

Assessment of Air Quality Index Of Davangere City- A Case Study

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Abstract— The present investigation deals with the Study of PM₁₀ concentration in ambient air of Davangere city. Increasing population and vehicular density shows that reduction of greenery and lung spaces; it's affecting air quality in city and hence there is chance of air pollution. The air samples are collected at 12 different locations during February 2015 to April 2015. This study is to determine the PM₁₀, oxides of sulphur and oxides of nitrogen at 12 different sampling locations of Davangere city and present investigation shows that PM₁₀ values in some stations are exceeded the National Ambient Air quality standard limits and other two parameters were within the limit. The air quality index is established and in one station the quality of air is highly polluted and the level of health concern is hazardous.

Index Terms— Air quality, Oxides of nitrogen, Oxides of Sulphur and PM₁₀.

I. INTRODUCTION

Air, water, food and shelter are basic and essential needs for humans to survive. Man can survive without water for few days but we can't survive without air for a single second. The life on the earth is survived by many things among them one basic need is air. Air which we inhale is polluted. Especially in urban areas, due to heavy population and migration of people pollution of air is getting worse.

Air contamination in India is exponential extreme issues. The principal hotspots for air contamination are fuel wood and biomass burning and emissions from vehicles and traffic congestion. At the present time the connection between nature and improvement has turn into vital point. Due to mechanical activities, horticultural exercise, transportations and development works are debasing the nature.

Due to urbanization and industrialization, the air quality changes their composition by air pollutants and it leads to the environmental pollution.

It is extremely crucial to screen the segments of environment so as to perceive the levels and impacts of contaminations. Along these lines, that gives us perception about the seriousness of contamination setback.

Numerous nations are confronting different sorts of modern contamination setback. It creates particulate matter, sulphur-dioxide and so forth which are exponential poisonous to bio frameworks. So basically there are many issues related

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to air pollution like industries, traffic, and population, burning of fuels, and many more. In order to avoid this pollution and to minimize its effects on earth and its living bodies, one must be aware of it. The governmental bodies should educate every one about do's and don'ts related to air pollution.

There are many laws has made to treat this air pollutions and many acts are also came into light regarding clean air. Hence everyone should obey all those. If the main reason of air pollution is population then the solution should also be the same.

II. MATERIALS AND METHODOLOGY

2.1. Study Area

For the present study Davangere city is considered. Davangere is located on the western part of the south India. It is situated topographically focus of Karnataka state, consequently is called as the heart of Karnataka. Davangere lies in the maidan area on the Deccan plateau.

Location: 14°28'00" N and 75° 55'27"E

Mean sea level: 601m

Country: India

State: Karnataka

Total area: 77km²(30sq mi)

Population (2011-2012): 4, 35,128

Davangere is the area central command. Aside from exchange and trade these days Davangere is additionally being perceived for instructive foundations. The fig.2 shows the satellite view of the Davangere city.

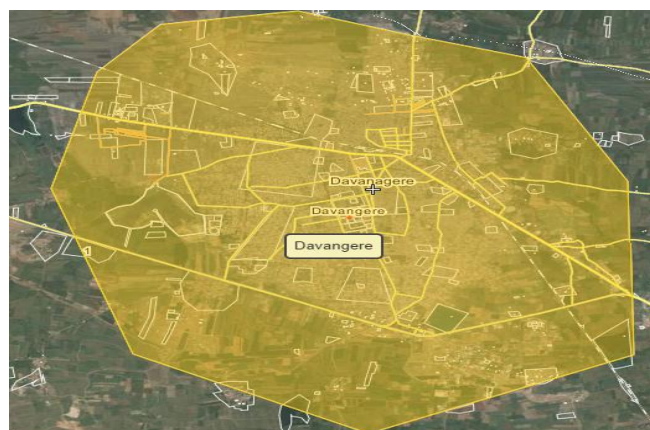


Fig. 2.1: Satellite view of Study area (source: Google maps)

