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REVIEW ARTICLE

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Effect of Pollution on Environment: A Case Study of Surrounding Region of NTPC Seepat Town

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ABSTRACT

The air pollutants like SPM, NO_2 and SO_2 worsening air quality of surrounding region of NTPC Seepat Town of Bilaspur City. I have measured the availability of air pollutants in 5 villages e.g., Rakh, Ralya, Darrabhatta, Janji and Koudia which big challenge to human, animal health and agriculture in Seepat Town. The Air Quality Index (AQI) was found to be more than 50 which exhibits moderately high air pollution in that region.

Keywords: Air Quality Index (AQI), Air Pollutants, Impact and NTPC Seepat Town.

INTRODUCTION

The primary source of air pollutants worsening the air quality in urban, rural and industrial areas due to vehicles like automobiles, industries and power plants. Out of these, the last two sources are stationery sources of pollution affecting environment in a limited area to a greater extent however vehicles are mobile source of environmental pollution affecting larger

area without limitation (USEPA, 1991a and 1991b, Bradley et al., 1999 Ye et al. 2000 and Schifter et al., 2003).

The main air pollutants emitting are oxides of nitrogen, Carbon, Sulphur eg. NO_2, CO_2, CO, SO_2, hydrocarbons, lead (Pb) and particulate matter (PM), due to these aforementioned pollutants discharge in excessive amount, the air quality is highly deteriorated continuously affecting humans, animals and plants health.

In this paper an attempt has been made to study the status of air quality/ air pollutions in surrounding region of NTPC Seepat Town which is located at 82^0 8'20" North Latitude in Bilaspur district of Chhattisgarh, India.

The total population of Town is 6205 as per 2011 census. The Town is linked with district and tehsil (Masturi) head quarter with metalled road or contracts. The Town shows recent developments all around with rapid progress.

Today the changes in quality of air in surrounding region of NTPC at Seepat Town in an important issue in front of us.

MATERIAL AND METHODS

The data were collected to measure the AQI (measurement of air quality index). The AQI is a rating scale for reporting the ambient air pollution recorded at monitoring sites on a particular time scale.

George Kyrkill et al., 2007 developed an aggregate air quality based on the combined effects on 5 criteria pollutants eg CO, SO_2, NO_2, O_3, and PM.

The air quality index for a particular pollutant (Ri) is calculated by using equation of Senthilnathan, 2007.

$$Ri = \frac{\text{Concentration of pollutant}}{\text{Standard Value of Pollutant}}$$

The total air quality index for I number of pollutant value can be obtained by

$$AQI = (\Sigma i/i) \times 100$$

The samples and data of NO_2, PM and SO_2, were collected as per methodology described by Shukla et al., 2010.

RESULTS AND DISCUSSION

The case study of five villages Rakh, Raluja, Darrabhata, Janji and Koudi were conducted as these villages are located near NTPC Seepat plant boundaries or fringe region the primary survey was done by collecting samples as these villages are facing many problems form year 2011 when power plant is fully activated.

In Rakh Village the concentration of 862 µg / m^3, 8.6 µg / m^3 , 38.6 µg / m^3 and 205 µg / m^3 of SPM, SO_2 NO_2 and PM_{10} respectively.

In Raluja Village: The values of concentrations were 823 µg / m^3, 8.6 µg / m^3, 36.4 µg / m^3 and 209 µg / m^3 for SPM, SO_2 NO_2 and PM_{10} respectively.

In Darrabhata: the value of concentrations were 738 µg / m^3, 7.8 µg / m^3, 29.4 µg / m^3 and 187 µg / m^3 for SPM, SO_2 NO_2 and PM_{10} respectively.

In Janji Village: the values were 912 µg / m^3, 9.1 µg / m^3 , 37.6 µg / m^3, and 188 µg / m^3 of SPM, SO_2 NO_2 and PM_{10} respectively.

In Koudi Village: the values were 927 µg / m^3, 7.4 µg / m^3, 38.0 µg / m^3, and 240 µg / m^3 for SPM, SO_2 NO_2 and PM_{10} respectively.

The standard value of these areas should be 200 µg / m^3 for SPM, 6.0 µg / m^3 , 30 µg / m^3 and 60 µg / m^3 for SO_2, NO_2 and PM_{10}.

Thus the values of AQI in these villages were found to be higher than 100 which are indicative of severe pollution.

