Impact of Khaperkheda and Koradi Thermal power stations on Water Quality

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Abstract

The quality of drinking water is one of the major parameter to assess the Human Development Index of the country and especially if the country is in the developing stage then it becomes very important for it to maintain the quality of available resources and manage to create new opportunities of development through Industrialization of the region. As development through industrialization always comes with its ill effects on the surroundings, it becomes essential to study the impact of industrial effluents on its surrounding. Thus keeping this view in mind, present study of impact of Thermal power stations(TPS) on the water quality of the water bodies situated in its vicinity is done with the objectives to assess the impact of the TPS on the surface water and ground water quality in the vicinity and to check the potability of the water in the vicinity of TPS.

We came to this conclusion that though The Power station in the vicinity of the study region are trying to follow the state policy to contribute to lessen the amount of effluents releasing from TPS, the water quality is showing some remarkable differences in samples taken from distant places.

KEYWORDS: Khaperkheda, Koradi, Thermal power stations, Water

Water is essential to sustain life, and a satisfactory (adequate, safe and accessible) supply must be available to all. Improving access to safe drinking-water can result in tangible benefits to health. Every effort should be made to achieve a drinking-water quality as safe as practicable.

Safe drinking-water, as defined by the Guidelines, does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages. Those at greatest risk of waterborne disease are infants and young children, people who are debilitated or living under unsanitary conditions and the elderly. Safe drinking-water is suitable for all usual domestic purposes, including personal hygiene.

It is often seen that the water bodies around the industrial area are knowingly or unknowingly affected due to the industrial activities. There are several rules and regulation which forbidden Industries to pour solid or liquid industrial wastes directly in the nearby water bodies which leads to sever water pollution. To study such type of impact and its intensity on the water bodies in the surroundings of the Thermal Power Station (TPS). This study has been done with the following objectives.

Objective :-

- To assess the impact of the TPS on the surface water and groundwater quality in the vicinity.
- To check the potability of the water in the vicinity of TPS.

