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ANALYSIS OF PARTICULATE MATTER CONCENTRATION OF KALABURAGI CITY

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Abstract - *This study's primary goal is to evaluate the summer season PM concentration. Particulate matter concentration and average particle size were measured at the five locations in Kalaburagi that were mentioned, including PDA-College, Kapnoor Industrial region, Jagat Circle, Godutai Nagar, and Ecological Park, an eco-sensitive region. In stations with higher particle concentrations, such as Jagat Circle and Kapnoor Industrial Area, the standard limit of the NAAQS of All Stations has been found to be exceeded, and the average particle size is between 5.16 and 8.76 in all five stations.*

Key Words: Particulate Matter, Summer Time, Particulate Matter size, NAAQS.

1. INTRODUCTION

Air is a necessary resource for life to exist, along with water and soil. Clean air is one of the most important essential necessities for enhancing human health and wellbeing. This changes the composition of the atmosphere and has a detrimental impact on the biotic environment. Pollutant levels are determined by polluter emission levels, as well as by the atmosphere's ability to absorb or spread such emissions.

Particles (minor fragments) of solids or liquids in the air are what make up particle pollution, also known as particulate matter (PM). These particles might consist of: Dust, dirt, soot, and smoke liquid drops.Some particles are large enough (or seem black enough) to be seen; smoke is one such example. Some are invisible in the air because they are so little.

1.1 SCOPE OF THE STUDY

The study was done in Kalaburigi city years ago, but the population of the city is increasing every day. A city's expanding population may have a substantial impact on air quality due to factors including increased emissions, vehicle emissions, industrial activities, energy consumption, waste generation, urban development, deforestation and land use changes. The ambient air quality situation in the region is to be investigated in depth as it is a key worry to care for the health of the people staying in the area since there will be a radical difference in the prior study and its results when compared to today.

1.2 Objectives

- To determine the particle matter (PM10) concentration
- To studying the distribution of particles based on their size fractions, such as PM10 (particles with a diameter of 10 micrometers).
- For the purpose of comparing measured levels to NAAQS standards.
- To find out the some of the major sources.

SOURCES AND EFFECTS OF PARTICULATE MATTER

Small fluid drips and tiny particles make up particulate matter. Due to small size, these particles are not stopped by the body's normal defenses in the nose and upper lungs but instead go deep into the lungs , where they may become trapped and cause disruption.

- **Sources of suspended particulate matter PM**
  - Dust coming from building destinations, landfill, farming
  - Dust blown from open terrains
  - Smoke from fierce blazes and waste consuming
  - Motor vehicles
- **Impacts of particulate_matter PM**
  - Difficulty in relaxing
  - Chest torment
  - General respiratory inconvenience
  - Sore throat
  - Lung tissue harm
  - Cancer
  - Asthma
  - Premature demise

1.3 METEOROLOGICAL PARAMETER:

The following factors are in charge of how the climatic variables impact the distribution and neutralization of air pollutants: Wind, Turbulence, Temperature ,Plume behavior , Humidity, Precipitation , Fog, Mist etc.

2. STUDY AREA

Kalaburagi City, in northern Karnataka, is situated between latitudes 17°.12' and 17°.46' north and 76°.04' and 77°.42' east. The city of Kalaburagi, sometimes known as Kalaburagi, is located in the Indian state of Karnataka. It is biggest city in North Karnataka's Kalyana Karnataka region and serves as the district's administrative hub. Hyderabad is 220 kilometers away from Kalaburagi, while Bangalore, the state capital, is 623 kilometers away. The city of Kalaburagi, which is run by a municipal corporation, is the part the Kalaburagi Urban Region

Sampling stations:

- Pda College
- Kapnoor Industrial Area (Industrial Area)
- Jagat Circle (Commercial Area)
- Godutai Nagar (Residential Area)
- Ecological Park (Eco Sensitive Area)

Fig 1. Study Area

3. MATERIALS AND METHODOLOGY

Particulate Matter Concentration:

- **Method :** Gravimetric Method
- **Equipment :** High Volume Sampler
- **Filter Paper:** Whatman Filter Paper (GF/A)

Calculation

Wfin. – Wint. x 106 / V = C of PM µg/m³

Where as,

- C = Conc.of PM10, in µg/m³.
- Wfin. = final filter weight in grams
- Wint. = Filter's initial weight in grams
- 106 = G to G conversion
- V = vol. of sampled air

Particulate Matter Size Analysis :

- **Method:** Hydrometer Analysis
- **Equipment :** Hydrometer
- **Procedure** :When using the hydrometer, fill the jar with the sample liquid. Place the hydrometer in the jar and quickly swirl it around to remove the air bubbles. Once the hydrometer has settled, take the reading for 8 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, and 24 hours from the appropriate scale.

