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Website: www.mutagens.co.in
E-mail: submit@mutagens.co.in
researchsubmission@hotmail.com

Research Paper

EFFECT OF TEXTILE INDUSTRIAL EFFLUENTS ON BANDI RIVER (PALI) RAJASTHAN, INDIA

Meena L. R. and P. Nama

Department of Zoology,
J.N.V. University Jodhpur, Rajasthan,
India.

Abstract

In the present study the effects of Textile industrial effluent on Bandi river water was investigated at Pali district of Rajasthan. The physicochemical analysis was done for one year and the present reveals that, the pH of River water is more than the standard levels and the other parameters of the river water was found to be higher in concentration. On the basis of these observation it can concluded that the textile industrial effluents was adversely affecting on the river water quality, which affects on aquatic environment and human beings of surroundings.
Key words: effluents, textile, environment, etc.

INTRODUCTION

Water pollution can be from anthropogenic (human activities) or geogenic (natural geological phenomena) sources. The major anthropogenic sources are disposal of untreated domestic sewage, industrial effluents and agrochemical run-off. Anthropogenic pollution is known to have serious consequences on human health and the environment. The effect on aquatic ecosystem is more noticeable, because water is a good carrier and transports almost everything to distant places. When the pollution loads are too high, the habitat is destroyed; pollutants accumulate bio-concentrates and enter food chains and magnify. As humans occupy the highest level in the food chain, they receive concentrated amounts of the pollutants and these bring out dose-dependent responses. Anthropogenic contamination, especially untreated sewage water, can lead to epidemic Outbreaks of cholera, typhoid and other dreadful infectious waterborne diseases. Numerous studies have been conducted all over the world to show pollutant impacts. Anthropogenic contamination, especially untreated sewage water, can lead to epidemic outbreaks of cholera, typhoid and other dreadful infectious waterborne diseases.

Industrial pollution involves release of untreated or incompletely treated effluents into the ecosystem. Industrial effluents and solids, and hospital wastes, contain a spectrum of life-threatening contaminants such as heavy metals, pathogens, antibiotics etc. that are dangerous to life. Fluoride contaminations are generally geological in origin. Their contamination is due to the release of fluorides and arsenic from mineral-rich rocks

lining the aquifers. Textiles are among the basic needs of human being. The textile industries therefore have great economic significance by virtue of its contribution to overall industrial output and employment generation. This sector has wide spectrum of industries ranging from small scale units that use traditional manufacturing process, to large integrated mills using modern machineries and equipment (CPCB ministry of environment and forestry). Textile industry is one of the most important and rapidly developing industrial sectors in world. The textile industry requires water during various processes. The printing and dying process require great quantities of water that is often discarded into fresh water resources. These effluents, waste products contain about 20% of the dyes such as coloring agents; it contains large quantities of heavy metals, bleaching agents and acids. This causes degradation of water quality, soil fertility and serious diseases on human being in textile industrial region. Textile companies are facing problems in some instances of crisis proportions, in dealing with the effluent that they generate. The solution to the problem will vary from company to company depending on many variables such as the volume and nature of the effluent, location, site geography and finance available. Unfortunately for some companies, the inevitable conclusion will be that there is no viable solution. There will be in-house debates but there should also be frank discussions with all those concerned and those who can help. This will include the NRA, water service companies by **Norman and Seddon (1991).**

SITE DESCRIPTION:

Pali : Pali is situated on the bank of river Bandi. Pali is the district of Rajasthan state and administrative headquarters. The city lies between $25^0$77' N latitude to $73^0$33' E longitude. While Bandi is Latitude $25^0$15' and $25^0$55', Longitude $72^0$56' and $73^0$57'. Bandi river is a major tributary of Luni river and flows in almost east to west direction and passes through south of Pali city. Pali is the industrial dying and printing hub of Rajasthan state. At present about 800 textile industries are working.