2.2. Sampling station

12 Sampling locations are selected for the monitoring of PM₁₀. Out of these 12 sampling locations- 3 are residential, 3- commercial, 3- traffic areas and 3- industrial areas. The sampling sites is showed in table 2

Table 2.1 sampling stations

SL.NO.	Selected stations	Type of zones
1	Vidyanagar	Residential
2	P.J Extension	Residential
3	Shivakumar Badavane	Residential
4	Clock tower	Commercial
5	K.R. Market	Commercial
6	Jaideva circle	Commercial
7	Big bazaar	Traffic
8	KEB circle	Traffic
9	Gundi circle	Traffic
10	Mandakki bhatti	Industrial
11	Sun steel fab	Industrial
12	Ramnagar	Industrial

2.2 Parameters considered

The parameters considered for the study are oxides of Sulphur, Oxides of nitrogen and PM₁₀ to calculate the Air quality index

2.3 Air quality index

Air quality index is a number which is utilized to report the everyday air quality. This number is used by government organization to convey to general society how contaminated the air right now is. As the AQI builds, an inexorably extensive rate of the populace is prone to experience progressively serious unfavorable wellbeing’s impacts. Distinctive nations have their own particular AQI, relating to diverse nation air quality principles.

It is calculated by following equation:

$$AQI = \frac{1}{3} \{ (SO_2/sSO_2) + (NO_2/sNO_2) + (PM_{10}/sPM_{10}) \} * 100$$

Where,

SO₂ = individual Values of Sulphur-dioxide

NO₂ = individual Values of Nitrogen- dioxide

PM₁₀ = individual Values of Particulate Matter with 10microns in diameter

sSO₂, sNO₂ and sPM₁₀ = Standards of Ambient Air Quality of Oxides of Sulphur, Oxides of Nitrogen and Particulate Matter.

Table No.2.2: AQI values and Levels of Health concern (Source Kamath and Lokeshappa 2014)

Colour code	AQI values(When values in this range)	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 of the present study shows the PM₁₀ values were exceeded the national ambient air quality standards and the gaseous pollutants were within the limit.

- The PM₁₀ concentration in the study area varied between a maximum of 954µg/m³ and minimum of 75µg/m³ which is exceeded the standard limit.

- The SO_x Concentration is varied between a maximum of 60.81µg/m³ and minimum of 2.74µg/m³ which is within the limit.
- The NO_x concentration is varied between a maximum of 43.27µg/m³ and minimum of 4.71µg/m³ which is within the limit
- Air quality index is calculated for the selected stations of Davangere city. The following table no. 2.3 shows the average air quality index of the selected stations.

Table No. 2.3 AQI values

Sl. No	Stations	AQI	Remarks
1	Vidyanagar	38.16	Good
2	P.J Extension	55.47	Moderate
3	Shivakumar Badavane	39.33	Good
4	Clock tower	61.80	Moderate
5	K.R. Market	91.11	Moderate
6	Jaideva circle	137.44	Unhealthy for sensitive groups
7	Big bazaar	104.21	Unhealthy for sensitive groups
8	KEB circle	107.40	Unhealthy for sensitive groups
9	Gundi circle	85.84	Moderate
10	Mandakki bhatti	347.2	Hazardous
11	Sun steel fab	51.62	Moderate
12	Ramnagar	64.69	Moderate

IV. CONCLUSION

The samples are collected from February- April 2015 in the city. In the entire city the PM₁₀ concentration is exceeded the NAAQS limit and gaseous pollutants were within the limit. The air quality index in one station is 347.2 and the level of health concern is hazardous. The vehicular emission is mainly caused for the increase in particulate matter in residential as well as in commercial area. This study further recommend that communal consciousness shows a main rule in solving the air pollution setbacks, and continuous monitoring of ambient air in the city should be done so that the public can know the quality of air. Proper segregation of zones is required for the upcoming residential layouts from the industrial area.

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