EnviroVigyan

Understanding About Air Pollution

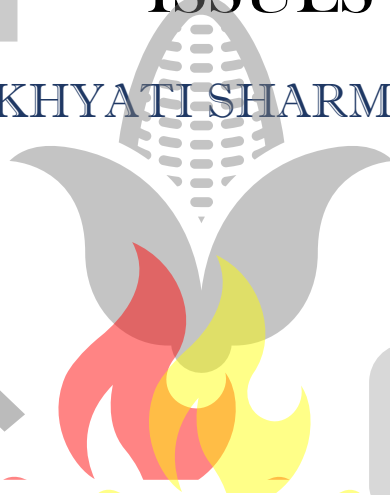## AirKaCare

Awareness campaign against world's silent killer

THE ENVIRONMENTAL TIMES

ISSUES N0- 3

BY- KHYATI SHARMA & ANCHAL GARG

AirKaCare

Awareness campaign against world's silent killer

About EnviroVigyan

EnviroVigyan is a registered not-for-profit, non-government organization (NGO), founded by Dr. Anchal Garg in the year 2021. The scientific activities of this organization are supported by a dedicated team of experts drawn from academia and research institutions. The self-motivated dynamic group of experts works in multi-disciplinary areas of societal importance covering different issues of environmental concern. The research, training, and awareness programme focus on the thematic areas ranging from air pollution, waste management, water, and sanitation, to climate change, ecosystem restoration, and associated public health.

About The Environmental Times

The Environmental Times is a monthly report prepared by EnviroVigyan. The aim of The Environmental Times is to highlight the significance, major contribution, and way forward to solve the major environmental issue. It also focuses on changing our pathways from unsustainable to sustainable practices.

What is Air Pollution?

The contamination of indoor and outdoor environments by any chemical, physical, or biological agents that modifies the natural characteristics of the atmosphere. – World Health Organisation (WHO).

Air pollution consists of chemicals or particles in the air that can harm the health of humans, plants, and animals. Pollutants in the air can take many forms-solid, liquid, or gas particles. – National Geographic Society.

Air pollution is a mixture of hazardous substances from both human-made and natural sources. – National Institute of Environmental Health Sciences.

Air pollution consists of harmful or poisonous substances in the outdoor or indoor air. It is harmful to people even if they do not have lung disease, but it is particularly dangerous for people living with asthma or COPD. – Respiratory Health Association.

Air pollution is the presence of any solid, liquid, or gaseous substances in the atmosphere in such

concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. – Air (prevention and control of pollution) Act, 1981, CPCB.

PERCENTAGE OF DIFFERENT GASES IN

ATMOSPHERE

- Nitrogen
- Oxygen
- Other gases (mostly Argon)
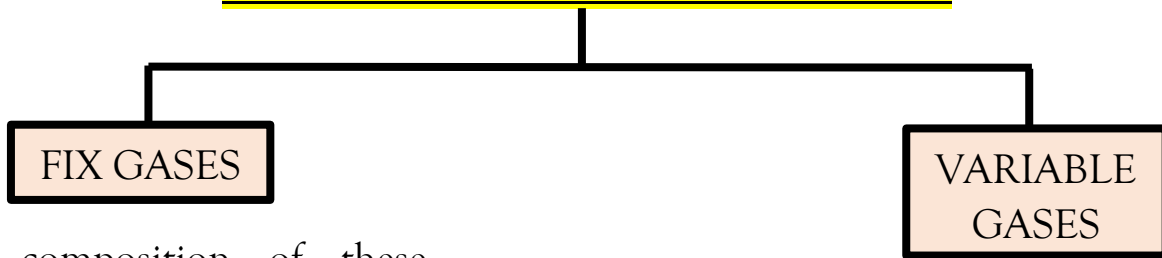- Carbon dioxide

0.90% 0.41%

21%

78%
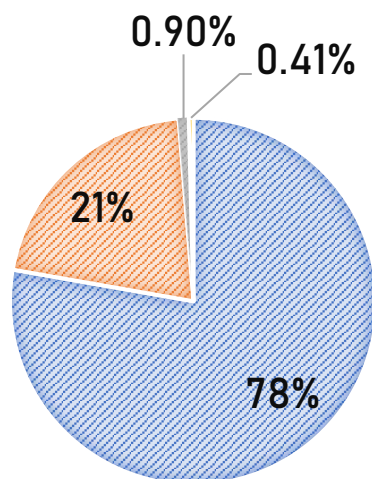
Do You Know???

Air pollution is a **major environmental threat** and one of the main causes of death among all risk factors, ranking just below hypertension, tobacco smoking, and high glucose - WHO

TYPES OF ATMOSPHERIC GASES

FIX GASES

The composition of these gases remains constant from the origin of the atmosphere.