MATERIAL AND METHODS:

Monthly Water sample were collected from two different sampling sites (Pali and Balotra) in the periods of One Year (July 2013 to Jun 2014). Water Temperature analyzed by simple thermometer, pH, Transparency by using Sacchi Disc, Total Hardness as Calcium and Magnesium, DO (Dissolved Oxygen), Free CO_2, Carbonates, Bicarbonates, Chloride, Salinity, Phosphate, Nitrates, Fluoride by using ELICO NEPHELOMETER CL 52D and SPECTROPHOTOMETER 106 SYSTRONIC by using photometric method, BOD, analyzed by Titrometric method with the help of standard method for water analysis (APHA) by **Clesceri et al., (1998).**

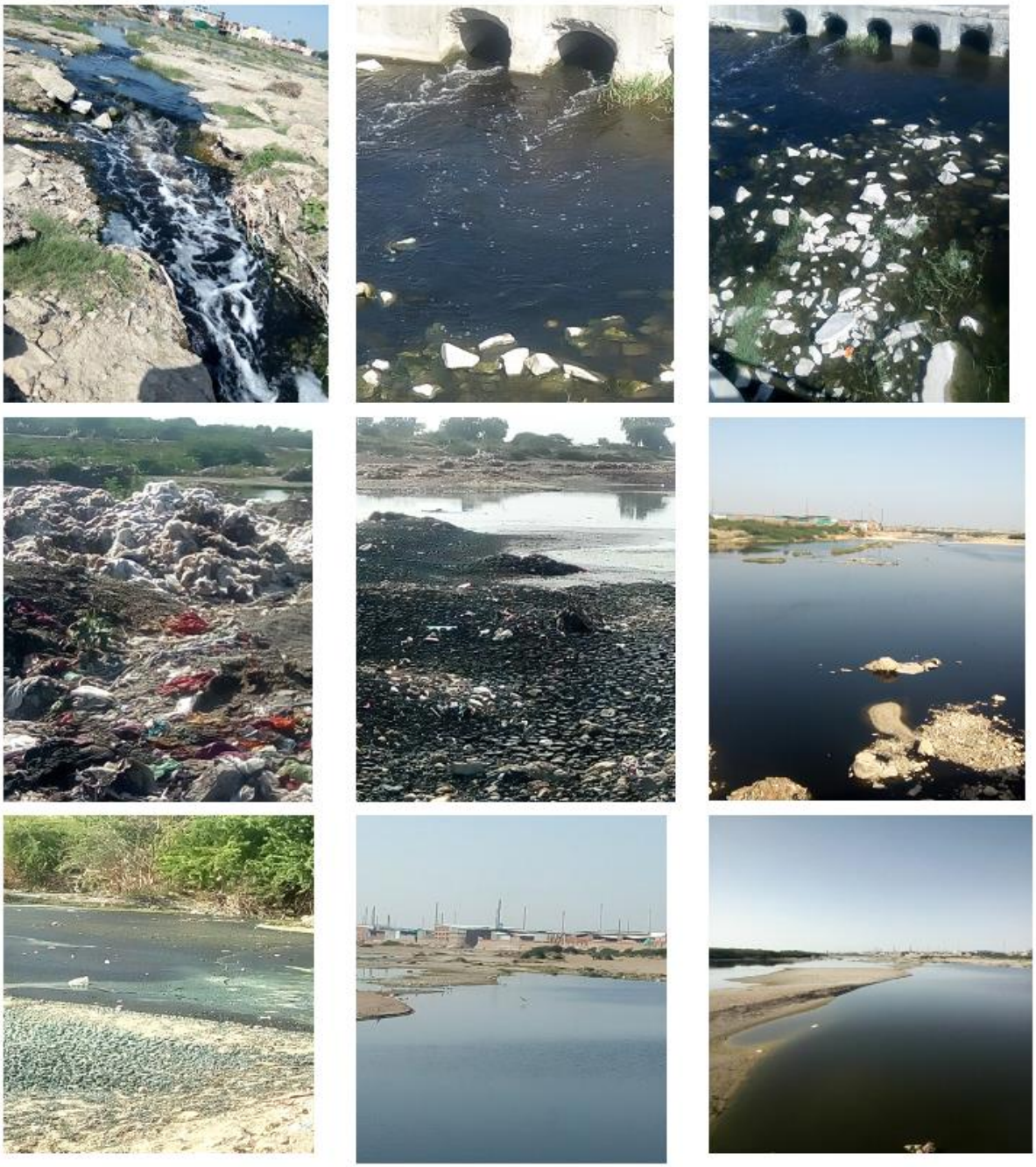


Fig. No. 1. Photo plate shows Runoff Effluents in Different Areas of Bandi River Pali.

RESULTS AND DISCUSSION:

Temperature is most important parameters of aquatic life during the study periods mean temperature ranges from 25.9C° to 42.1 C° . Highest was observed in May while lowest was in December. Textile industries use different dyes for coloration purposes due to that pH value was always observed as alkaline above 9 while in summer it was up to 10.4. **Islam *et al.,* (2011)** studied the affect of Textile industries effluents and their courses mainly, hazards caused by dye effluents, which contain both chemical and organic pollutants **Munnaf *et al.,* (2014).** Excessive use of chemical dyes should be restricted and should be replaced with vegetable dyes studied by **Pathak *et al.,* (2012).** The huge quantities of wastes and sludge discharged from industries might be responsible for the enrichment of all studied physico-chemical parameters at discharging point by **Tabassum *et al.,* (2015)**.

