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Innovation The Research Concept

Study of the Yash Paper Mill Effluent on the Darshanagar Area Around River Marha U.P.

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Abstract

The untreated effluent of Yash paper mill is released directly into Mahra river through open drain. The very preliminary survey from the point of discharge of effluents from the paper mill downward long the course of Marha river drought fact to light that effect of water pollution reaches upto 10 kilometer. Thus, effluent can be considered as both a resource and a problem, effluent and its nutrient content can be used extensively of irrigation and other ecosystem services. It reuse can deliver positive benefits to the farming community society and municipalies. However, effluent reuse also exerts negative externally effect on human and ecological system, which need to be identified and assessed. Before one can endorse effluent irrigation as means of increased water supply.

Keywords: Endorse, Biodegradable, Porosity Qualitative And Quantitative Estimation.

Introduction

Among various industrial units pulp and paper industries in our country is a core industry. Indian paper mills are designed for forest based, agro-based and other non-wood raw material based processing which contribute in manufacturing sector as 12.9, 28.1 and 29% respectively. The large scale mechanised technology of paper making was introduced in 1905 and at present there are 380 pulp and paper industries with an aggregates of 3.95 paper industries with an aggregates of 3.95 million tonnes per annum. In U.P. there are 62 units of paper and pulp industries.

The pulp and paper mill discharge a huge amount of dark brown effluent, which is having slightly alkaline pH, high bio-chemical and electrical conductivity and poses serious threat to aquatic as well as soil, flora and fauna. These changes might influence the fertility of the soil and there by biological productivity of the region. Like anyother industrial effluent treatment, the pulp and paper mill effluent treatment also involves primary, secondary and tertiary level of treatment to recover pollutants as a source prevent or reduce their formation, conserving water and other basic raw material and chemical and easy disposal of industrial waste by economical treatment.

Material and Methods

Study Area

Faizabad district (Fig. I) is situated in the eastern part of Uttar Pradesh. It lies between latitude $26^0$09 and $26^0$50 north and longitude $81^0$40 and $83^0$08 east. Districts of Gonda and Basti are located in the north-west and north directions. On the south lies Sultanpur, on the west Barabanki and on the east are the boundaries of the Ambedkarnagar, Azamgarh and Gorakhpur districts. The city Faizabad is located at the bank of Saryu (Ghaghra) in a 6 km downstream stretch at $26^0$47 N and latitude and $82^0$13 N latitude.

Regarding the industrial structure, the district Faizabad occupies a leading place among the eastern cities of Uttar Pradesh. During last few years there has been a mushroom growth of large number of small and big industrial units in and around the city including the industrial area of Mumtaj Nagar. The important big industrial units of the district are Montinagar Distillery, Masaudha, Motinagar Sugar Mill, Masaudha, Durga Bansal Fertilizer, Mangari and Yash Paper Mill, Darshannagar (Fig. 2). these industrial units release bulk of toxic substances along with the effluents through independent drains into various fresh water bodies which are only source of crop irrigation in the area. People being ignorant about the cause

of damage to fresh water ecosystems and fish production potential by such water bodies.

Pulp and Paper Industry

There are a number of large, medium and small scale paper mill spread all over the country which produce a variety of paper mill spread all over the country which produce a variety of paper and other raw material like grasses and waste paper in place of the wood. During the chemical pulping and paper making process a huge quantity of waste water or effluent is release from these mills. The effluent from paper mills contain high BOD and COD. The toxicity of the effluent has attracted the attention of technologist and scientists as its disposal causes severe land and water pollution and also has deleterious effects on natural flora which disturbs the ecological balance. These industries in our country consuming large amount of water and discharges a huge amount of dark brown effluent, which is having slightly alkaline pH, high biochemical oxygen demand and electrical conductivity and poses serious threat to aquatic as well as soil, flora and fauna. These changes might influence the fertility of soil and thereby biological productivity of the region. Like any other industrial effluent treatments, the pulp and paper mill effluent treatment also invovles primary, secondary and tertiary level of treatment to recover pollutants at source, prevent or reduce their formation, conserving water and other basic raw materials and chemical and easy disposal of industrial waste by economical treatments.