The AQI value is related to the overall status of air pollution which is predefined set of clear values. It affects flora and fauna of that region (Environmental Protection Agency, 1998). Air quality index increasing value beyond 25 responsible for health effect. AQI value was calculated with the help of concentration values SO_2, NO_2, PM_{10} and SPM (Longurst, 2005, Shukla et al., 2010), and standard prescribed by National Ambient Quality Standards (Table 2). The AQI value is to assess the degree of pollution in air (Senthilnathan and Rajan, 2002 a). The higher value of AQI index is responsible for following impacts.

Table 1. Measurement of Air pollutants (Average for the month of November).

Pollutant	Rakh Village	Raluja Village	Darrabhata	Janji Village	Koudia Village
SPM	862 µg /m^3	823 µg/m^3	738 µg/m^3	912 µg/m^3	927 µg/m^3
SO_x	8.6 µg /m^3	8.6 µg /m^3	7.8 µg /m^3	9.1 µg /m^3	7.4 µg /m^3
NO_x	38.6 µg /m^3	36.4 µg /m^3	29.4 µg /m^3	37.6 µg /m^3	38.6 µg /m^3
PM_{10}	205 µg /m^3	209 µg /m^3	188 µg /m^3	188 µg /m^3	240 µg /m^3

Impact of pollution on environment in surrounding regions of NTPC Seepat Town

The NTPC Seepat produces steam for power generation by combustion of fuels thus produces significant amounts of air pollutants. The coal is used fly ash, sulphur dioxide and oxides of nitrogen are the major pollutants. The three major air pollutants from power stations are SO_2 and SO_3 and NO_2. Today the impact of air pollution on environment is the major issue before us, therefore five villages Rakh, Raluja, Darrabhata, Janji and Koudia for study there are as following problems:-

1. The loss of agriculture due to pollution
2. The loss of natural vegetation and forest greenery
3. The polluted river water due to high temperature
4. The air pollution on human health.
5. Near the ash of dam of Raluja village, agriculture is affected by pours ash water which is highly toxicated through ash dumping in the dam.
6. The coal particle which is present in air near to the Janji Village is migrating through air.

The air pollution prevention and control Act, 1981 (Government of India) came in to force from May 16, 1981. The act is applicable throughout the country. The act provides for an integrated approach for tackling environmental problems relating to the pollution. The NTPC Seepat plant air quality data they were not published but in following table the air quality is as following when plant is fully activated.

Table 2. Scale of Air Quality Index.

AQI Value	Remarks	AQI and level of health concern
0-25	Clear air	The AQI in normal.
26-50	Light Air Pollution	The AQI is low.
51-75	Moderate air pollution	The AQI is moderately high.
76-100	Heavy Air Pollution	The AQI is high.
>100	Severe Air Pollution	The AQI is very high.

The effects of air pollution on human health generally occur as a result of contact between the pollutants and the bodies following disease exist in survey

1. Eye irritation among the villagers
2. The breathing problem eg asthma in child and elderly population due to dust particles.
3. The nose and throat irritation.
4. Suffering from cold and skin disease.
5. Some peoples were affected by allergic problems.

Effects of air pollution on animals and forest area

The NTPC Seepat is located nearest pat of forest Bitkuli, Manjurpheri and Dalapodei. These are the forest greenery regions but due to air pollution becoming dry as temperature are rising continuously.

Effects of air pollution on agriculture production

The case study of five villages Rakh, Raluja Darrabhata, Janji and Koudia is that air pollution causing a reduction in agriculture production of paddy. Pollutants present in wind blowing at high speed will have more abrasive effects and they may also be carried over long distance. The rain water near Raliya village, the dumping of ash the dam is causes severe damage to crop however the level of pollution reduces in the monsoon with the flushing of impurities. But in summer the Lilagar River water decreases as temperature rises.

CONCLUSION

The NTPC Seepat Town is under development and rapidly progress. The problem of air pollution came into existence at this time. Today it is the important issue in front of us. The NTPC Seepat plant surrounding five village's primary survey has been done and the schedule and collecting samples of air and water are taken to study the polluting health and diseases. The effects of air pollution on animals and forest area cause injury from polluting gases. The agriculture production decreases and acid rain water causes damage to crops. In summer the Lilagar river water decreases as temperature rises.

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