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Studies on levels of pollutants in commercial areas of davanagere city- A case study

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Abstract: This paper explains the concentration of pollutants in commercial area of davanagere city. This study includes three months sampling. That is from February to April 2017.from the analysis the pollutants like So_x, N_{ox} are within limits. As per NAAQ standards. However, the particulate matter concentration, beyond the limit. Main cause for this problem was uplifted sediment by vehicular movements and road patches are filled by soil as temporary filling material. In commercial areas, population and vehicles are densely occupied in peak hours in a day. The obtained data shows PM_{10} values 375 to 400µg/m^3,at jayadeva circle sampling location. which is hazardous to health. And other two locations are K.R market and Mandipet. The obtained PM_{10} values are 187.5 and 100µg/m^3, respectively. In addition, correlate with the wind speed, wind direction and humidity. This says the dependency of above parameters with pollutants. And also regression model gives the probable concentration of the pollutants in the feature.

Keywords: Sox,nox,PM_{10} NAAQS,commercial,

Introduction

The urban air pollution increases day by day. Due to population migration towards the urban and semi, urban areas, this directly affects air quality. In modern days life style of people changes. So it directly affects on population of vehicles. The main sources of air pollution are industries, vehicles, and burning of organic and inorganic things, without taking precautions. Like open burning. The main aim of this paper is to know the level of pollutants in commercial area of the davanagere town. Moreover, it is 601m high from mean sea level. This is located in Karnataka. In addition, it is famous for trading and it is named as commercial town of Karnataka state.

For study purpose, the sampling locations are selected in three locations. Study area located in old part of the town. Davanagere Mainly divided into north and south part. Commercial areas are concentrated towards south part of the town. Features of this area are, congested roads, multiple shopping centers, which directly influences density of population, and vehicles. So it affects on air quality. Other areas also having commercialized buildings, but those are less populated areas. Compare to these areas. The case study includes the level of Sox, Nox and PM_{10} concentration in the selected sites. Mainly commercial areas are busy with following activities, like loading and unloading of goods, shopping marts. From Sunday to Friday, the sampling locations are busy in peak hours in a day. The pollutants like Sox (oxides of sulphur) main sources are industrial emissions. Nox means combination of N_2O and NO_2.nitrogen occurs naturally in atmosphere. However, its level increases, it affects on human health and environment.

From National air monitoring program, Karnataka state selected for air monitoring, which covers the eleven cities, including four board stations. Totally 24 stations are monitored. The main aim of this program is to determine status and trends of ambient air quality and to identify the non-attainment of standards. Developing preventive measures in places where air quality standards are violated.

From 2013 pollution control board report, said that RSPM and PM_{10} beyond the limits. The gaseous pollutants like Nox and Sox are within limits.

Materials and Methodology

(a) Sampling location:

Sampling locations are located at three points. Namely K.R market, Mandipet, and jayadeva circle. These points comes under commercial area of the town. And those are surrounded by many shopping marts and partially covered with residential building.

(b) Sample collection:

Samples are collected monthly basis. That is from February to April. For sampling purpose, we use the fine particulate sampler of envirotech APM-550, and gaseous pollutant sampler of envirotech APM-433. Samples are collected according to NAAQ standard procedure. For collecting samples of both particulate matter and gaseous pollutant, samplers are kept for 8 hours in day time.

Results and Discussion

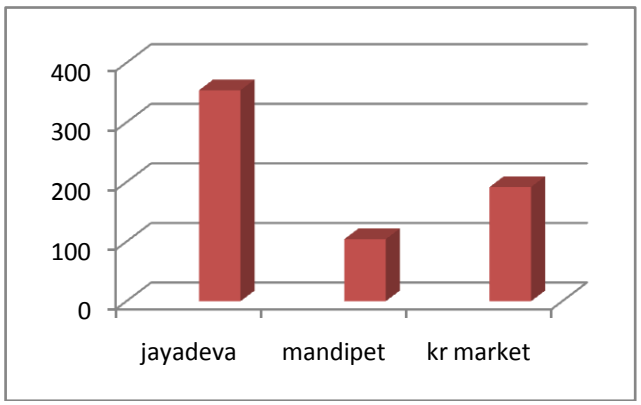
Table (1) shows the values obtained from the analysis. Jayadeva circle got more PM_{10} value. Compared with other locations.