M/S Yash Paper Mill Ltd. Darshannagar District Faizabad located at 8 km from Faizabad city on Faizabad. Azamgarh road. This industry is the manufacture of high quality low grammage wrapping and packing Kraft paper. The effluents discharged by the Mill are carried to open channels and finally joins to nearby rive Marha which is the chief source of irrigation in the area. Heavy rain causes spread of the effluents to a large area through narrow drainage. However, the diluted effluent may be managed for irrigation purposes, which can solve the problem of hygiene and sanitation.

In paper manufacturing raw material like bagasses, sarkanda, sarpat, moonj and dried puall are used which are processed at first with caustic soda to dissolve the lignin present in them and then are washed with later to remove lignin and other colouring matter by long chain of aromatic organic compounds. The pulp so obtained is bleached with calcium hydrochloride and ultimately used for paper manufacturing.

The untreated effluent of the Yash Paper Mill is released directly into Marha River through open drain. the very preliminary survey from the point of discharge of effluents from the paper mill downward long the course of the Marha River brought the facts to light that effects of water pollution reaches upto 10 kilometers.

Meteorology of the Experimental Site

The climate of the Faizabad district is semi-arid with hot summers and cold winters. Nearly, 80% of the total rainfall is received during the monsoon from June to September with few showers in winter. Therefore, meteorological data of the industrial site for a period of two years (Jan 15 to Dec. 2016) were collected from Government agencies of the Faizabad district.

The data indicate (Table-III.1) that mean maximum temperature values were highest in May (44.2 ^{0}C) while mean minimum temperature values being obtained in January (4.6 ^{0}C). Relative humidity was maximum in July (84.8) where as the same was minimum (39.5) in May. Rainfall exhibited erratic behaviour during the study period. Maximum rainfall (336.2 mm) was recorded in August with maximum number of rainy days (twenty two) during the study period climatic features immensely effect the terrestrial and aquatic flora and the activity of microbes which bring about periodic alteration in physico-chemical and biological characteristics of the effluent thus affecting its toxicity level at different periods of seasonal rhythm.

The Experimental Site

After a thorough survey of the area under investigation three sampling stations on the effluent channel of M/s Yash Paper Mill Ltd. Darshanagar, Faizabad (Fig. 2) were established. A brief description of sampling sites selected for the study are given below:

Site-I

It is the main exit point of the effluent from the industry. It is situated on the eastern side approximately 0.5 km away from the factory.

Table-III.1: Meteorological data of Industrial site (Average of two years 2015 and 2016).

Months	Mean Temperature (^{0}C)		Relative humidity (%)	Total rainfall (mm)	Total No. of rainy days
	Max.	Min.	(8.30 am)		
1. January	18.2	4.6	78.5	45.0	5
2. February	19.0	10.6	63.0	85.0	8
3. March	27.0	11.5	60.5	20.6	5
4. April	39.5	22.2	40.5	Nil	Nil
5. May	44.2	26.7	39.5	8.0	2
6. June	41.2	24.0	74.0	170.5	11
7. July	31.7	22.4	84.8	265.8	18
8. August	33.9	25.0	82.2	336.2	22
9. September	30.4	21.0	72.2	227.4	14
10. October	29.8	20.1	73.2	62.5	2
11. November	24.3	12.6	66.8	15.0	4
12. December	20.4	6.5	80.4	25.0	6

Site-II

This is the main reservoir of the effluent channel. The distance between site I and site II is approximately 0.5 km from each other.

Site-III: This site is lies at the distance of approximately 2 km from the site-I. The effluent channel ultimately marges with the river Marha.

The details of experimental sites are given to the Table-III.2.

