



EVALUATION OF PHYSICOCHEMICAL FACTORS OF RIVER KOYANA IN DISTRICT SATARA (MAHARASHTRA-INDIA)

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Abstract

Koyana river is one of the major river in district Satara. It has important role in the supply of water for drinking, agricultural and production of energy (Electricity). The physicochemical factors of Koyana river were studied at two different spots near Patan and Karad town and analyzed for the study of pollution. It is observed that the physicochemical factors such as temperature, pH, Turbidity, TDS, total alkalinity, total hardness, BOD and COD were increased at the Karad town as compared to the spot near Patan town. These results are discussed on the basis of origin of river and the increased population and Industries on the banks of river.

Keywords: - Koyana river, physicochemical parameters

Introduction:

The Koyana river is the largest tributary of Krishna river. It originates in the hills of Kshtra-Mahableshwar, Satara district (Maharashtra-India). The river flows in North to South direction. It meets the Krishna River at Karad. There is dam on this river at Koyanagar. The water reservoir is used mainly for production of electricity and agricultural purpose. Upto the Patan town there is no any industry on banks of river after that the sugar factories and other industries are situated on the banks of this river. Hence efforts have been made to study the physicochemical factors at two spots one is near Patan and other is near Karad town and further data is used for the comparative study.

Material and Methods:

Two spots were selected on the Koyana river at Patan (S1) and Karad town (S2) for the collection of water samples. The samples were collected at regular interval of one month for a period of one year from October 2013 to September 2014 into plastic cans of 5 liters between 10.00 am to 11.30 am. The physical factors such as Air temperature and Water temperature, pH were recorded at the spot at the time of Sample Collection. The air and water temperature was recorded with the help of thermometer. The pH of the water was determined by using pen pocket size digital pH meter. While samples were analyzed for other parameters such as turbidity, TDS, DO, BOD, COD, free CO₂, total alkalinity and total hardness etc. in the laboratory by standard methods suggested by APHA (1996), Trivedi and Goel (1986), Kodarkar (2006).

Results and Discussion:

The air temperature at spot S1 was observed as 24.2°C to 35.6°C and at the spot S2

as 24°C to 34.4°C. The water temperature during the study period fluctuated from 19.8°C to 29.8°C at the spot S1 and 20.6°C to 30.8°C at the spot S2. The pH of water was found in between 6.9 to 8.1 at the spot S1 and 7.4 to 8.2 at the spot S2. The pH values at the spot S2 were found alkaline in nature. The average pH value of water observed during the study is within the permissible limit of WHO (1993).

Turbidity values were observed 1.0 NTU to 5.2 NTU at the spot S1 and 0.2 NTU to 5.2 NTU at the spot S2. Turbidity might be due to the presence of small amount of inert and relatively harmless minerals like clay particles. The maximum permissible levels for turbidity vary from 0-10 NTU (WHO standard).

The Dissolved Oxygen was found in between 4.4 mg/lit to 10.2 mg/lit at the spot S1 and 3.6 mg/lit to 5.2 mg/lit at the spot S2. The BOD was minimum 2.0 mg/lit at spot 1 and maximum 8.4 mg/lit at spot 2. The values of COD were observed in between 4 mg/lit to 24 mg/lit at the spot S1 and 12 mg/lit to 32 mg/lit at the spot S2.

Total alkalinity of water is due to carbonates and bicarbonates ion. The values were found between 30 mg/lit to 86 mg/lit at the spot S1 and 94 mg/lit to 200 mg/lit at the spot S2. The Total hardness values were observed between 10 mg/lit to 72 mg/lit at the spot S1 and 92 mg/lit to 174 mg/lit at the spot S2.

TDS values were found minimum at the spot S1 as compared to the spot S2. Similar type of results were observed by different Scientists such as Prasad and Patil (2008), Manjare *et al.* (2010), Varunprasath and Daniel (2010), Yadav *et al.* (2011), Muniyan and Ambedkar (2011), Kumar *et al.* (2011), Mandal (2011), Sahni and Yadav (2012), Waghmare *et al.* (2012), Ugwu (2012), Gaikwad *et al.* (2012), Singh *et al.* (2013), Baskar *et al.* (2013), Patil

Table. 1- Physicochemical parameters of Koyana river water at Patan (S1)

