



CAUSES, CONSEQUENCES AND VARIOUS CONTROL MEASURES OF AIR POLLUTION AND EXTENT OF AIR POLLUTION IN RAJAHMUNDRY

V.Hema Sri¹, V.Prabhat¹, S.Divya¹, V.Devi Anusha¹, U.C.Praveen¹
and M.Leela Krishna²

¹UG students, Department of Civil Engineering, Aditya Engineering College (A),
Surampalem

²Assistant professor, Department of Civil Engineering, Aditya Engineering College (A),
Surampalem

ABSTRACT

Air Pollution occurs when gases, dust particles, fumes (or smoke) or odour are introduced into the atmosphere in a way that makes it harmful to humans, animals and plant. Air pollution threatens the health of humans and other living beings in our planet. It creates smog and acid rain, causes cancer and respiratory diseases, reduces the ozone layer in atmosphere and contributes to global warming. In this Industrial age, Air Pollution cannot be eliminated completely, but steps can be taken to reduce it. The government has developed, and continues to develop guidelines for air quality and ordinances to restrict emissions in an effort to control air pollution. On an individual level, we can reduce our contribution to the pollution problem by carpooling or using public transportation. Additionally, buying energy-efficient light bulbs and appliances or otherwise reducing our electricity use will reduce the pollutants released in the production of electricity, which creates the majority of industrial air pollution.

Keywords: Plastic bottles; masonry wall; building construction; compressive strength; temperature susceptibility; environmental hazard.

1. INTRODUCTION

Air Pollution occurs when gases, dust particles, fumes (or smoke) or odour are introduced into the atmosphere in a way that makes it harmful to humans, animals and plant. Air pollution threatens the health of humans and other living beings in our planet. It creates smog and acid rain, causes cancer and respiratory diseases, reduces the ozone layer atmosphere and contributes to global warming.

In this industrial age, air pollution cannot be eliminated completely, but

steps can be taken to reduce it. The government has developed, and continues to develop, guidelines for air quality and ordinances to restrict emissions in an effort to control air pollution.

Air Pollution is the introduction into the atmosphere of chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment. A substance in the air that can be adverse to humans and the environment is



known as an Air Pollutant. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made.

Pollutants can be classified as Primary or Secondary Pollutants. Usually, primary pollutants are directly produced from a process, such as ash from a volcanic eruption, the carbon monoxide gas from a motor vehicle exhaust or sulphur dioxide released from factories into the atmosphere and it increases the toxicity. Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. An important example of a secondary pollutant is ground level ozone – one of the many secondary pollutants that make up photochemical smog. Some pollutants may be both primary and secondary: that is, they are both emitted directly and formed from other primary pollutants .

2. Literature Review:

- Stationary sources include smoke stacks of fossil fuel power stations, manufacturing facilities (factories) and waste incinerators, as well as furnaces and other types of fuel- burning heating devices. In developing and poor countries, traditional biomass burning is the major source of air pollutants; traditional biomass includes wood, crop waste and dung.
- Mobile sources include motor vehicles, trains (particularly diesel locomotives and DMUs), marine vessels and aircraft.
- Controlled burn practices in agriculture and forest management. Controlled or prescribed burning is a technique sometimes used in forest management, farming or greenhouse gas abatement. Fire is a natural part of both forest and grassland ecology and controlled fire can be a tool for foresters. Controlled burning

stimulates the germination of some desirable forest trees, thus renewing the forest.

- Fumes from paint, hair spray, varnish, aerosol sprays and other solvents. These can be substantial; emissions from these sources were estimated to account for almost half of pollution from volatile organic compounds in the Los Angeles basin in the 2010s.
- Waste deposition in landfills, which generate methane. Methane is highly flammable and may form explosive mixtures with air. Methane is also an asphyxiant and may displace oxygen in an enclosed space. Asphyxia or suffocation may result if the oxygen concentration is reduced to below 19.5% by displacement.

3. EFFECTS OF AIR POLLUTION

Air Pollution is harmful to our health, and it impacts the environment - reducing visibility and blocking sunlight, causing acid rain, and harming forests, wildlife, and agriculture. Greenhouse gas pollution, the cause of climate change, affects the entire planet.