Example- N_2, Ar, O_2, Ne

VARIABLE GASES

Gases that show changes in their concentration with time are called variable gases. These are also called Greenhouse Gases (GHG).

Example- CO_2, CH_4, NO_2, SO_2

CRITERIA AIR POLLUTANTS

Environmental Protection Agency has called certain pollutants criteria air pollutants since it sets the National Ambient Air Quality Standard based on certain criteria i.e., the latest scientific information regarding their effects on health.

There are seven criteria air pollutants namely- **PM** (PM_{10}, $PM_{2.5}$), **Ozone** (Tropospheric O_3), **Lead** (Pb), **Nitrogen dioxide** (NO_2), **Sulphur dioxide** (SO_2), **Carbon monoxide** (CO), and **Ammonia** (NH_3).

Do You Know???

The combined effects of ambient air pollution and household air pollution are associated with **6.7 million premature deaths annually.**

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) IN INDIA

POLLUTANT	ANNUAL STANDARD ($\mu g/m^3$)		24 HOURS STANDARD (($\mu g/m^3$))		METHODS OF MEASUREMENT
	Indian NAAQS (2009)	WHO NAAQS (2021)	Indian NAAQS (2009)	WHO NAAQS (2021)	
PM_{10}	60	15	100	45	Gravimetric method
					Tapered element oscillating balance (TEOM)
					Beta attenuation method
$PM_{2.5}$	40	5	60	15	Gravimetric method
					Tapered element oscillating balance (TEOM)
					Beta attenuation method
NO_2	40	10	80	25	Modified Jacob and Hochheiser
					Chemiluminescence
SO_2	50	Not set	80	40	Improved West and Gaeke method
					Ultraviolet fluorescence
O_3	100 (8 hrs)	100 (8 hrs)	180 (1 hr)		UV photometric
					Chemiluminescence
Pb	0.50		1.0		Energy dispersive X-ray fluorescence (ED-XRF)
CO	2 mg/m^3 (8 hrs)		4 mg/m^3 (1 hr)	4 mg/m^3	Non- dispersive infrared (NDIR) spectroscopy
NH_3	100		400		Indophenol blue method
					Cavity Ring Down spectroscopy (CRDS) method

HEALTHY AND UNHEALTHY AIR-

The air which is free from any contamination/pollution is known as healthy air. You can classify the air into a **healthy category**, if-

- ✓ The air is <u>free of air pollutants</u>

- ✓ The air seems to be <u>fresh and clean</u>

- ✓ The sky seems to be <u>clear blue</u>

- ✓ The visibility is clear at several distances

- ✓ You are not feeling any discomfort in breathing.

CAN YOU TELL WHICH COULD BE THE HEALTHY AIR FROM THE FOLLOWING TWO FIGURES?

Source- BBC

WHAT IS AIR QUALITY?

When the air quality is good, <u>the air is clean and contains only a small amount of solid particles and chemical pollutants</u>. Poor air quality, which <u>contains high levels of pollutants</u>, is often <u>hazy</u> and <u>dangerous to human health and the environment.</u> – Centre for Science Education

WHY DO WE MEASURE AIR QUALITY?

We need to measure air quality on a regular basis because-

- ✓ It categorizes air into ==polluted== and ==clean categories==.

- ✓ It helps us in understanding how healthy is the air where we live.

- ✓ It helps to guard against extreme events by ==notifying people== and ==start acting== for their healthy life.

- ✓ It helps in decision-making for our daily outdoor activities.

- ✓ It helps in identifying the sources of air pollution.

- ✓ It helps in identifying the level of air quality with respect to standards of air pollutants as prescribed by regulatory bodies.

- ✓ It is very important to measure the air quality at the city, state,

country, and global levels.

✓ Measurement of air quality helps in generating the air quality databases of our own country.

Air Quality of any place has been measured in the form of an Air Quality Index (AQI). **AQI is a tool for effective communication of air quality status to people in terms, which are easy to understand. It transforms complex air quality data of various pollutants into a single number (index value), nomenclature, and colour.**

