

# Monitoring of SPM, SO<sub>2</sub>, NO<sub>2</sub> And Air Quality Index In Selected Areas of Davangere City During Rainy Season

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**Abstract-** The main aim of this project is to check the ambient air quality in Davangere city and to determine AQI in the Residential, Commercial, Industrial and Sensitive areas of the 13 selected locations of the Davangere city during rainy season. It has been observed that concentration of suspended particulate matter is more in these stations like PB road Aruna theatre, Old bus stand, Gandhi circle, Pooja international hotel, UBDT college and Bapuji Hospital were exceeds the standard limit of National Ambient Air Quality standards(NAAQS). The concentration of Sulphur dioxide and Nitrogen dioxide is within the NAAQS limit in all the stations. But Air Quality Index (AQI) values of the PB road old bus stand, Gandhi circle, Pooja international hotel, and Bapuji hospital stations were severely polluted and it is very unhealthy for the public and causes some various health problems.

**Keywords-** Suspended Particulate Matter, SO<sub>2</sub>, NO<sub>2</sub>, NAAQS, AQI.

## I. INTRODUCTION

Air is the very important factor in all the living beings on this planet earth. Without air no living beings can survive on this earth. A man can survive without a food in 3 days. But he cannot survive without a air in just five minutes. Normally a man requires 16.5 kg of air requires per day.

Specifically, focuses about pollutant in the urban communities need aid surpassing the Indian national to these territories would presented will bad contamination levels. The rapid population growth, industrialization Furthermore expanded vehicles alongside inappropriate usage for Ecological tenets aggravate those air contamination issue still additional worse.

Number of health problems will occur when the concentration of pollutants like sulphur dioxide, nitrogen dioxide and suspended particulate matter is exceeds the

limit. (Mainly chronic bronchitis, as thama problems, coughing etc) approximately 4-5 million new cases of chronic bronchitis related problems will comes in every year. And also report shows that high levels of a particulate matter are exposed in ambient air, 4-8% premature death will occur.

## II. AIR POLLUTION PROBLEMS IN INDIA

Air contamination in India is for the most part a caused from three sources to be specific Motor vehicles, Industries and a Domestic sources. The air contamination is principally packed in following ranges.

**Major cities:** The issue of air contamination is in major cities where the conspicuous well spring of air contamination is transport vehicles and little/medium scale industries. These cities incorporate Delhi, Bengaluru, Pune, Mumbai, Chennai, Hyderabad, Nagpur and Kanpur so on.

**Rural areas:** The indoor air contamination exists in rural areas where the primary well spring of air contamination is a domestic fuel utilized. Especially in rural areas cow waste, wood sticks, are utilized as fuel in family unit. The kitchens are with no legitimate ventilation bringing about working up of air contaminations in the houses.

## III. MATERIALS AND METHODOLOGY

### A. Study Area

Davangere city is situated at western part of South India and it is located about 260km from the capital city of Karnataka Bengaluru. It is positioned at the geographical center of the Karnataka state towards 14° 28' 00" N and 75° 55' 27" E. It is a calm and quite city in southern India attracted by many people due to industries, cotton business and domain important thing is due to availability of large fertile land. Davangere city is the district headquarters. As per the 2011 census, the city of population was 4,35,128. Due to the Rapid

development in urban areas causes pollution and also sudden increase in the industries and automobiles in the city has drastically increased the level of air contaminants. Many industrial belts have been located in and around Davangere city.

### B. Selection of Sampling Stations

Thirteen sampling stations were selected to determine the concentration of SPM, SO<sub>2</sub>, NO<sub>2</sub>, and also to calculate the air quality index of those stations. Out of these 13 sampling stations PB road Aruna Theatre, PB road Old bus stand, PB road Gandhi circle, PB road Pooja International Hotel, Vidyarthibhavan, Jayadeva circle stations were commercial cum traffic. UBDT college, Bapuji hospital, Kundwada Lake stations were sensitive. Ramanagara, Wire and Rope Industry were Industrial. And Vidyanagar, Anjaneya Badavane were residential.

### C. Parameters Considered

The parameters affecting the air quality and the air quality varies a widely. However, by keeping in mind the industrial activities, commercial and domestic activities in the study area and vehicular movement, Three air quality parameters such as Sulphur Dioxide(SO<sub>2</sub>), Nitrogen Dioxide(NO<sub>2</sub>) and project and also these three parameters were selected for establishing the Air Quality Index.