3.1 Harming Human Health:

According to the World Health Organization, an estimated seven million people die each year from air pollution. More than 4,000 people died in just a few months due to a severe smog event that occurred in London in 1952. Ground-level ozone causes muscles in the lungs to contract, making it difficult to breathe. Exposure to high ozone levels can cause sore throat, coughing, lung inflammation, and permanent lung damage. Symptoms from short term exposure typically resolve quickly, but long term exposure is linked to serious illness and disease in multiple body systems. Children, the elderly, and people with ongoing illnesses are more vulnerable to air pollution than other groups. Urban populations are also at



greater risk due to high concentrations of pollution within cities. Check the current air quality in your area to determine if you should take precautions such as reducing or avoiding outdoor activity. While modern developments have made life easier for us in some ways, our environment and our health are suffering.

3.2 Othma

Though it isn't a direct cause of asthma, air pollution can increase the frequency and severity of asthma attacks. Excessive ozone and particulate pollution causes inflammation of the respiratory tract. During an asthma attack, the airways are so swollen from inflammation that air struggles to

move through them. A person having an asthma attack is not receiving the oxygen their body needs to function, which can lead to coughing, wheezing, and blue fingertips. Asthma can usually be managed with medication, but in more severe cases a person must seek immediate medical treatment.

3.3 Bronchitis

Like asthma, bronchitis is an inflammation of passages in the lungs, but it includes more mucus production and heavy coughing. Chronic bronchitis is more common for people who live near power plants and factories or in cities, where they are exposed to more pollutants in the atmosphere. Highly industrialized nations, like Ireland and the United Kingdom, have the highest number of deaths due to respiratory diseases per year. Prolonged bronchitis can lead to other diseases, like Chronic Obstructive Pulmonary Disease (or COPD), which can cause premature death, particularly in those who smoke.

4. AIR QUALITY INDEX

An air quality index (AQI) is used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast

to become. Public health risks increase as the AQI rises. Different countries have their own air quality indices, corresponding to different national air quality standards.

4.1 Air Quality Index in India

The National Air Quality Index (AQI) was launched in New Delhi on September 17, 2014, under the Swachh Bharat Abhiyan. The Central Pollution Control Board along with State Pollution Control Boards has been operating National Air Monitoring Program (NAMP) covering 240 cities of the country having more than 342 monitoring stations. An Expert Group comprising medical professionals, air quality experts, academia, advocacy groups, and SPCBs was constituted and a technical study was awarded to IIT Kanpur. IIT Kanpur and the Expert Group recommended an AQI scheme in 2014. While the earlier measuring index was limited to three indicators, the new index measures eight parameters. The continuous monitoring systems that provide data on near real-time basis are installed in New Delhi, Mumbai, Pune, Kolkata and Ahmedabad. There are six AQI categories, namely Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe. The proposed AQI will consider eight pollutants (PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, and Pb) for which short-term (up to 24-hourly averaging period) National Ambient Air Quality Standards are prescribed. Based on the measured ambient concentrations, corresponding standards and likely health impact, a sub-index is calculated for each of these pollutants. The worst sub-index reflects overall AQI. Likely health impacts for different AQI categories and pollutants have also been suggested, with primary inputs from the medical experts in the group.

5. CAUSES OF AIR POLLUTION IN RAJAHMUNDRY

The various causes of air pollution in Rajahmundry are as follows

5.1 INDUSTRIAL EMISSIONS: There are a number of industries and plants in Rajahmundry as well as at the outskirts of the city that releases harmful emissions into the air. The Major industries causing pollution are as follows-

1. GVK Industries Limited
2. Vemagiri Power Generation Limited
3. International Paper APPM Limited
4. AP Industrial Machinery (P) Limited
5. Coastal Papers Limited
6. Coastal Gases and Chemicals (P) Limited
7. Sami Agro Products (P) Limited
8. Sir Arthur Cotton Modern Rice Mill
9. Sri Lakshmi Srinivasa Modern Rice Mill
10. Sri Luxmi Tulasi Agro Paper (P) Limited
11. And Many More Small, Medium and Large industries.

5.2 VEHICULAR POLLUTION

Day by Day, Number of Vehicles is increasing everywhere which also pollutes the environment. Carbon Monoxide is released from vehicles which pollute the atmosphere and this gas is very much harmful for our health.