	Air Temp. °C	Water Temp. °C	pH	Turbidity NTU	Dissolved Oxygen mg/lit.	BOD mg/lit.	COD mg/lit.	Free CO ₂ mg/lit.	P* mg/lit.	Total Alkalinity mg/lit.	Total Hardness mg/lit.	TDS ppt
October 2013	24.4	22	7.1	1.5	10.2	2.0	8	2	Nil	86	54	0.098
Nov.2013	25	21.3	7.3	3.8	8.4	2.6	4	4	Nil	30	10	0.085
Dec.2013	24.2	23	7.0	2.9	8	3.8	12	6	Nil	64	64	0.105
January 2014	25.8	21.2	7.0	2.2	6.4	3.8	12	8	Nil	76	50	0.098
Feb.2014	29	23	6.9	1.0	4.4	3.6	16	6	Nil	82	58	0.081
March 2014	30.6	22	7.6	2.0	4.8	2.4	20	8	Nil	50	62	0.086
April 2014	33.9	25.2	7.9	1.8	5.2	4.2	20	2	Nil	34	28	0.017
May 2014	35.6	29.8	7.8	3.6	5.6	3.6	24	6	Nil	44	50	0.086
June 2014	30.8	22.6	8.0	2.4	7.6	4.0	20	8	Nil	48	52	0.091
July 2014	29	20.2	7.6	2.1	7.6	3.4	16	10	Nil	52	66	0.098
August 2014	29.6	19.8	8.1	3.2	8.0	2.2	16	4	Nil	54	72	0.078
Sept. 2014	29.4	20.4	7.5	5.2	4.8	2.8	16	6	Nil	64	60	0.065

P*= Phenolphthalein alkalinity

Table. 2- Physicochemical parameters Koyana river water at Karad (S2)

	Air Temp. °C	Water Temp. °C	pH	Turbidity NTU	Dissolved Oxygen mg/lit.	BOD mg/lit.	COD mg/lit.	Free CO ₂ mg/lit.	P* mg/lit.	Total Alkalinity mg/lit.	Total Hardness mg/lit.	TDS ppt
October 2013	26.3	24.7	7.8	1.2	4.8	8.0	24	22	Nil	94	124	0.145
Nov.2013	24.2	22.2	7.5	0.6	4.0	8.4	16	16	Nil	98	118	0.196
Dec. 2013	24	22	7.8	0.2	4.4	7.2	12	18	Nil	112	116	0.177
January 2014	25.3	21	7.9	1.9	4.8	6.0	24	20	Nil	200	110	0.179
Feb. 2014	29.2	22.4	8.0	1.8	5.2	5.2	24	22	Nil	182	106	0.183
March 2014	30.3	26.2	8.2	2.6	4.4	6.6	20	12	Nil	140	156	0.179
April 2014	34.4	25.5	8.1	2.9	4.0	7.0	28	14	Nil	122	164	0.182
May 2014	36.2	30	8.0	3.8	4.4	8.0	24	24	Nil	116	144	0.191
June 2014	32.1	30.8	7.6	3.2	3.6	7.2	32	20	Nil	128	174	0.185
July 2014	29.8	24.2	7.4	3.9	5.2	7.8	28	18	Nil	130	98	0.155
August 2014	28.9	20.6	8.0	4.0	5.2	6.4	28	16	Nil	144	92	0.150
Sept. 2014	27.4	22.2	7.8	5.2	5.0	7.2	24	16	Nil	152	102	0.141

P*= Phenolphthalein alkalinity

and Ghorade (2013), Jena (2013), Gund and Kakde (2014), Jagtap (2014) and Doifode and Rewatkar (2014).

During present investigation Temperature, pH, TDS and Turbidity values were observed within the range at the both spots. The higher values of BOD, COD, free CO₂, total alkalinity, total hardness at the spot S2 were observed as compared to spot S1.

According to Choudhary *et al.* (2011), Sharma *et al.* (2011), Thorvat *et al.* (2012) and Jena *et al.* (2013) the physicochemical factors of river water samples found to be crossed the maximum permissible limit, which is because of the mixing of industrial effluents, domestic wastes and other man made activities in the river. In our observations it was observed that due to the addition of industrial effluents, domestic sewage and manmade activities the physicochemical parameters crossed the maximum permissible limit hence the balance of river gets disturbed and water became polluted.

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