

# AIR POLLUTION IMPACT ON ENVIRONMENT IN KOZHIKODE CITY

Sinam Shirin<sup>1</sup>, Harsha P<sup>2</sup>

<sup>1</sup>M. tech Environmental Engineering Student, KMCT CEW, Kerala, India

<sup>2</sup>Assistant Professor, Dept. of Civil Engineering, KMCT CEW, Kerala, India

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**Abstract** - The strong demographic explosion, the production of waste from urban areas, the automobile and industries largely exploded and resulted in the increase in air pollution. The man-made activities are the leading root for the damage of air quality and are the donors of anthropogenic oxides. This project studies to a greater extent, on the exit of dangerous air problems in the city of Kozhikode. This thesis with the help of Pollution Control Board (PCB) also includes the various evolution of air in Kozhikode city in the past and in the current scenario. It also comprises of an air quality assessment based on the covid19 lockdown scenario as well as arranging the data based on daily activities.

**Key Words:** Pollution, Air Pollutants, Air Quality Index, Vehicular Emission, Pandemic

## 1. INTRODUCTION

Air pollution can be explained as the presence of excess amount of chemicals, oxides, particulate matter, or other harmful materials in the wide range of atmospheres that cause harm or discomfort to humans or other living organisms and may even harm the natural environment. Pollutants are mainly classified into primary and secondary. And again, air pollution can be classified into anthropogenic and non-anthropogenic origin. World Health Organization (WHO) has a proper definition for the air pollution, "Substances that put into air by the interest of mankind into concentration sufficient to cause very harmful effect to human health, vegetables, properties or interfere with enjoyment of human property".

Air quality and pollution is one of the greatest threats to the planet, fueled primarily by the rapid population growth, continuous hike in energy consumption, deforestation, and increases in the vehicle density, especially in the urban cities. The wave of lockdowns in India, especially in major cities, following the covid19 pandemic has forced the people to stay at their own homes. All transport services such as roads, railways and air transport were disrupted to run and were not allowed to operate with an anomaly of essential and emergency systems. Thus, promoting to a decrease in traffic, industrial activities and other pollution transmitting works. Thus, ultimately to the decline in the air pollution for a small amount.

## 1.1 Scope

An air pollutant is mainly in the characteristics of a solid (large or small molecules), liquid or gas. Air Pollution may be set up from a natural or anthropogenic source or from both origins. Air pollution causes health issue to living beings, damage of materials and ecosystems, and poor visibility. Climate impact or change is characterized by the lengthy alteration of the weather and the temperature in the atmosphere. The biomass and fossil fuels that cause air quality deterioration can also have affected the warming of the earth's atmosphere mainly by the release of greenhouse gases (GHGs). This evaluation is almost based on the air pollutants that effect environment in the wide range.

This research interest come up with increasing the assess of response to air pollution in our country to address this universal problem responsibly. Pressure groups can use this research activity data to enforce certain environmental and industrial agendas on politicians and political campaigns. Places with soaring levels of air quality damage should get entangled in air pollution research to provide health policy founders with baseline data for future action. This project therefore makes it possible to collect, then to assemble and issue technical and statistical data relating to air pollution. And mainly to provide technical assistance, support and advice to the Pollution Control Board (PCB) Committee. This project work thus suggests possible prevention and control program and abatement of air pollution. This can help many countries motivate academics and researchers to create research venues to monitor the air quality and level at the national level of air pollution and can be seen a step forward that must be taken by all countries for an adequate climate and standard of living.

## 2. MATERIAL AND METHODOLOGY

### 2.1 Air Pollutants

The air borne emitted from countless factories or industries and are a cause of major concern. These discharges are of three vital forms, they are solid particles, liquid and gaseous emissions. Thus, air pollutants can be in the form of solid particles, liquid droplets, or gases. They can be natural or manmade. Major air pollutants discussed are particulate matter, oxides of nitrogen, oxides of Sulphur, carbon monoxide, ammonia and ground level ozone.