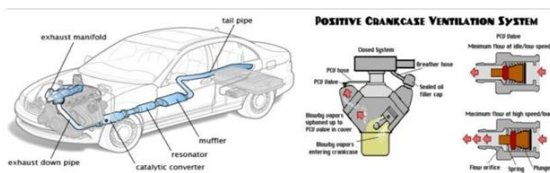


Fig.1 Car

5.3 CONSTRUCTION DUST

Rajahmundry is a city constantly redeveloping itself, expanding and improving its infrastructure. However, the cost of this is the soot and cement (smaller

particles) and grit and wood (larger particles) that are released into the environment.

5.4 AIR (PREVENTION AND CONTROL OF POLLUTION) ACT

The Air (Prevention and Control of Pollution) Act, 1981 is an Act of the Parliament of India to control and prevent air pollution in India. The law was amended in 1987. This was the first attempt by the government of India to combat air pollution.

6. PROCEDURE OF OBTAINED RESULTS

6.1 BAG HOUSE COLLECTOR

Bag House Dust Collectors use long, cylindrical bags (or tubes) made of fabric to filter dust particles out of the airstream. The dirty air enters the dust collector and is directed to the filters of the bag house. Dirty air passes through the bags where the dust particulate is collected outside the filter while clean air passes through the filter. The clean air is released into the environment or recirculated back into the facility.

Most bag houses have a filter clean system of one type or another. There are three common types of filter cleaning systems.

- **Shaker System:** This is the most basic filter cleaning system and typically uses a motor to shake the dust particulate off the outside of the bags.
- **Reverse-Flow:** This utilizes a fan that continuously moves around and blows air into the center of a bag, which forces the dust off the outside of the bag.

- **Pulse Jet Filter:** This method shoots a blast of compressed air down the center of a bag and forcibly blasts the dust off the outside of the bag.

In all cases, once the dust is off the bag, it should end up in the hopper, where it will ultimately be deposited into a container of choice.

6.2 WORKING OF BAGHOUSE DUST COLLECTOR

Baghouse dust collectors and cartridge dust collectors are two common types of industrial air cleaning systems that provide numerous benefits to the well-being of a facility and those working in it. A few benefits of baghouse and cartridge dust collectors include:

- Clearing the air
- Improving employee efficiency
- Increasing employee retention
- Ensuring a safe working environment
- Reducing equipment maintenance costs

6.3 TYPES OF BAGHOUSES

Generally, all bag houses have a tube sheet, which the bags attach to. They also have an inlet for dirty air and an outlet for clean air. Then there's an opening at the bottom for collected dust to drop out. The location of these features depends on the type of bag house. The main differences between types of bag houses are how they clean the bags.

6.3.1 SHAKER BAGHOUSES

A shaker bag house cleans the bags by mechanically shaking them. The bags usually hang from the top of the unit and attach to the tube sheet at the bottom. In this type of system, air

typically enters from the bottom. The system pulls the air through to collect dust on the inside of the bags. Clean air then exits at the top while collected dust remains inside of the bags.

To clean the bags, the airflow must first be shut off. Then the hanging mechanism shakes the bags to get rid of the dust, which drops out the bottom. These are not the most efficient types of baghouses and can be high-maintenance. Yes, the design is simple and does not require compressed air or complicated supports for the bags. However, damage to the bags can occur from the mechanical shaking mechanism.

6.3.2 REVERSE AIR BAGHOUSES

In a reverse air filter bag house like our BRF, dirty air enters the collector and dust collects on the outside of the bags, which are supported by a metal cage to keep the air pressure from collapsing them. Steady air circulation continuously pulls air through the filter bags. For cleaning, a fan rotates over the bags, blowing reverse air into them to remove dust.

This type of reverse air baghouse generates a lower pressure than the compressed air pulses of a pulse jet. This decreases wear and tear on the bags and saves on the cost of compressed air. They are usually very cost-efficient and when used within the design parameters, they are also very effective. Also, this type of reverse air bag house can continue running while cleaning occurs.

An older type of bag house, also sometimes referred to as reverse air, collects dust on the *inside* of the bags. Then it cuts off the inflow of dirty air and uses a reverse flow of clean air. This partially collapses the bags, which also removes the dust. These

types of bags have rigid rings that allow them to flex but not collapse completely, or “pancake”.