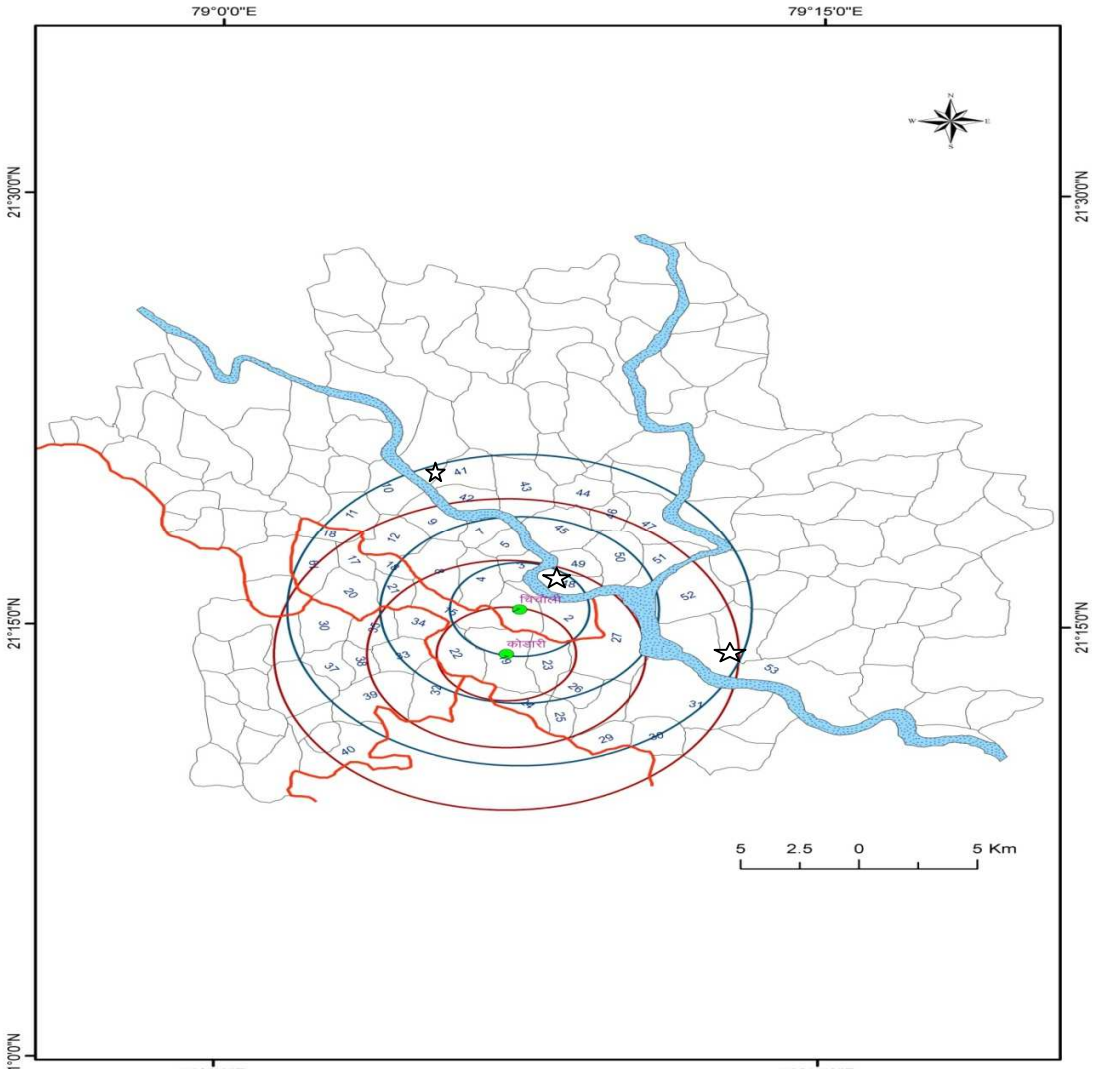
Methodology :-

To find out the impact of fly ash on the water in the vicinity of Kaperkheda and Koradi Thermal power stations chemical tests of the water samples of the major river of this region Kanhan were taken along with the ground water samples and the results were analyzed.

Three samples of the river water were taken for chemical tests. First river water sample(Station 1) was taken from the site right before entrance of the river in the vicinity of the Thermal power stations i.e. Wakodi, second sample(Station 2) was taken from the site located in middle of the vicinityi.e.Saholi and third (Station3) from outside the vicinityi.e.Kanhan. Metals like Aluminium,Arsenic,Boron,Cadmium,Nickel,Selenium and Zinc were tested in the samples taken from these three different locations.

Study region :-

Location: Koradi and Chicholi(Khaperkheda) are the places located in the Indian state of Maharashtra.Koradi is located at 21°14′56″N 79°5′56″E.Chicholi(Khaperkheda) is located at the latitude of 21.25 (21° 15' 0 N) and the longitude of 79.12 (79° 7' 0 E). Koradi is 12 km and Chicholi(Khaperkheda) is 25 km distant from Nagpur city. Vicinity of the thermal power stations located in these two villages is the main study region



Note:- ☆ **41 indicates Station 1- Wakodi**
☆ **48 indicates Station 2- Saholi**
☆ **53 indicates Station 3- Kanhan**

Impact of TPS on Surface water :-

The impact of the TPS on the surface water of the vicinity was checked along with given parameters and availability of these parameters in the given samples are shown in the following table

Surface Water Sample Analysis

(metals in mg/L)

Metal	Station 1 (Wakodi)	Station 2 (Saholi)	Station 3 (Kanhan)
Aluminum	0.03	0.04	0.05
Arsenic	ND	ND	ND
Boron	0.04	0.04	0.086
Cadmium	0.03	0.009	0.02
Nickel	0.03	0.02	0.02
Selenium	ND	ND	ND
Zinc	0.04	0.03	0.03

As per test report of MahabalEnviro Engineers Pvt.Ltd

As the data suggests content of Aluminum and Boron increases in the samples from three stations while amount of Nickel and Zinc decreases through the journey of river before entering the vicinity to passing away from the same. Amount of Cadmium shows irregularity through the passage of river and traces of Arsenic and Selenium were not detected in these sample.

