chemical parameters four sampling stations were selected. Samples were collected in 2lit. Plastic containers between 9am to 10.30 am in monsoon season different physical and chemical parameters were analyzed like Temperature, pH, Conductivity, Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand, Total Dissolved Solids temperature of sewage water measured by mercury thermometer at site, pH also measured at site with help of portable pH meter. With the help of conductivity meter sewage water conductivity is measured. Turbidity of water is occur due to the suspended materials, silt, water runoff from nearby areas etc. Dissolved oxygen is measured by Winkler's method Golterman, *et al.* (1978). Total dissolved solids measured by Gravimetric method, it expressed in mg/lit. Trivedy & Goel (1984). biological oxygen demand was analysed by subtracting the value of final concentration of dissolved oxygen from initial concentration of dissolved oxygen. Vandana Magarde, *et al.* (2009) [12].

Chemical oxygen demand was analyzed by Dichromate reflux method.

3. Result and discussion

Table 1

Physical & Chemical parameters	Site 1	Site 2	Site 3	Site 4
Temperature (° c)	24.3	25.0	24.0	25.3
pH	7.1	7.4	6.9	7.1
Conductivity(µmhos/cm)	198.4	233.2	255.4	269.2
Turbidity (Hz)	268.3	281.2	273.8	284.9
Dissolved Oxygen (ml/lit)	2.5	2.9	2.7	2.9
Total Dissolved Solids (mg/lit)	1388	1814	1680	1979
BOD (mg/lit)	63	89	78	152
COD(mg/lit)	365	623	560	653

Temperature may affect the aquatic ecosystem or aquatic environment. Increase and decrease of water temperature is depending on the atmospheric temperature. Evaporation is high in high temperature it also effects on the density of water it may also effect on the amount of dissolved oxygen in water. Temperature ranged between 23.5⁰c to 26.5⁰ c during monsoon season temperature of sewage water is recorded at site 1 is 24.3⁰c, at site 2 25.0⁰c, at site 3 24.8⁰c and at site 4 25.3⁰c. Maximum temperature was recorded at site 4.concentration of hydrogen ion may indicate the alkalinity of water as well as acidity of water. High pH is related with photosynthetic activity and high rate of photosynthesis can be related to the higher concentration of plant nutrients and it indicates the pollution of aquatic system Bajpai, *et al.* (2001) in present study pH ranged between 7.0 to 7.8. Organisms of aquatic ecosystem may be affected due to pH of water because metabolic activities of aquatic organisms are depend on pH of water. Salinity of water can be indicated by pH high pH or low pH is affected aquatic organism and human being.

Electrical conductivity is important parameter it is depend on the weight of waste water, polluted water is good conductor due to presence of acids, salts etc. In present study electrical conductivity is ranged between 198.4µmhos/cm to 269.2 µmhos/cm. High conductivity was recorded at site 4 it may be due to addition of detergents, salts in sewage water. Electrical conductivity can indicate the dissolved solids in water because concentration of ionic species determine the conduction of electrolyte current. Hayashi (2004).

Hayashi M. (2004), Temp. – Electrical Conductivity Relation of Water for Environmental Monitoring and Geophysical Data Inversion. *Environ. Monit. Assess.* 96:199-228. Electrical conductivity is very important parameter from which it may decide that water is suitable or not suitable for irrigation purpose.

During monsoon season turbidity of sewage water is recorded it ranged between 268.3Hz to 284.9Hz turbidity caused due to the soil erosion, irrigation and surface runoff. High turbidity of water may link to the presence of dissolved solids in the effluent released in to water Eletta and Adekola, (2005). Due to different types of suspended material, industrial waste, runoff from nearby areas water became turbid mostly in monsoon season particularly silt, clay and sewage affect. Production of plankton is mainly affected due to turbidity.

Productivity of fish and phytoplantonic growth is affected due to level of dissolved oxygen. Dissolved oxygen is very important and most essential in water. Low concentration of dissolved oxygen may be due to the high load of organic material. Continuous introduction of effluents in water may support the growth of aquatic weeds and flocs formed on water surface and due to this reduction of dissolved oxygen take place. Morrison, *et al.* (2001) ^[4]. in present study dissolved oxygen is ranged between 2.5ml/lit to 2.9ml/lit.

Biological oxygen demand is ranged between 63.0mg/lit to 152.0mg/lit in present study. High biological oxygen demand means domestic waste is added in water. Textile effluents discharged in water and it affects the aquatic ecosystem. Biological oxygen demand indicates the organic matter decomposed in water. Dead plants, dead animals, debris, animal manure etc. is the source of biological oxygen demand in water. High biological oxygen means water is polluted. Government of India (1985) suggest that biological oxygen demand of sewage water must be below 20mg/lit for drained into river, lake or stream because biological oxygen demand depletes the oxygen in water. The low biological oxygen demand during monsoon attributed to dilution of water, Upathya and Rana (1991). Organic matter is high in water it increase the biological oxygen demand and dissolved oxygen is reduced and relatively it affect on fitness of natural population of fish and quality of water, Adewoye, *et al.* (2005) ^[3]. Load of organic and inorganic waste from sewage and textile industries measured by chemical oxygen demand. Value of chemical oxygen demand in present study was ranged between 365mg/lit to 653mg/lit. chemical oxygen demand and biological oxygen demand act related purpose that to measure oxygen consumption capacity of water during decomposition of organic matter and oxidation of inorganic chemicals. Permissible limit of chemical oxygen demand for agriculture and irrigation and discharged in to river is 250mg/lit ISI (1995).

Due to mismanagement and lack of awareness towards water conservation, environmental pollution produced many disorders related to human being. Physical parameters and chemical parameters of sewage water from Solapur city are above permissible limit and hence their must be treatment plant before this water is drained in to Sina river is essential.

4. Conclusion

In present study parameters are reported above the permissible limit. In sewage various pollutants added from industrial waste, domestic waste and various anthropogenic activities due to this Sina river get polluted and it may causing serious health problems.

5. References

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