These types of reverse air bag houses have to be taken offline for cleaning. But sometimes they are divided into compartments so one section at a time can be cleaned.

6.3.3 PULSE JET BAGHOUSES

A pulse jet bag house design is somewhat similar. Metal cages support the bags and hang from a tube sheet at the top of the bag house. Dust and air enter and dust collects on the outside surface of the bags, not the inside. Bursts or pulses of compressed air clean the bags. These travel down the length of the bag and dislodge the dust. Because the pulse of air travels very quickly down the bags, the baghouse is cleaned without taking it offline. This allows them to operate more efficiently since the system removes dust from the bags at more regular intervals. The downside to the pulse jet bag filter design is the higher pressure and expense of compressed air. These both add to operating costs.

6.3.4 FILTER REPLACEMENT

One thing that is a major headache for owners of any type of bag house: replacing the bags. This is usually a dirty, messy, and time-consuming job. It also requires the collector to be offline for a considerable period of time. It often involves working in an enclosed space. Mechanisms for attaching the bags to the tube sheets vary widely. It can be a very involved process, especially when using cages. Some companies installing new dust control equipment choose a cartridge filter collector. This is because vertical

collectors are easy to change and do not involve issues with confined spaces.

For existing bag houses that need frequent bag changes, a pleated filter bag is an option that should be considered. These have a much larger surface area and last much longer than traditional bags, which mean less frequent changes. Also, pleated filter bags do not require cages, which greatly simplify the changing process.

6.3.5 SMOG FREE PROJECT

SMOG FREE PROJECT is a campaign for clean air led by Daan Roosegaarde to reduce air pollution and provide an inspirational experience of a clean future, including a series of urban innovations such as the SMOG FREE TOWER which provide a local solution of clean air in public spaces. It is combined with workshops with governments, students and the clean-tech industry to work together and make a whole city smog free. Recent SMOG FREE PROJECTS campaigns have been launched in South Korea, China, the Netherlands, Mexico, and Poland. Daan Roosegaarde: "We are on a mission for clean air".



Fig.2 BAGHOUSE COLLECTORS

6.3.6 SMOG FREE TOWER

The SMOG FREE PROJECT is a long term campaign for clean air in which Daan Roosegaarde and his team of experts have created the world's first smog vacuum cleaner. The 7-meter tall SMOG FREE TOWER uses patented positive ionisation technology to produce smog free air in public spaces, allowing people to breathe and experience clean air for free. It is equipped with environment-friendly technology, cleans 30,000 m³ per hour and uses a small amount of green electricity. The SMOG FREE TOWER provides a local solution for clean air such as in parks. The function of the SMOG FREE TOWER has been validated by the results compiled by the Eindhoven University of Technology. The recent SMOG EATING BILLBOARD is launched at UDEM University in Mexico by students in collaboration with visiting professor Daan Roosegaarde which provides clean air for 104,000 people each day.

6.4 CATALYTIC CONVERTER

The catalytic converter was first invented by a French mechanical engineer Eugene Houdry in the year 1930. A catalytic converter is an automobile pollution control device. It converts more toxic pollutants produced from the automobile vehicles exhaust into the less toxic pollutants. The broad application of catalytic converters did not occur until more stringent emission control regulations forced the removal of antiknock agent tetraethyl lead from most types of gasoline. The catalytic converters were initially introduced in American production cars in 1975 due to the Environmental Protection Agency regulations on the poisonous gasses emissions reductions. The United States Clean Air Act required a 75% decrease in

emissions of all the new model vehicles after 1975, a decrease to be carried out with the use of catalytic converters. Without catalytic converters, vehicles release HC, CO and NO_x. A catalytic converter is placed in the internal combustion engine of vehicles. The catalytic converter is divided into three parts

- (1) Two-way catalytic converter
- (2) Three-way catalytic converter
- (3) Four-way catalytic converter



Figure 3: Smog Tower installed in Delhi

The two-way catalytic converter is converting CO and HC into CO₂ and H₂O. The three way catalytic converter is shown in the below figure. It is also use for the reduction of NO_x. The four-way catalytic converter has ability to converts CO, HC, NO_x and particulate matter on a single support.