### C. BRIEF DESCRIPTION ABOUT INSTRUMENT: HIGH VOLUME AIR SAMPLER (HVAS)

**Introduction:** High Volume Air Sampler is the basic instrument used to monitor the ambient air quality and pollution. Pollution in urban areas, industrial areas, commercial areas, on the shop floor, near monuments and other sensitive areas. The high volume sampler is a fundamental tool for studies relating the impact of industrialization to the air environment, and for work relating diseases of the respiratory system to air pollution. In these samplers, using high efficiency filter paper measures the air borne particulates by passing air at a flow rate of 1.1 to 1.7 cubic meters per minute. The particles will be retained in the filter paper. The instrument measures the volume of air sampled, while the amount of particulates collected is determined by measuring the change in weight of the filter paper. To prevent the heavier settleable dust particles from reaching the filter, the air passage is designed. Hence a high volume air sampler measures the concentration of suspended particulate matter in the atmosphere. Often high volume air samplers are connected with absorbers, which would be sample for gaseous pollutants. Here the specific gases will be

absorbed by the necessary chemicals that would absorb when the air is passed, and the concentration of gaseous pollutants is determined by a chemical analysis of the absorbing solutions.



Fig1. Pictorial View of high Volume Air Sampler

## IV. RESULTS AND DISCUSSIONS

The air quality monitoring of the thirteen selected locations have been monitored in and around Davangere city is discussed in this chapter. The concentration of primary pollutants like Suspended Particulate Matter, Nitrogen Dioxide and Sulphur Dioxide were determined. The data and results are presented in tables and graphs for convenient of analysis. Based on the data and results documented discussions were made. Further AQI for the 13 selected areas, have been calculated and discussed in this chapter.

Table1: Concentration of Suspended Particulate Matter, Sulphur Dioxide, Nitrogen Dioxide and during Rainy Season

Sl. no	Locations	SPM μg/m <sup>3</sup>	SO <sub>2</sub> μg/m <sup>3</sup>	NO <sub>2</sub> μg/m <sup>3</sup>	AQI
1	PB road Aruna Theatre	177.70	19.19	25.32	481.6
2	PB road Old bus stand	493.15	20.68	53.61	113.14
3	PB road Gandhi circle	553.67	13.09	39.36	114.13
4	PB road Pooja international hotel	370.65	11.16	51.74	87.98
5	Vidyarthibhavan	146.60	15.17	21.92	39.88
6	Jayadeva circle	196.72	19.78	19.95	49.34
7	Ramanagara	86.33	32.71	37.64	25.29
8	Wire and rope industry	95.15	32.43	38.81	26.15
9	UBDT college	137.43	3.41	21.26	73.22
10	Bapuji hospital	299.43	12.05	21.70	137.31
11	Kundwada Lake	30.25	4.16	4.60	19.81
12	Vidyanagar	72.06	8.16	11.39	20.15
13	Anjaneya Badavane	74.53	11.0	12.38	22.16