Traces of Aluminium is increasing through the course of river and it is exceeding the permissible limit of the drinking water according to the IS10500.

Thus the state has a policy which requires that a safe distance be maintained between industrial units and rivers in order to avoid discharge of effluent into water bodies. Policy also ensures that no industry will be established along a river bank.

Impact of TPS on the ground water

To check the impact of effluents from TPS on ground water , the ground water samples of the same villages from where we have collected the surface water samples were given to the laboratory for potability test following are the results of the test

Water Sample Analysis Report(dug well)

Sample: 1 WakodiT.SaonerD.Nagpur

Sr.	Parameters	Unit	BIS.(10500)-2004-05		Analysis Report
			Requirement (Desirable Limit)	Permissible Limit in the Absence Alternate Source	
1.	Turbidity	NTU	5	10	--
2.	Electrical Conductivity	µS/cm	--	--	865

3.	Total Dissolved	mg/L	500	2000	562
4.	pH	--	6.5-8.5	No Relaxation	7.9
5.	Total Hardness	mg/L	300	600	--
6.	Iron	mg/L	0.3	1	0.03
7.	Nitrate	mg/L	45	45	24
8.	Fluoride	mg/L	1	1.5	--
9.	Sulphate	mg/L	200	400	24
10.	Chloride	mg/L	250	1000	32
11.	Total Alkalinity	mg/L	200	600	--
12.	Calcium	mg/L	75	200	--
13.	Magnesium	mg/L	30	100	--
14.	Carbonate	mg/L	--	--	--
15.	Bicarbonate	mg/L	--	--	--
16.	Sodium	mg/L	--	--	--
17.	Potassium	mg/L	--	--	--

As per test report of Regional Water Testing Laborator

Water Sample Analysis Report(dug well)

Sample: 2 Saholi T.Kamptee D.Nagpur

Sr.	Parameters	Unit	BIS.(10500)-2004-05		Analysis Report
			Requirement (Desirable Limit)	Permissible Limit in the Absence Alternate Source	
1.	Turbidity	NTU	5	10	--
2.	Electrical Conductivity	µS/cm	--	--	831
3.	Total Dissolved	mg/L	500	2000	540
4.	pH	--	6.5-8.5	No Relaxation	7.5
5.	Total Hardness	mg/L	300	600	--
6.	Iron	mg/L	0.3	1	0.03
7.	Nitrate	mg/L	45	45	24
8.	Fluoride	mg/L	1	1.5	--
9.	Sulphate	mg/L	200	400	--
10.	Chloride	mg/L	250	1000	--
11.	Total Alkalinity	mg/L	200	600	--
12.	Calcium	mg/L	75	200	--
13.	Magnesium	mg/L	30	100	--
14.	Carbonate	mg/L	--	--	--
15.	Bicarbonate	mg/L	--	--	--
16.	Sodium	mg/L	--	--	--
17.	Potassium	mg/L	--	--	--

As per test report of Regional Water Testing Laboratory.