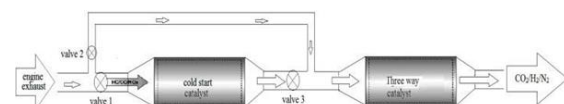


Figure 4: Catalytic Converter

6.5 Electrostatic Precipitator

Electrostatic precipitator, also called **electrostatic air cleaner**, a device that uses an electric charge to remove certain impurities—either solid particles or liquid droplets—from air or other gases in smokestacks and other flues. The precipitator functions by applying energy only to the particulate matter being collected, without significantly impeding the flow of gases. Originally designed for recovery of valuable industrial-process materials, electrostatic precipitators are used for air pollution control, particularly for removing harmful particulate matter from waste gases at industrial facilities and power-generating stations. If released into the atmosphere, such particulates reduce visibility, can contribute to climate change, and lead to serious health problems in humans, including lung damage and bronchitis. Electrostatic precipitators can capture fine particles (i.e., those that are smaller than 2.5 microns [0.0001 inch] in diameter), which are especially dangerous if released because they can be drawn deep into the lungs and can trigger inflammatory reactions.

6.5.1 Design and Process

Precipitators function by electrostatically charging particles in the gas stream. The charged particles are attracted to and deposited on plates or other collection devices. The treated air then passes out of the precipitator and through a stack to the atmosphere. When enough particles have accumulated on the collection devices, they are shaken off the collectors by mechanical rappers. The particulates, which can be either wet or dry, fall into a hopper at the bottom of the unit, and a conveyor system transports them away for disposal or recycling. Precipitators are often deployed with denitrification units that remove nitrogen oxides and scrubbers

or other devices that remove sulfur dioxide.

The most basic precipitator design consists of a row of thin vertical wires and a stack of large flat vertical metal plates. The plates are spaced from less than 1.3 cm (0.5 inch) to about 17.8 cm (7 inches) apart, depending on the application. The gas stream flows horizontally between the wires and through the stack of plates. A negative charge of several thousand volts is applied between the wires and plates to remove impurities from the gas stream.

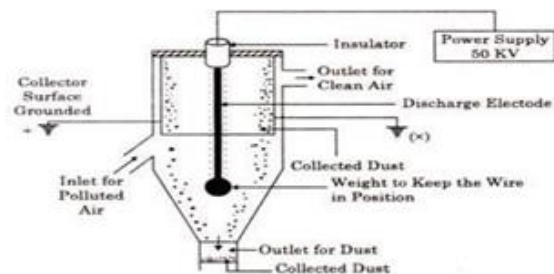


Fig 6: Electrostatic Precipitator

6.5.2 USES

- Removing dirt from flue gases in steam plants
- Removing oil mists in machine shops
- Removing acid mists in chemical process plants
- Cleaning blast furnace gases
- Removing bacteria and fungi in medical settings and pharmaceutical production facilities
- Purifying air in ventilation and air conditioning systems
- Material recovery from gas flow
- Separating rutile from zirconium sand in dry mills and rutile recovery plants

7. WORLD'S LARGEST AIR PURIFIER

As an experiment, China builds the world's largest air purifier in an attempt to curb the air pollution. The 100-meter-high tower is located in the city of Xian in Shaanxi province of northern China. The research

is being led by the Institute of Earth Environment at the Chinese Academy of Sciences.

According to the head of research, Cao Junji, they observed improvements in the quality of air over an area of 10 square kilometres in the city. Over the past few months, the tower has produced more than 10 million cubicmeters of clean air.

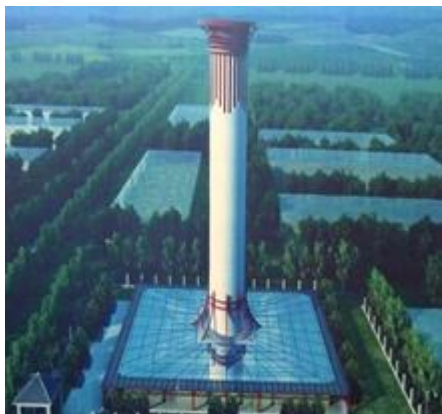


Figure 7: World's Largest Air Purifier

7. RESULT

➤ AIR QUALITY INDEX (RAJAHMUNDRY) VARIATIONS IN AQI VALUES OF RAJAHMUNDRY



Here is the Air quality index of the Rajahmundry area for the months of April and May 2021.