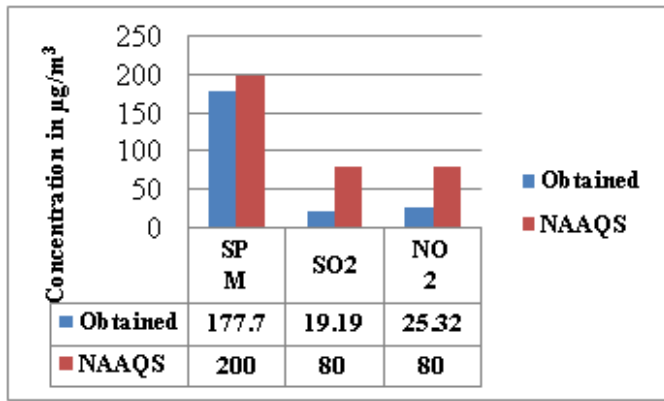


Fig2: Variation of Air Quality Parameter at PB Road Aruna Theatre

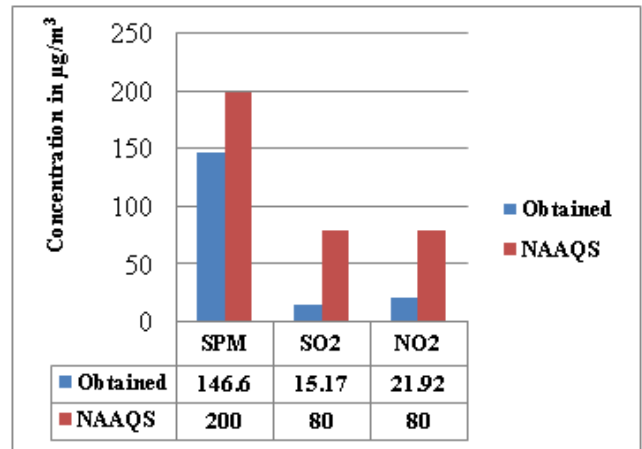


Fig5: Variation of Air Quality Parameter at PB Road Pooja International Hotel

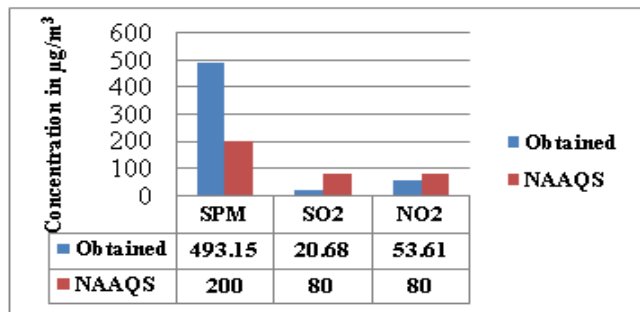


Fig3: Variation of Air Quality Parameter at PB Road Old Bus Stand

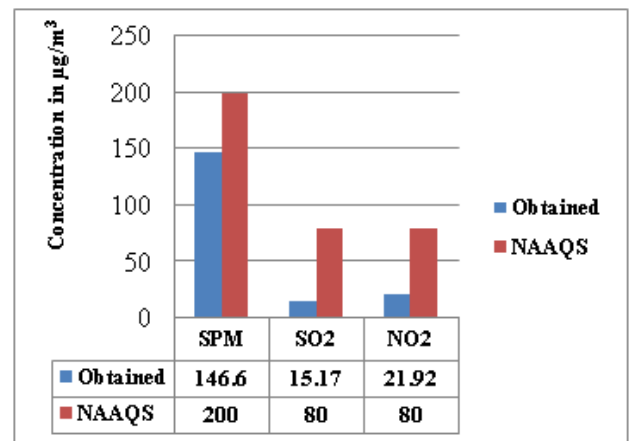


Fig6: Variation of Air Quality Parameter at Vidyarthibhavan

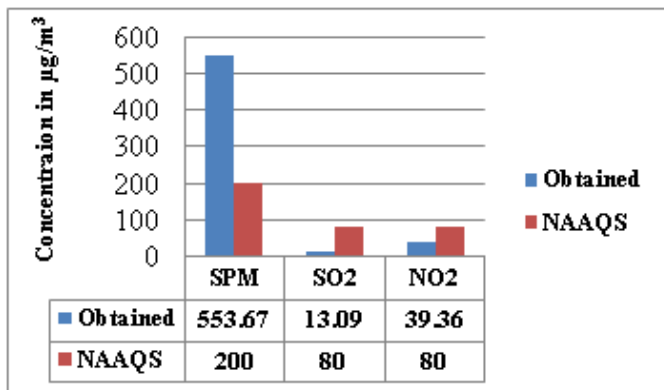


Fig4: Variation of Air Quality Parameter at PB Road Gandhi Circle

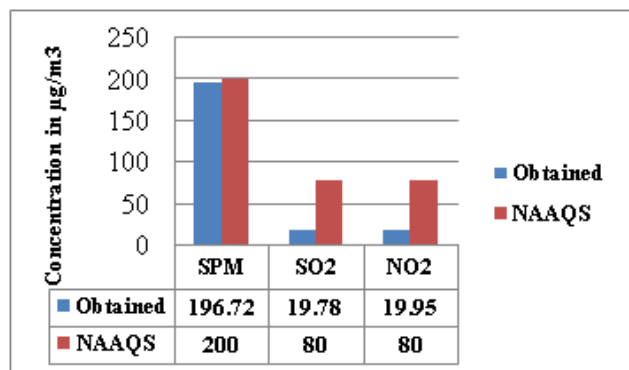


Fig7: Variation of Air Quality Parameter at Jayadeva Circle

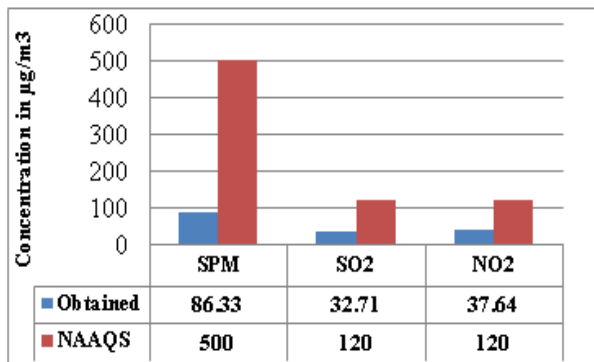


Fig8: Variation of Air Quality Parameter at Ramanagara

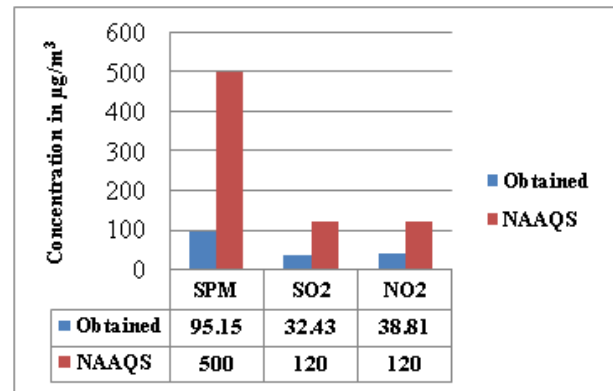


Fig 12: Variation of Air Quality Parameter at Wire and Rope Industry

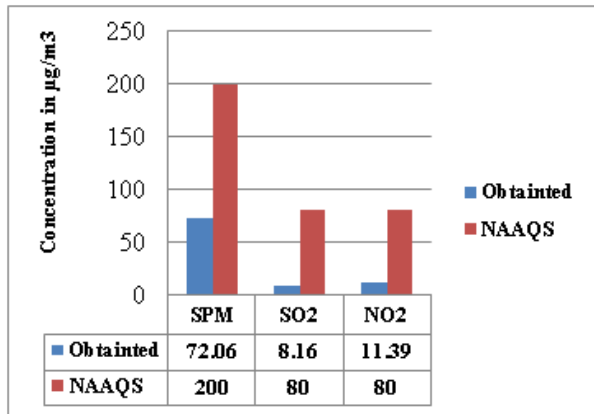


Fig9: Variation of Air Quality Parameter at Vidyanagar