**Table -1:** Air Pollutants

PARAMETER	ORIGIN	HEALTH CONSEQUENCES
Particulate matter	Industries, vehicles	Eye irritation, Cancer, cardiovascular damage
NO <sub>x</sub>	Vehicular emission	Respiratory reactions
SO <sub>2</sub>	Petrol and coal factory	Respiratory reactions
Oxides of carbon	Vehicular emission	Heart impairment
Ammonia	Agriculture, sewage	Skin distress
Ozone	vehicle	lung damage, eye and throat irritation

### 2.2 Study Area

The rapid development in the urban Kerala has resulted in a tremendous increase in the number of industries and motor vehicles. Vehicles are the main root of urban air quality damage and are increasingly main contributors of anthropogenic oxides. Industries also contribute significantly to environmental pollution. The city of Kozhikode is the selected area

**Table -2:** Study Area

District	Site
Kozhikode	Palayam bus stand
Kozhikode	Children’s Hospital
Kozhikode	Nallalam

### 2.3 Methodology

The main parameters accumulated for the air quality analysis from Pollution Control Board (PCB) are are particulate 10 (PM10), particulate 2.5 (PM2.5), SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub>, CO<sub>x</sub> and ozone. The area chosen for the thesis includes Kozhikode Palayam Bus Stand, Kottam Children's Hospital and Nallalam. Plot different graphs and diagrams.

Data collection is executed on parameters PM2.5, PM10, SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>x</sub>, O<sub>3</sub>, NH<sub>3</sub> from PCB Kozhikode during February 2022. The initial visit to the PCB befell in December 2021. Data of the years 2019, 2020 and 2021 are collected.

Data collection and analyses were based on covid-19 lockdown scenario. Data is grouped into pre lockdown, lockdown and post lock down sets. Again, the data scrutinized based on a diurnal basis. The overall analysis is

mainly based on vehicle density assuming vehicle density is much large and industrial activities.

Pre lockdown data 2019 will be clustered with respect to seasons to see impact of seasons on air. The above data is further clustered with respect to time of the day (8am, 4pm, 12am) to see the impact of vehicle density and industrial activities. The same will be verified for containment and post-containment in 2020 and 2021 respectively. Graphs of each parameter is made separately under each cluster heading.



**Fig -1:** Pollution Control Board-Kozhikode



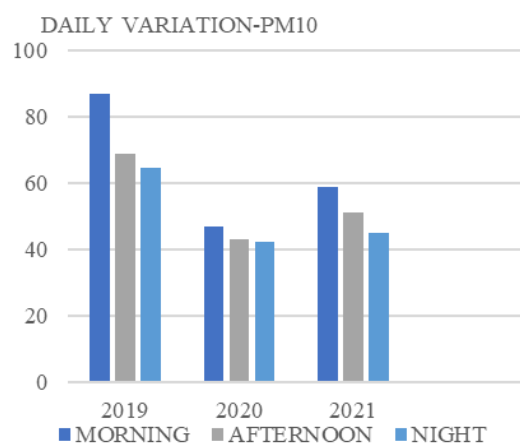
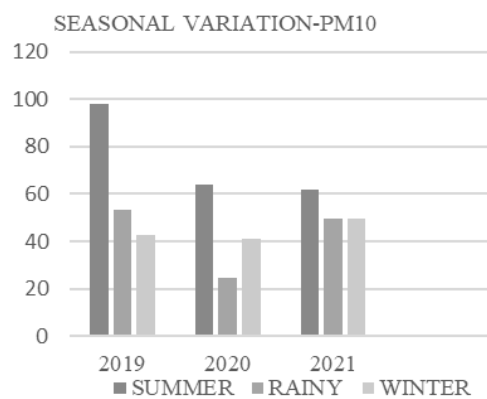
**Fig -2:** Site visit-Kottam Hospital