Through this table, it is clearly observed that the Air Quality Index in the month of April and May falls under Good and Moderate category.

DATA	PM2.5	PM10	NO ₂	NH ₃	SO ₂	CO	Ozone	AQI	Category
01-04-2021	95	107	14	4	18	39	24	107	Moderate
02-04-2021	77	100	15	4	15	48	23	100	Satisfactory
03-04-2021	75	102	12	4	11	40	20	102	Moderate
04-04-2021	73	103	19	4	4	48	22	103	Moderate
05-04-2021	72	101	20	5	4	32	11	101	Moderate
06-04-2021	68	101	18	5	4	45	13	101	Moderate
07-04-2021	59	101	17	4	4	48	18	101	Moderate
08-04-2021	49	89	11	3	4	46	18	89	Satisfactory
09-04-2021	44	78	12	3	5	41	19	78	Satisfactory
10-04-2021	38	68	16	2	4	48	24	68	Satisfactory
11-04-2021	30	56	15	2	3	52	19	56	Satisfactory
12-04-2021	30	63	14	3	4	61	19	63	Satisfactory
13-04-2021	36	64	20	3	5	62	19	64	Satisfactory
14-04-2021	28	50	21	3	4	70	17	70	Satisfactory
15-04-2021	19	38	18	3	6	48	22	48	Good
16-04-2021	11	33	17	3	10	41	24	41	Good
17-04-2021	7	34	18	3	4	30	21	34	Good
18-04-2021	10	26	13	3	6	14	18	26	Good
19-04-2021	21	42	11	3	6	34	25	42	Good
20-04-2021	26	47	10	3	6	35	24	47	Good
21-04-2021	28	56	14	3	6	35	21	56	Satisfactory
22-04-2021	31	51	13	3	7	32	26	51	Satisfactory
23-04-2021	35	56	21	2	9	32	22	56	Satisfactory
24-04-2021	35	55	23	2	7	33	27	55	Satisfactory
25-04-2021	41	56	14	4	4	42	34	56	Satisfactory
26-04-2021	36	61	11	3	4	32	26	61	Satisfactory
27-04-2021	40	75	13	3	4	39	28	75	Satisfactory
28-04-2021	55	83	21	2	4	37	30	83	Satisfactory
29-04-2021	47	78	20	2	5	47	26	78	Satisfactory
30-04-2021	47	68	16	3	5	47	27	68	Satisfactory
01-05-2021	29	47	10	3	3	33	21	47	Good
02-05-2021	22	38	10	3	5	34	25	38	Good
03-05-2021	28	48	12	2	4	36	21	48	Good
04-05-2021	13	29	11	3	3	21	16	29	Good
05-05-2021	10	40	13	2	3	29	14	40	Good
06-05-2021	12	32	10	3	3	42	15	42	Good
07-05-2021	7	21	11	2	4	40	19	40	Good
08-05-2021	12	26	17	3	4	28	19	28	Good
09-05-2021	6	18	12	3	5	32	17	32	Good
10-05-2021	12	23	12	3	5	35	22	35	Good
11-05-2021	7	21	10	3	5	20	19	21	Good
12-05-2021	6	17	9	3	6	50	21	50	Good
13-05-2021	21	28	11	3	5	26	26	28	Good
14-05-2021	13	25	8	2	3	63	21	63	Satisfactory
15-05-2021	15	27	13	3	5	22	18	27	Good
16-05-2021	10	21	9	3	4	23	18	23	Good
17-05-2021	15	25	9	2	3	33	20	33	Good
18-05-2021	19	28	10	2	5	18	17	28	Good
19-05-2021	19	31	9	2	4	12	20	31	Good
20-05-2021	26	38	9	3	6	31	31	38	Good
21-05-2021	38	42	10	3	4	18	32	42	Good
22-05-2021	24	34	11	3	4	24	33	34	Good
23-05-2021	33	47	14	2	4	26	38	47	Good
24-05-2021	61	76	21	3	5	37	38	76	Satisfactory
25-05-2021	131	131	22	4	4	45	39	131	Moderate
26-05-2021	102	135	20	2	5	45	42	135	Moderate
27-05-2021	100	124	21	3	3	25	35	124	Moderate
28-05-2021	72	109	17	3	5	30	30	109	Moderate
29-05-2021	51	82	11	4	5	24	33	82	Satisfactory
30-05-2021	55	87	10	3	4	34	40	87	Satisfactory

