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Assessment of Ambient Air Quality Status and Air Quality Index at Selected Areas of Davangere City

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Abstract— *the main objective of this study was to analyze the concentration of air pollutants and to predict the air quality index around the selected areas of Davangere city. They conducted the investigation with reference to major pollutants like PM_{10}, SO_X and NO_X respectively. They selected areas based on vehicle density that is residential, sub commercial and commercial areas. During the time of study the readings were recorded for about two months at three different stations. They observed that the concentration of pollutant was varied gradually throughout the season. The obtained results were compared with the NAAQS standard values. AQI range in Siddaveerappa Layout is good, in MCC'A BLOCK is moderate and in jayadeva circle it's unhealthy for sensitive groups respectively.*

Index Terms—*: PM_{10}, SO_X, NO_X, AQI and NAAQS.*

I. INTRODUCTION

The very basic necessity required for each and every human being to survive on the earth is Air. Nowadays air is getting polluted, especially in urban areas due to heavy anthropogenic activities it is getting more worse. To achieve the economic stability in all the sectors pollution has been crossed its limit. The main reason behind pollution is entering of Unwanted or undesirable elements to the atmosphere. This makes huge Impact not only on human Activity it will affect plants, animals, marine life, monuments and etc.

So basically, there are many issues related to air pollution like industries, traffic and burning of fossil fuels etc. In order to avoid this pollution and to minimize its effect on earth and other living organisms, one must be aware of it. The governmental bodies should educate everyone about do's and don'ts related to air pollution. There are many laws has made to treat this air-pollution and many acts are also Came into light regarding clean air. So, one should obey all those. If the main reason of air pollution is auto mobiles then reducing Usage of auto mobiles is the only solution for it.

II. MATERIALS AND METHODOLOGY

A. Study Area

For the present study Davangere is considered. Davangere is located on the western part of south India.It is situated at center part of Karnataka hence it is called as heart of Karnataka. Davangere Lies in the maidan area on the Deccan Plateau.Its lies at 79°59'27" E longitude and 14°28' N scope (602.5 m over the MSL). The following Fig 2 shows the satellite view of the Davangere city.

Fig: Satellite view of Study area (source; Google maps)

B. Sampling station

3 Sampling locations are selected for monitoring of PM10.The locations are selected based are Traffic density over places that is 1 is residential, 2 is school area with medium traffic level and last is commercial area, the sampling sites are listed below table 2.

Table 2: sampling stations

Sl no	Selected stations	Type of zones
1.	Siddaveerappa layout	Residential
2.	MCC'A Block	Commercial
3.	Jayadeva Circle	Traffic

C. Parameters Considered

The parameters considered for the study are oxides of Sulphur,Oxides of nitrogen and particulate matter to calculate Air Quality index.

D. Air Quality index

The air-quality index is the indicator of air quality of surrounding environment, it relies upon air contaminations that affect human wellbeing and condition. This number is used by Government organization to convey the society how contaminated air right now is. As the AQI builds, an undeniably enormous number of inhabitants is probably going to encounter extreme antagonistic impacts.

It is calculated by following Equation:

$$\mathbf{AQI=1/3[\{SO_X/SSO_X\}+\{NO_X/SNO_X\}+\{PM_{10}/SPM_{10}\}]*100}$$

Where,

SO_X= Discrete values of Sulphur dioxide.
NO_X= Discrete values of oxides of nitrogen.
PM_{10}= Discrete values of suspended particulate matter.
SSO_X, SNO_X and SPM_{10} = Standards of ambient air Quality of Sulphur dioxide, nitrous oxide and particulate matter.

Table 2.2: AQI values and Levels of Health concern (Source: kamanth and Lokeshappa 2014)

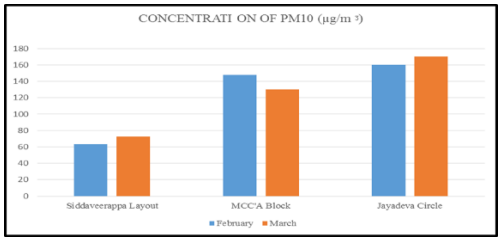
Color code	AQI values	Levels of Health Concern
Green	0-50	Good
Yellow	51-100	Moderate
Orange	101-150	Unhealthy for sensitive groups
Red	151-200	Unhealthy
Purple	201-300	Very Unhealthy
Maroon	301-500	Hazardous

III. RESULT AND DISCUSSION

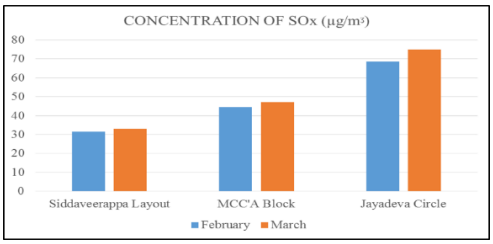
The results obtained from the present study shows that pollutant PM_{10} has more influence than other two pollutants. We observed that concentration of PM_{10} Was exceeded the national ambient air quality standards and the gaseous pollutants were in the limits.

- The PM_{10} concentration in the study area varied from 170-60 µg/m³ which is exceeded the NAAQS standard limit (60-100 µg/m³).
- The SO_x Concentration is varied between maximum of 75 µg/m³ and minimum of 31.5 µg/m³, these concentrations were within the limit that is (50-80 µg/m³).
- The NO_x concentration is varied between maximum of 32 µg/m³ and minimum 4.8 µg/m³ which is under standard limit (40-80 µg/m³).

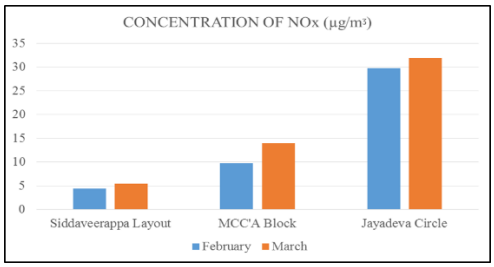
Below area wise concentration of pollutants were plotted 3.1, 3.2 and 3.3.



3.1- Concentration of PM_{10} (µg/m³) throughout the two months at three sampled areas.



3.2-Concentration of SO_X (µg/m³) throughout the two months at three sampled areas.



3.3-Concentration of NO_X (µg/m^3) throughout the two months at three sampled areas.

Air quality index of study area is predicted using formula. Values are tabulated in the below table

Sl no.	Study Area	AQI	Remarks
1	Siddaveerappa layout	38.16	Good
2	MCC'A Block	58.46	Moderate
3	Jayadeva circle	129.4	Unhealthy for Sensitive groups

IV. CONCLUSION

The samples are collected during the month of February and March 2020 in the city. In the entire city the PM 10 concentration is exceeded the NAAQS limit and the other two pollutants were within the limit. Among the study areas the one station's AQI is 129.4 and the level of health concern is Sensitive for Unhealthy groups. The main reason behind the Increasing concentration of PM10 is a vehicular emissions around that center place. During these days the gaseous pollutants are also getting higher due to heavy activities which are happening around. By studying the concentration of pollutants we can plan the distribution of resources and the infrastructure of that city.

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