**Table -3:** Air Quality Standards from CPCB site

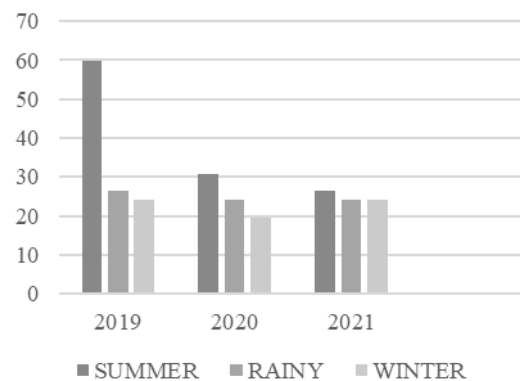
NATIONAL AMBIENT AIR QUALITY STANDARDS					
PARAMETER	UNIT	PERMISSIBLE VALUE			
		RESIDENTIAL AND INDUSTRIAL AREA		ECOLOGICALLY SENSITIVE AREA	
		Annual	24hrs	Annual	24hrs
PM2.5	µg/m <sup>3</sup>	40	60	40	60
PM10	µg/m <sup>3</sup>	60	100	60	100
SO <sub>2</sub>	µg/m <sup>3</sup>	50	80	20	80
NO <sub>x</sub>	µg/m <sup>3</sup>	40	80	30	80
CO <sub>x</sub>	µg/m <sup>3</sup>	2	4	2	4
O <sub>3</sub>	µg/m <sup>3</sup>	100	180	100	180
NH <sub>3</sub>	µg/m <sup>3</sup>	100	400	100	400

