



Short Communication

Effect of Coal Mine Effluents on Population of Fishes in River Erai

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Abstract

Water is one of the most amazing compounds in nature consist of two common elements hydrogen and oxygen; it is indispensable for life, both for plants and animals. This paper attempts to find out the effect of coal mine effluent on population of fishes in Erai River. Both experimental and survey methods were used to generate data for the study. The physico-chemical and heavy metal analysis was done by using standard method prescribed in APHA. Analysis of data showed that there is frequent elevation in the physicochemical properties of river water. The survey data showed that the population of fish in river was decreased over time. The study concluded that physicochemical alteration and entry of heavy metals due to coal mine effluent in river is responsible for decrease in fish population in various ways. Fishes are not actively respond to the conditions created due to entry of coal mine effluent in the river, which resulted in the ill health of fishes, due to this they are prone to diseases and death.

Keyword: Fish, Population, Erai River.

Introduction

Water is one of the amazing natural resources which is responsible for life on Earth as, evolution of living organisms and human civilization could not have been possible without water. It acts as a solvent for many more compounds than any other liquid providing ionic balance and nutrients which support life. Pollution in general is particularly in relation to water poses burning problem to human populations; water quality degenerate and water is said to be polluted due to sewage industrial discharge, degeneration of protein materials and surface runoff water entering ponds, lakes and rivers form land treated with chemical and pesticides to protect crops¹.

The water quality is affected by anthropogenic activities and is declining due to the urbanization, population growth, industrial production, climate change and other factors.

This may adversely affect all uses of water, such as domestic, agriculture, aquaculture, industrial, recreation, aesthetic, navigation, power generation, etc. The condition may be more worst if entire aquatic system is thrown out of gear which leads to biological imbalance causing ecological disaster in the biosphere.

River Erai is the main tributaries of the Wardha River. It originates in the northern part of Warora tahsil and flows towards south over a length of 80 km. till it meets the Wardha River near Wadha village of Chandrapur district. Zarpat River is a tributary of Erai River. Total length of Erai River from

origin to meeting point at Wardha River is 25 km approx. and length of Zarpat River from its origin to confluence point with Erai River is 15 km approx. Zarpat river flows between the dense populations of Chandrapur City that includes slum area. Zarpat River originated from the natural spring near Lohara village and meets into Erai River near Mana village.

WCL are the contributor of industrial pollution load in Erai River. The treated effluent from M/s CSTPS are utilized by industry but still some seepages / over-flow discharging into Erai River through Randvendali nalla. Mine discharge from M/s WCL Bhatadi, M/s WCL Padmapur, M/s WCL Durgapur, M/s WCL Bhatadi & M/s WCL Hindustan Lalpeth Opencast Mine. These mine effluent actually diluting the pollution load of Erai River. WCL mines have provided sedimentation tank for the primary treatment of mine discharge. These mine discharge are utilized for drinking water/dust suppression/ firefighting and excess is discharging into river².

The coalmine effluent contains heavy metals such as Hg, Cu, Cd, Cr, Pb, Zn, Ni etc. It also contains acid, alkalis, cyanide etc and dissolved salts of Ca, Mg, Na, K, Fe, Mn and HCO₃, PO₄, Cl, SO₄, NO₃, etc³. These chemicals can harm the flora and fauna existed in the river⁴⁻⁹. In this paper an attempt is made to explore the effect of coal mine effluent on the population of fishes in Erai River.

Methodology

Both experimental and survey methods were used to generate

data for the study. The physico-chemical and heavy metal analysis was done by using standard method prescribed in APHA¹⁰. Four samples were drawn on each day at different time. The samples were collected at the interval of every three months for year from the sampling site 1 km away from actual entry point of effluent. By using an interview schedule responses regarding availability, quantity and quality of fish were collected from fisherman in the area.

Results and Discussion

Analysis of data showed that the average pH of water sample was 8.7 ± 2.6 and there is significant variation in pH with respect to sampling time and season. The average temperature was $26.4^\circ\text{C} \pm 2.6$, the temperature of river also varies with the sampling time and season. The colour observed was pale to dark green throughout the study period. The turbidity values varied from 0.15 NTU to 0.35 NTU. Total alkalinity values ranged from 22mg/L to 34mg/L. Total hardness fluctuated from 22mg/L to 41 mg/L. The chloride values ranged in between 32.21mg/L and 36.21mg/L. The value of DO varies in between 4mg/L and 9.62mg/L. The BOD values ranged from 2.36mg/L to 3.49 mg/L during study period. The samples showed high

values of COD ranged from 17 to 26mg/L. Heavy metals such as Hg, Zn, Cr, Ni, and Pb were also detected in water sample.

The analysis of data collected from the fisherman indicated that there is significant decrease in fish population of Erai River from last 5 years. The incidences of catching unhealthy fish were significantly more. It is evident that at every catch fisherman observed on an average 5 to 8 fishes unhealthy or with deformities or other health effects. The gills of such fishes were also observed dark brown instead of red. The skin of fish was also showed hyper activation.

Conclusion

There are very strong evidences of effect of coal mine effluent pollution on decrease in fish population of Erai River. It is evident from the result that physicochemical alteration and entry of heavy metals due to coal mine effluent in river is responsible for decrease in fish population in various ways. Fishes are not actively responding to the conditions created due to entry of coal mine effluent in the river, which resulted in the ill health of fishes, due to this they may prone to diseases and death.

Table-1
Physico-Chemical Analysis

Parameters	Average \pm Std. Dev.	Min	Max
Temperature	$26.4^\circ\text{C} \pm 2.6$	22.4°C	39.6°C
pH	8.7 ± 1.2	7.6	8.9
Turbidity	0.27 ± 0.04 NTU	0.15NTU	0.35NTU
Total Alkalinity	24.6 ± 7.4 mg/L	22 mg/L	34mg/L
Total Hardness	29.7 ± 8.2 mg/L	22mg/L	41mg/L
Chloride	34.71 ± 2.1 mg/L	32.21mg/L	36.24 mg/L
BOD	3.12 mg/L	2.36 mg/L	3.49 mg/L
COD	22mg/L	17 mg/L	26 mg/L
DO	5.2 ± 1.1 mg/L	4 mg/L	9.62 mg/L

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