4. RESULTS

The investigation of Particulate Matter concentrations and size distribution at five different locations is what led to the results that were presented

(Values in µg/m³)

Station Name	March	April	May	June	July
Pda College (Station 1)	30	31	27	36	32
Kapnoor Ind. Area (Station 2)	87	94	98	90	86
Jagat Circle (Station 3)	70	71	62	60	70
Godutai Nagar (Station 4)	65	64	67	71	60
Ecological Park (Station 5)	45	33	36	29	32

The Five stations are:

- Pda College(Station 1)
- Kapnoor Industrial Area (Station 2)
- Jagat Circle (Station 3)
- Godutai Nagar (Station 4)
- Ecological Park (Station 5)

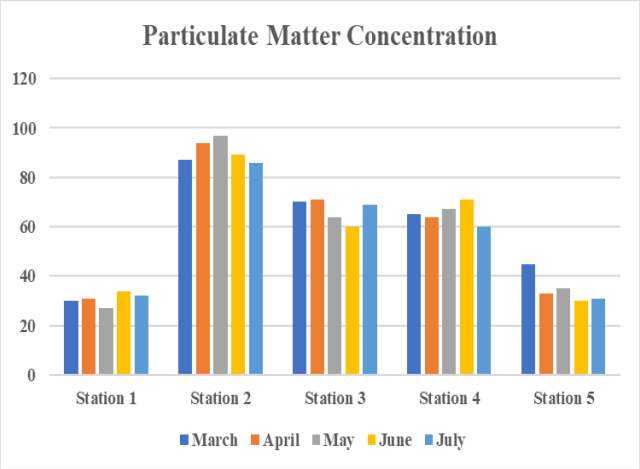

Fig 2. Monthly Average Concentration Of PM

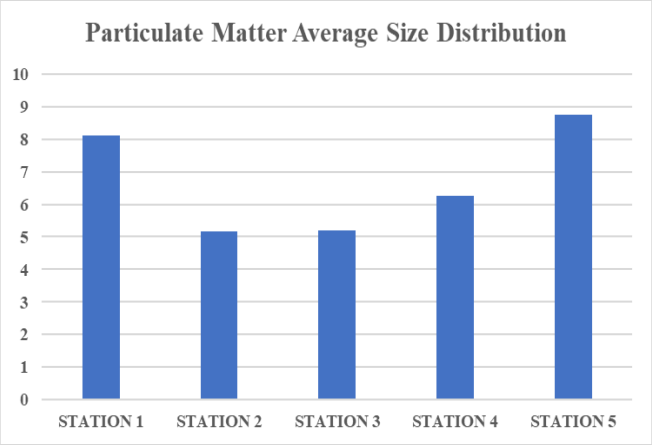

Fig 3. The Average Size Of Particulate Matter

According to measurements taken from March to July 2023 at all stations, the particulate matter (PM10) concentration was between 27 and 36 µg/m^3 at Station 1 and between 86 and 98 µg/m^3 in Station 2. In addition, it varies between 60 and 71 µg/m^3 at Station 3, and between 29 and 45 µg/m^3 and 60 and 71 µg/m^3, respectively, at Stations 4 and 5. They are all under the NAAQS-permitted range of 100 µg/m^3. In all sites, the average particle size ranges from 5.16µ to 8.76µ.

5. CONCLUSION

The standard limit of the NAAQS has been found to be exceeded in locations with higher particulate matter levels, such as Jagat Circle , Kapnoor Industrial Area. The concentrations of Particulate Matter in all places were determined to be satisfactory to moderate, and when it comes to Vehicles and Industrial activities are the main sources of particulate matter in Kalaburagi City.

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