Transparency of Bandi River was near about 9.35 to 20.1. Dissolved oxygen contain of Bandi River was near about observed nil during the study periods slightly occurrences of DO during the Manson periods because rainwater may be aerated river water. The long days and intense sunlight during October seems to accelerate photosynthesis by phytoplankton, utilizing CO2 and giving off oxygen **Meena and Nama (2015)**. Carbon dioxide was observed during the Manson while in summer it was may converted in to the carbonate as well as bicarbonates.

Bandi river have alkaline pH due to that free Carbon dioxide was converted in to Bicarbonate **Tandale and Dabhade (2014)** and very less is converted in to carbonate hence carbonate values was ranges in between 10 mg/l to 183 mg/l, highest was during the summer while lowest was in manson. High Bicarbonate values recorded during the study periods which was in thousands mg/l. Chloride ions was observed very high due to that the Bandi river water is not suitable for drinking purposes observed values was ranges 1027mg/l to 2020mg/l. From the Chloride we also calculated the value of Salinity which was also ranges from 1961mg/l to 3872mg/l such high amount of salinity was observed in this river.

For aquatic ecosystems Nitrates and Phosphate is act as a nutrients for living algae, on the basis of such nutritive substances we measures the nature of aquatic body, hence during the study periods nitrates values was ranges 82.4 mg/l to 200 mg/l. **Hussain *et al.,* (2013)** studied Surface water was the highest concentration of cations and anions. Phosphates values was ranges between 2.1 mg/l to 8.64mg/l hence we predicted that Bandi river water is unsafe for drinking . In Pali region Fluoride value in water was observed very high above the permissible limit that was ranges from 2.1 mg/l to 3.6 mg/l. **Gautam *et al.,* (2011)** studied the problems related to fluoride on human being.

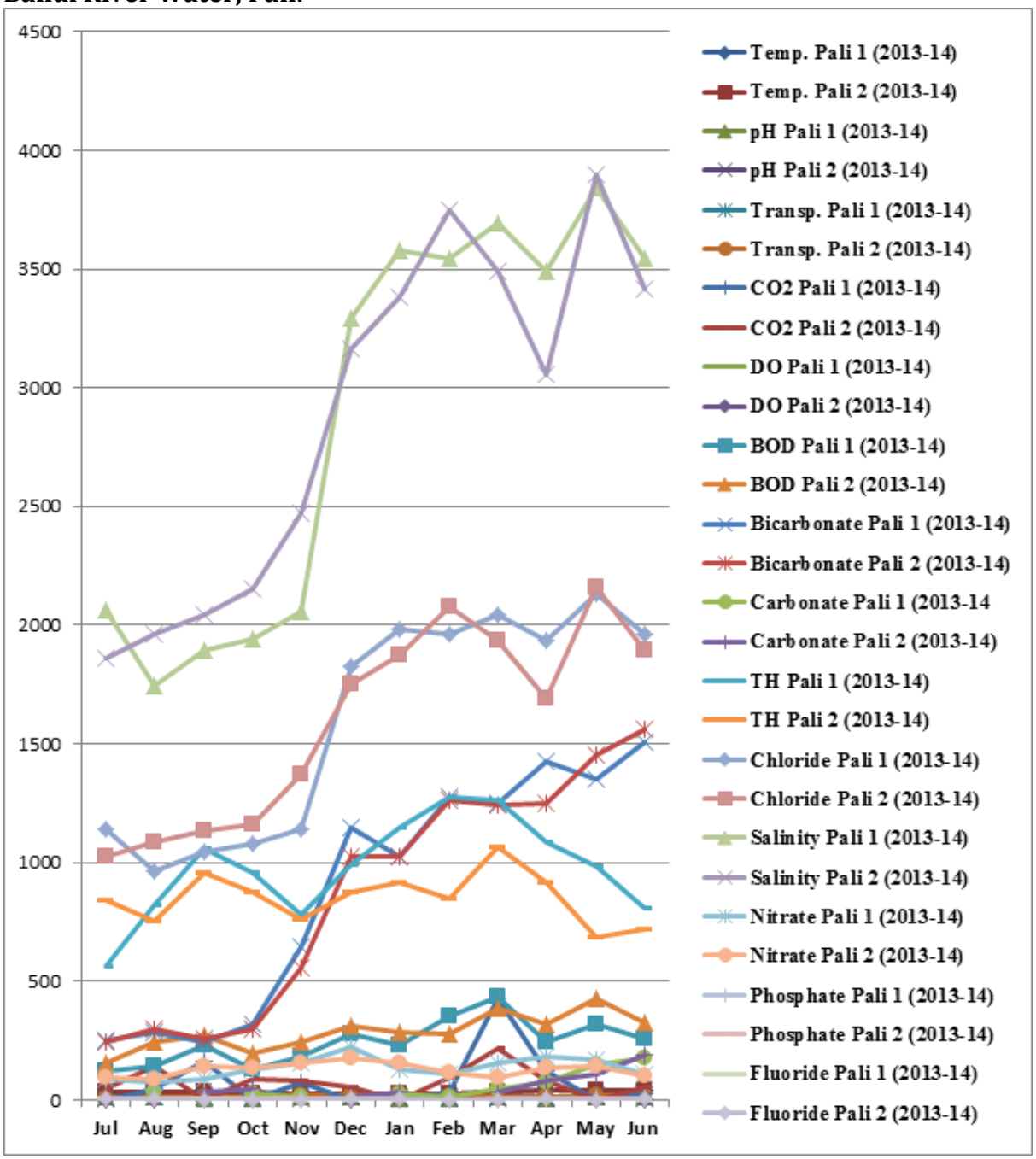
Due to increasing the heavy load of such nutrient in water body their biological oxygen demand also more **Dabhade and Tandale (2016)** hence during the study periods the BOD values was ranges 140mg/l to 411mg/l. **Rathore (2012)** studied the wastewater from industries had a deleterious impact on the water quality of Bandi river. **Varma and Sharma (2011)** told about Wastewater which was not recommended for irrigation in agricultural fields. Water with high sodium content, high TDS, BOD, COD values is unsuitable for irrigation.