31-05-2021	56	72	11	4	6	38	39	72	Satisfactory
01-06-2021	49	64	14	3	4	38	34	64	Satisfactory
02-06-2021	52	65	13	3	5	51	34	65	Satisfactory
03-06-2021	34	46	14	3	3	28	21	46	Good
04-06-2021	32	45	18	3	4	31	25	45	Good
05-06-2021	25	40	10	3	4	16	25	40	Good
06-06-2021	17	33	9	2	3	15	22	33	Good
07-06-2021	38	45	13	3	4	28	30	45	Good
08-06-2021	44	59	9	3	5	28	32	59	Satisfactory
09-06-2021	34	61	8	3	4	19	26	61	Satisfactory
10-06-2021	24	37	13	3	5	14	21	37	Good
11-06-2021	18	26	9	3	5	33	12	33	Good
12-06-2021	14	34	10	2	4	24	16	34	Good
13-06-2021	15	30	9	2	5	28	16	30	Good
14-06-2021	18	35	9	2	6	26	18	35	Good
15-06-2021	23	45	12	2	4	20	18	45	Good
16-06-2021	21	37	10	3	6	30	16	37	Good
17-06-2021	20	44	10	2	4	24	17	44	Good
18-06-2021	22	46	12	3	6	30	19	46	Good
19-06-2021	38	89	10	2	4	22	16	89	Satisfactory
20-06-2021	30	70	11	3	5	28	16	70	Satisfactory
21-06-2021	51	109	14	3	5	36	22	109	Moderate
22-06-2021	67	123	14	3	5	29	26	123	Moderate
23-06-2021	54	89	15	3	4	30	21	89	Satisfactory
24-06-2021	45	80	12	3	6	37	23	80	Satisfactory
25-06-2021	38	76	14	3	4	25	18	76	Satisfactory
26-06-2021	39	77	16	3	4	31	19	77	Satisfactory
27-06-2021	32	53	11	3	6	34	23	53	Satisfactory
28-06-2021	29	40	12	3	5	24	21	40	Good
29-06-2021	47	59	11	3	4	24	21	59	Satisfactory
30-06-2021	32	57	10	3	4	36	23	57	Satisfactory

- Smog Free Tower
- Smog Free bicycle

These were not implemented in small cities as they are costly, the cost of implementation is very high. But keeping this aside, if we implement this, then we can control the extent of air pollution and one of the major problems can be eliminated. Also, the most outrageous advantage of these methods is, they are easy to maintain and the maintenance cost is also less. We can observe that at the starting of April month, pollution is more, that is because there is no lockdown in Rajahmundry. But from the end of April month, pollution levels started decreasing, i.e., because the lockdown started due to the pandemic. From 29-04-2021 it is clear that the environmental condition is good and again from 19-05-2021 the condition of the environment fluctuated.

This fluctuation is mainly because people started coming out, so vehicular emissions increased. And by the month of June, the situation became normal. It is impossible for a state or a country to stop their daily activities and throughout the year, keeping lockdown is also impossible and uneconomical.

“Our main aim of the project is to provide the clean environment by implementing the methods instead of stopping civilization”.

As a result, environmental damage from air pollution will be reduced. Both financial costs (waste management and clean up) and environmental costs (health problems and environmental damage) can be prevented.

8. CONCLUSIONS

While the effects of air pollution on materials, vegetation, and animals can be measured, health effects on humans can only be estimated from epidemiological evidence. Most of the evidence comes from occupational exposure to much higher concentrations of pollutants than the general public is exposed to. Moreover, the health effects of smoking and other lifestyle characteristics and exposures confound the observations of air pollutant effects. Ethical considerations preclude deliberate exposure of human subjects to concentrations of pollutants that might produce adverse effects, so evidence from sources other than epidemiology is virtually impossible to obtain. All of the evidence we have suggests that air pollutants threaten human health and well-being to an extent that control of these pollutants is necessary.

We can reduce the pollution by implementing the following methods:

- Air Filtration
- Air Bag House Collector
- Filter Replacement

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