As per NAAQ standards, PM_{10} value exceeds the limit. The Sox and Nox values are within limits. From the analysis, the PM_{10} values are beyond the limits and other two pollutants are within the limits.

The following equation shows the future prediction of pollutants.

1. PM_{10} = zero + 15.43T - 34.31W + 2.27H.
2. SO_X =zero + 1.03T - 0.29 W + 0.30H.
3. Nox = zero+0.38T -0.02W+0.30H.
4. PM_{10} = zero+ 0.38T – 0.02W +0.30H.
5. SO_X = zero+ 2.75T -5.82W-0.05H.
6. NO_X= zero+0.16T-0.28W +0.01H.
7. PM_{10} = zero+0.16T-0.28W+0.01H.
8. SO_X = zero+1.62T-0.95W+0.24H.
9. NO_X= zero + 0.39T -0.18W + 0.03H.

Graph of PM_{10} of respective stations:

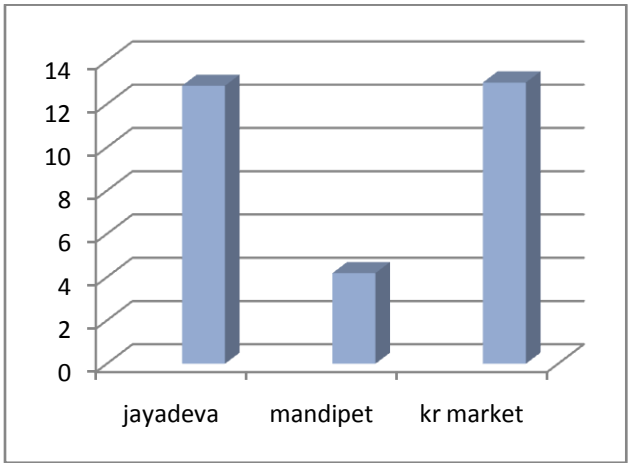


Conclusions

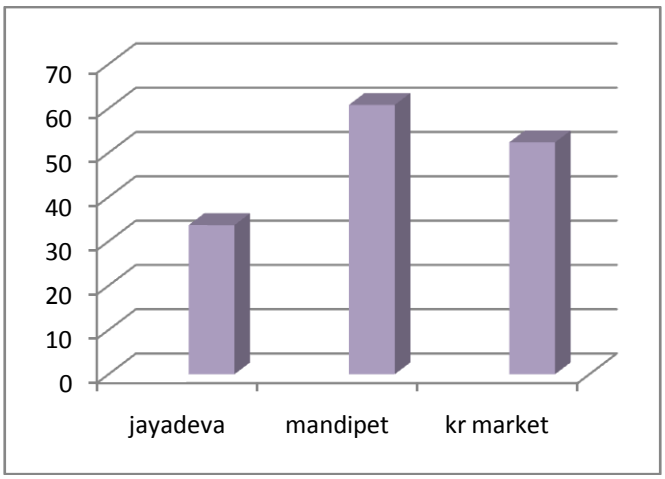
Three stations of commercial zones of davanagere. The following pollutants are analyzed based on NAAQ standards. The pollutants are pm10, sox and Nox. From the analysis pm10, value exceeds the NAAQ standards. In addition, sox and Nox values are within the limits. The factors, which influence the pollutant concentration, are wind speed, temperature, humidity, and density of vehicles in particular hours.

Regression analysis is done to know the dispersion of pollutants in designated commercial zones of davanagere city. In jayadeva circle, it is observed that, pm10 and sox value depends on humidity. Moreover, Nox value depends on temperature. In mandipet it is observed that pm10 depends on temperature and wind speed. Sox value independent on temperature, humidity and wind speed. Nox value depends on humidity. In K.R Market station, it is observed that pm10, sox, and Nox value depends on humidity.

Graph of NOX of respective stations:



Graph of SOX of respective stations:



The following graph shows the level of pollutants in respective locations.
From the graphs PM_{10} was too high in the jayadeva circle. when compared with the other two locations.

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