The observed values of all physic-chemical parameters are discuses in Table no. 1 and Graph plate no. 1.

Table No. 1. Physico-Chemical Parameters of Bandi River water, Pali.

Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Temp.	32.7	35.05	35.3	30.9	28.9	25.9	27.2	28.3	36	39.1	42.1	40.9
pH	9.8	10.8	10	9.2	10.3	10.4	8.7	9	10.2	9.5	10.3	10.4
Trans.	9.35	12	14.2	15.8	17.7	17.8	15.9	15.2	15.2	14.4	20.1	18.7
DO	0.1	0.21	0.24	AB	AB	0.1	AB	AB	AB	AB	0.13	0.42
CO2	45	94	165	87	78.5	57	AB	63	323	101	AB	41.5
TH	702	789	1009	915	773	932	1033	1062	1167	1001	836	765
CO3	10	35	35	37.5	10	10	30	15	40	76	130	183
HCO3	248	293	253	310	603	1088	1026	1268	1245	1338	1401	1536
Cl	1086	1027	1089	1120	1254	1788	1929	2020	1988	1812	2145	1928
Salinity	1961	1854	1967	2050	2265	3228	3482	3647	3589	3272	3872	3481
Nitrate	91.4	82.4	115	129	156	200	144	112	128	157	157	105
Phos.	5.7	8.2	6.4	5.4	6.3	4.6	1.5	2.7	4.04	6.2	8.64	5.8
F	3.6	3.3	2.7	2.9	1.8	2.4	3.4	2.6	2.7	3.3	2.1	3.4
BOD	140	194	250	165	215	295	258	313	411	281	373	292

Graph Plate No. 1. Shows Variation of Different Physico-Chemical Parameters of Bandi River Water, Pali.



***Here- Phos**.-Phosphate, **F -** Fluoride, **BOD** - Biological Oxygen Demand, **Cl** - Chloride**, HCO3 -** Bicarbonate Alkalinity, **CO3** – Carbonate Alkalinitty, **TH** - Total Hardness, **Free CO2 -** Free Carbonedioxyde, **DO -** Dissolved Oxygen **Trans.** – Transparency, **Temp. -** Temperature.

CONCLUSION:

Textile industrial effluent is the most effected factor for River water pollution in Pali, it can be observed that the pH of River water is more than the permissible limit while most of the parameter as well as BOD, Salinity, Alkalinity(as HCO3 and CO3), Total Hardness,(as Ca and Mg), are found much higher concentration. This study shows that textile effluents are highly toxic in nature and effects on these River water parameters.

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