### 3. CALCULATIONS

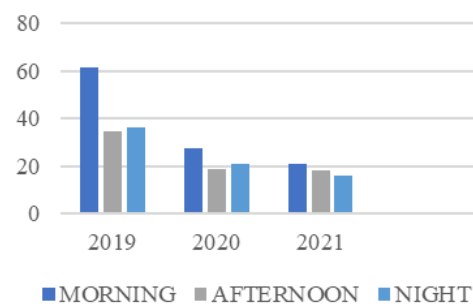
#### 3.1 Graphical Representation



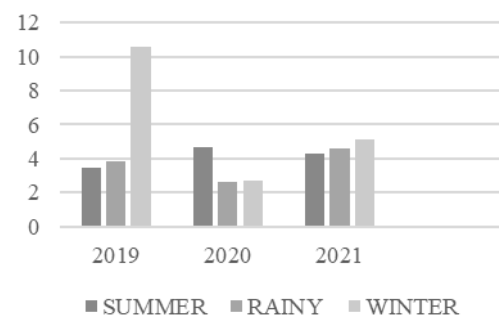
SEASONAL VARIATION-PM2.5



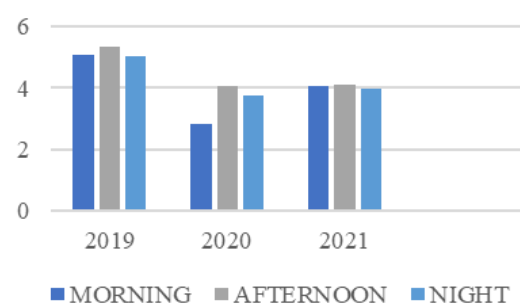
DAILY VARIATION-PM2.5



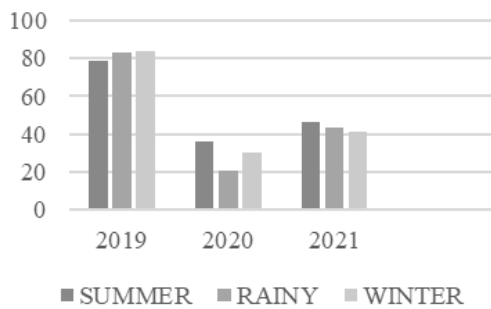
SEASONAL VARIATION-SO<sub>2</sub>



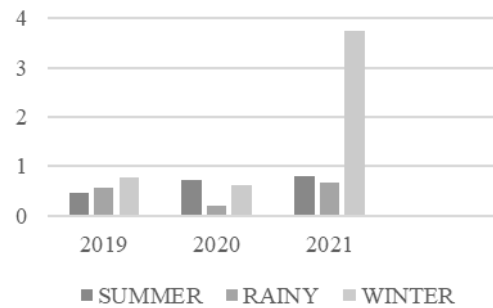
DAILY VARIATION-SO<sub>2</sub>



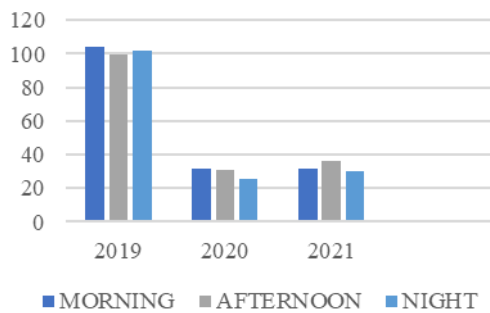
SEASONAL VARIATION-NOx



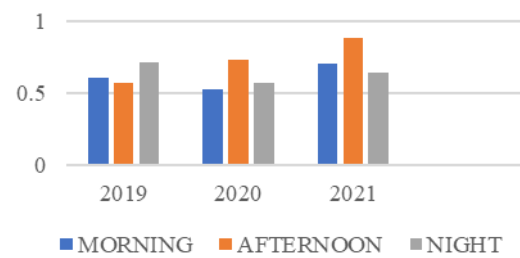
SEASONAL VARIATION-CO



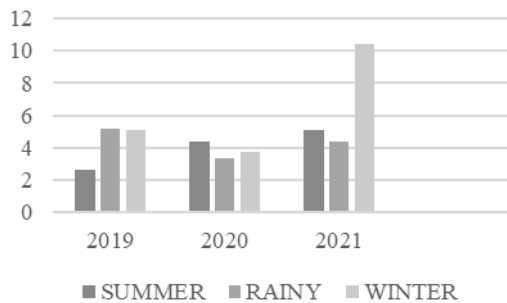
DAILY VARIATION-NOx



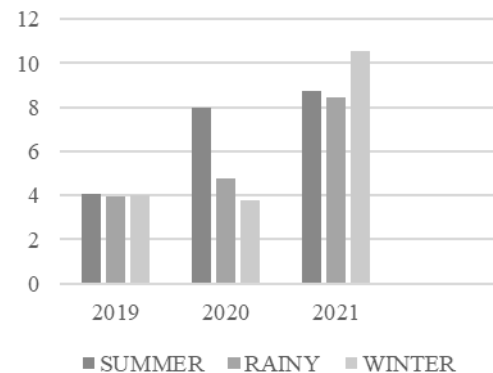
DAILY VARIATION-CO



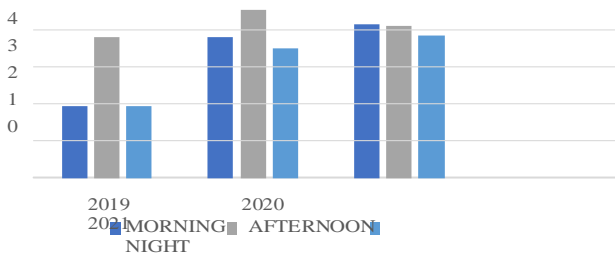
SEASONAL VARIATION-NH<sub>3</sub>



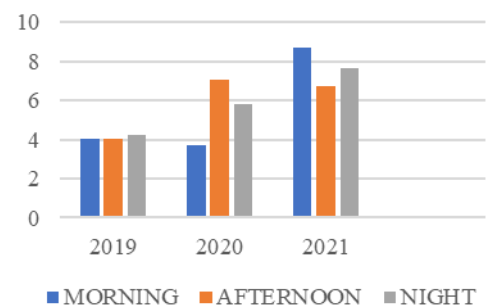
SEASONAL VARIATION-O<sub>3</sub>



DAILY VARIATION-NH<sub>3</sub>



DAILY VARIATION-O<sub>3</sub>



#### 4. CONCLUSION

Air pollution is a major threat in urban areas and should manage with almost as much care. From the study, Kozhikode city shown mixed results. PM10 emissions gradually decreased during lockdown and gradually increased with a normal lifestyle. Summer season had shown greater emission when compared to other seasons. PM2.5 shows that the summer season had a higher emission. Fewer problems during the lockdown period compared to the previous year. SO<sub>2</sub> and NO<sub>x</sub> emissions also decreased during the lockdown. Thus, concluded that vehicles and industries have a great hand on clean and fresh air.

- Encourage the use of electric and ecological vehicles
- Industries should reduce their reliance on coal power
- Switch to renewable source of energy

#### ACKNOWLEDGEMENT

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