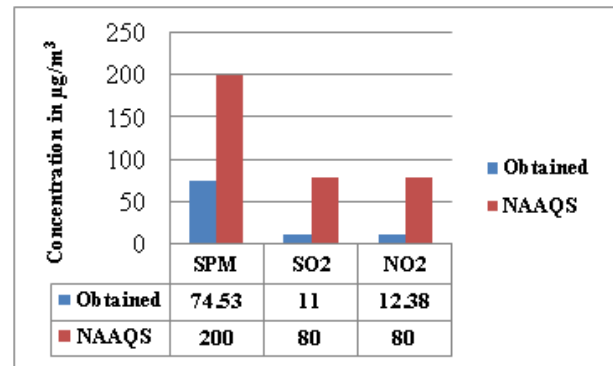


Fig 13: Variation of Air Quality Parameter at Anjaneya Badavane

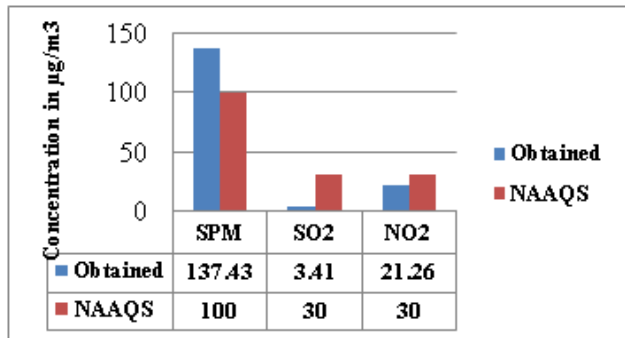


Fig10: Variation of Air Quality Parameter at UBBDT College

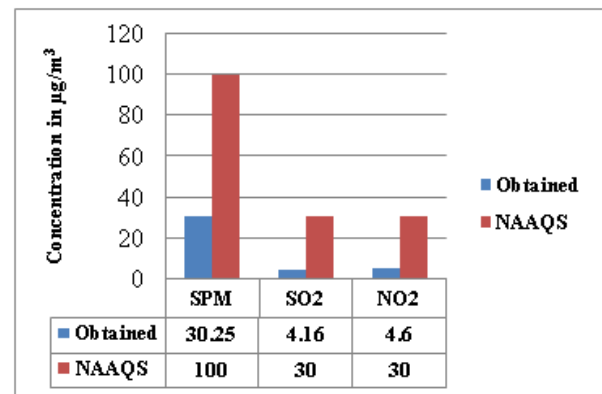


Fig 14: Variation of Air Quality Parameter at Kundwada Lake

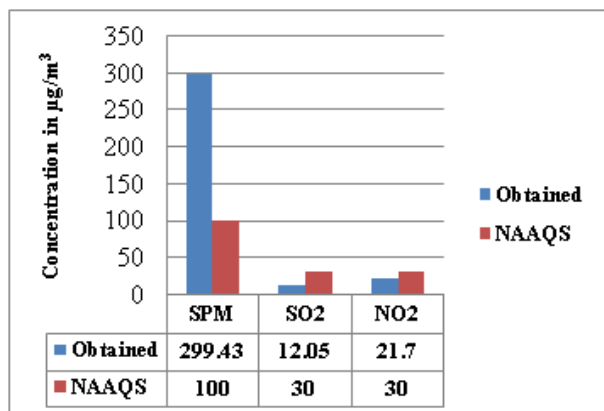


Fig11: Variation of Air Quality Parameter at Bapuji Hospital

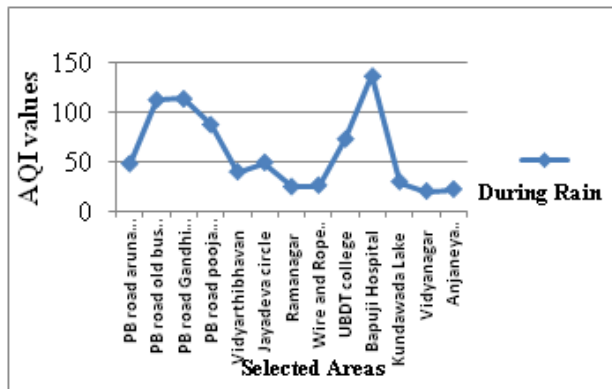


Fig15: Variation of AQI of the Selected Areas in Rainy Season

During rainy season, air quality index of the PB road Aruna theatre, Jayadeva circle, Vidyarthibhavan, Ramanagara, wire and rope industry is lightly air polluted and it can be accepted. Stations like PB road old bus stand, Gandhi circle and Bapuji hospital is severely polluted and it is very unhealthy for the public. Stations such as PB road Pooja international hotel and UBDT college is heavily air polluted and unhealthy for the public. Stations like Kundwada lake, Vidyanagar and Anjaneya Badavane air is good at these areas compared to other areas.

## V. CONCLUSION

1. Results reveals that Suspended Particulate Matter (SPM) concentration is more in these stations like PB road Old Bus Stand, Gandhi Circle, Pooja International Hotel, UBDT College and Bapuji Hospital stations were exceeds the standard limit of NAAQS (National Ambient Air Quality Standards) during rainy season and remaining stations were within the limit.
2. The Sulphur dioxide(SO<sub>2</sub>) and Nitrogen dioxide(NO<sub>2</sub>) concentration is within the permissible limit of NAAQS (National Ambient Air Quality Standards) in all the stations.
3. Air Quality Index (AQI) of the PB road Old Bus Stand, Gandhi Circle, Pooja International Hotel and Bapuji Hospital stations were severely polluted and it is very unhealthy for the public causes some various health problems.

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