Water Sample Analysis Report (dug well)

Sample: 3 KanhanT.KampteeD.Nagpur

Sr.	Parameters	Unit	BIS.(10500)-2004-05		Analysis Report
			Requirement (Desirable Limit)	Permissible Limit in the Absence Alternate Source	
1.	Turbidity	NTU	5	10	--
2.	Electrical Conductivity	µS/cm	--	--	2930
3.	Total Dissolved	mg/L	500	2000	1904
4.	pH	--	6.5-8.5	No Relaxation	7.1
5.	Total Hardness	mg/L	300	600	--
6.	Iron	mg/L	0.3	1	0.04
7.	Nitrate	mg/L	45	45	24
8.	Fluoride	mg/L	1	1.5	--
9.	Sulphate	mg/L	200	400	31
10.	Chloride	mg/L	250	1000	458
11.	Total Alkalinity	mg/L	200	600	--
12.	Calcium	mg/L	75	200	--
13.	Magnesium	mg/L	30	100	--
14.	Carbonate	mg/L	--	--	--
15.	Bicarbonate	mg/L	--	--	--
16.	Sodium	mg/L	--	--	--
17.	Potassium	mg/L	--	--	--

As per test report of Regional Water Testing Laboratory.

The status of the ground water were also checked and its potability test has been done in the Regional water testing laboratory ,Ground water Surveys and Development in order to analyse the difference in the parameters at different places in the vicinity. Three random ground water samples were tested and it was found that the ph of the ground water is decreasing as we are moving from northern part of the vicinity to further distant places in the southern part of the vicinity.

The Electrical conductivity is also having difference in three samples as it is found 865 s/cm in the first sample(Wakodi) and it is raised at2930 s/ cm at third station(Kanhan)

TDS is also showing remarkable difference in Wakodi and Kanhansamples while Iron content is slightly more in Kanhan sample than the Wakodi sample.

Sulphate content is showing fluctuation but Chloride is also showing remarkable difference in the first sample and third sample.

Conclusion:-

As the study shows some differences are seen in the parameters which were tested in the surface water and ground water samples collected from the vicinity .Though the

parameter have not exceeded the permissible limits but the increasing amount of the parameter such as Aluminum and Boron in samples of the surface water at Station1,Station2 and Station3 are observed in the vicinity of TPS.The differences could be due to several causes like tributaries coming from different regions etc. but the existence of thetwo TPSin the vicinity is one of the major factor causing changes or differences in the natural compositions of the water samples of the water bodies in the vicinity. Though ground water is fit for drinking but could get damaged in near future if effluents are not controlled.

The extremity of such impact of the effluents from the TPS results in the damage to the water bodies to such an extent that it gets completely prohibited for the usage for living things as it happened in case of Koradi lake located near Koradi TPS.

Measures taken by TPS to minimize such impacts on the surroundings.

In order to compliance of the environmental standards ,MPCB has taken initiatives, such as :-

1) All the thermal power plants have installed electrostatic precipitation ESP for collection and removal of dust .Operations of these ESPs is automated in order to increase their efficiency and optimize their performance .The major corner is the lack of availability of good quality coal in terms of ash content. The average ash content in coal is about 40-50% against expected 29-30%. This puts an extra load on ESP. Considering this constraint, MSEB (Presently coming under the field of MAHAGENCO) has started working on the use of washed coal. Further ,MSEB has submitted up gradation and modernization proposals for all ESPs so that they can comply with the emission norms.

2) The State Electricity Board has further attempted to use bag house (fabric) filters at one of their units in Koradi .The experiments was found to be successful and it is planned to adopt this technology at other places as well This has brought down the emission levels to less than 100 against the maximum limit of 150 .

3)Recently ,the State Electricity Board has also installed on a trial basis ammonia gas conditioning at Khaperkheda TPS to limit TPM emissions .The results are encouraging .

4) MSEB has also started recycling water from fly ash ponds. Plants like Khaperkheda have already achieved 100% recycle

5) Ozonization of cooling tower water : Conventionally , chlorine is used for disinfection of cooling tower water .Chlorine ,however is a known ozone-depleting substance and remains in various toxic and hazardous forms for disinfection of cooling tower water was attempted as it is more eco-friendly though relatively costlier .This is being tried for the first time in India.

Though these power stations are following the guidelines of the state policy for efficiently contributing to lessen the amount pollutant to rescue from the environmental damage, impact on water bodies is still visible in the vicinity of the TPS.

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