Table-III.2: Experimental sites.

Sites	Width of Channel (M)	Depth of channel in mid stream (M)	Rate of water flow (M/Minute)	Distance from the factory (Km)	Height of the Channel Bank from water (M)
I	1.0	1.5	15.0	0.5	0.75
II	20.0	1.0	10.0	1.0	0.50
III	1.0	2.0	20.0	2.0	1.00

Sampling And Preservation

Samples of water and effluents from preferred stations of the industrial sites as described earlier, were collected fortnightly in both the years of investigation. Samples were collected by using a water sampler and polythene bottles. During collection of samples, closed polythene bottles were lowered to the bottom of water or effluent by hand and were opened there. These were again closed after being filled with the sample and were brought back to the surface. Prior to the collection, sample bottles were rinsed thoroughly with the sample water to avoid any other material.

The sample handling and preservation techniques of APHA (1998) were followed. Immediately after the collection of samples each bottle was clearly labeled and brought to the laboratory for testing and protecting them from direct sunlight during transportation.

The collected samples were kept stored at 4^0C in the refrigerator in the laboratory after adding 5 ml of concentrated HNO_3 to each litre of sample to avoid absorption on the surface of polythene. The analysis of the collected samples were made as early as possible in the laboratory.

The samples collected for laboratory analysis were 'grab' and 'composite' both according to the requirement for physico-chemical analysis.

Grab Sample

This was taken from a particular place and represented the whole water quality. It was collected from the middle of the source and at mid depth.

Composite Sample

It was made up by mixing of 4-6 grab samples, which were collected at the intervals of 12 hrs.

Parameters like temperature, pH, alkalinity, D.O. were estimated immediately either by spot test using century made 'Water Analyzer Kit' or after being brought to the laboratory and for other physico-chemcial and biological analysis each sample was fixed by adding preservations.

Preservation of samples

As stated above, samples were preserved separately by adding different preservations or by different techniques as required for different analysis in the laboratory.

1. For total organic carbon: Conc. HCl was added to the samples to lower down the pH below 2.
2. For Nitrogen Balance: 1 ml. of conc. H_2SO_4 was added to 1 litre of samples and refrigerated.
3. For metals: pH below 2 was adjusted by adding conc. HCl or HNO_3 in the sample.
4. For Hardness: Sample was refrigerated at 4 ^{0}C maximum for 7 days.
5. For sulphate: Sample was refrigerated at 4 ^{0}C maximum for 7 days.

Prior to the use of preservatives or techniques, the samples so collected in the sampler were transferred to well-rinsed, appropriately labelled suitable sample containers of borosilieate glass or polyethylene.

Labels on different bottles clearly indicated the name and location of sampling station, date and time of sampling station number and depth.

These samples in well-labelled and tightly capped container were brought to the laboratory in an icebox and kept in a freezer to check the biological activity and preserve them. The physico-chemical and biological analysis of these samples were completed within a very short time to avoid chemical or biological deterioration of the samples (APHA, 1998). Some techniques for the preservation of samples for chemical analysis have been given in Table-III3.

Conclusion

Physico-chemical analysis 0f the paper mill effluent at three study sites near the mill effluent channel was made at monthly intervals from march 2015 to feb. 2016 .As obtained data demonstrated that each study side show high level of pollution load to their Physico-chemical characteristics which were beyond standard recommended permissible limit. Temperature, pH., conductance, transparency, TDS, alkalinity, hardness, calcium, chloride, magnesium, sodium, potassium, nitrogen, free CO2 , DO, BOD, and COD were analysed at all the tree sides beyond their respective maximum recommended tolerance limit.

Effect of pulp and paper mill effluent on zooplankton (Tubificid worm) has been studied. The results revealed that 100 and 75 % concentration of effluent were high toxic to the tubilicid worm. The 50% concentration of the effluent show moderate toxicity where as 25% concentration was recorded slightly toxic to the tubificid worms.

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