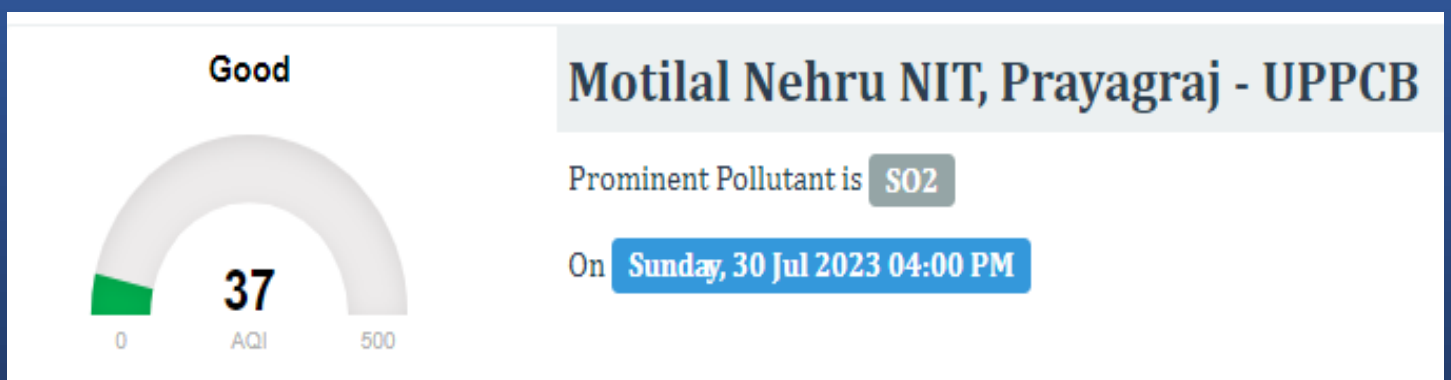In India, Central Pollution Control Board (CPCB), which is a pollution regulatory body has measured air quality. CPCB uses the below six major air pollutants for identifying the overall air quality of any place in order to track AQI-

✓ Coarse airborne particle (PM_{10})

✓ Fine airborne particle ($PM_{2.5}$)

✓ Nitrogen dioxide (NO_2)

✓ Sulphur dioxide (SO_2)

✓ Carbon monoxide (CO)

✓ Ground-level ozone (O_3)

AIR QUALITY INDEX

AQI	REMARK	COLOUR CODE	POSSIBLE HEALTH IMPACTS
0-50	GOOD		MINIMAL IMPACT
51-100	SATISFACTORY		MINOR BREATHING DISCOMFORT TO SENSITIVE PEOPLE
101-200	MODERATE		BREATHING DISCOMFORT TO THE PEOPLE WITH LUNG, ASTHMA, AND HEART DISEASES
201-300	POOR		BREATHING DISCOMFORT TO MOST PEOPLE ON PROLONGED EXPOSURE
301-400	VERY POOR		RESPIRATORY ILLNESS ON PROLONGED EXPOSURE
401-500	SEVERE		AFFECTS HEALTHY PEOPLE AND SERIOUSLY IMPACTS THOSE WITH EXISTING DISEASES

Source- CPCB, National Air Quality Index

Good

37
0   AQI   500

Motilal Nehru NIT, Prayagraj - UPPCB

Prominent Pollutant is SO2

On Sunday, 30 Jul 2023 04:00 PM

ACTION TAKEN FOR AIR POLLUTION IN INDIA OVER THE YEARS

1974 — Establishment of CPCB

1981 — Air (Prevention & Control of Pollution) Act by CPCB

1986 — CPCB adds provision for Environment Protection Act

1994 — (April) NAAQS standards introduced

1997 — MoEFCC established action plan for Delhi's pollution

1998 — (Jan) EPCA was established to address air pollution in Delhi NCR.
(Oct) NAAQS standards revised.

2003 — To reduce RSPM level, the Supreme court issued directives for preparation of action plans for 7 cities

2009 — (Nov) NAAQ standards revised and $PM_{2.5}$ added

2014 — (Jan) AQI methodology established

2015 — CPCB issued directives Air Act 1981 to implement action points in major cities including Delhi NCR

2016 — (April) $PM_{2.5}$ is included in all manual stations under NAMP.
(Dec) GRAP establish to address air pollution in NCR and Delhi

2018 — (April) MoEFCC issued a draft concept note of NCAP with multiple bound strategies to reduce air pollution

2019 — (10 Jan) NCAP launched as a time-bound national strategy to tackle air pollution.
(31 Jan) 3 member central committee examined and approved clean air action plan.
(July) 102 NAC were announced
(6 Aug) 20 new NAC were added.

2023 — Reduce $PM_{2.5}$ levels in 122 non-attainment cities by 20-30% compared to 2017 levels- NCAP

SOURCES OF AIR POLLUTION

Vegetation

Volcanoes

Natural sources

Forest fires

ON THE BASIS OF ORIGIN

Anthropogenic sources

Vehicles

Industries

Waste burning

Chimney

Ships

Buses

Stationary sources

ON THE BASIS OF MOBILITY

Mobile sources

Thermal power plant

Train

Coal burning

Industries

Aeroplane

Cars
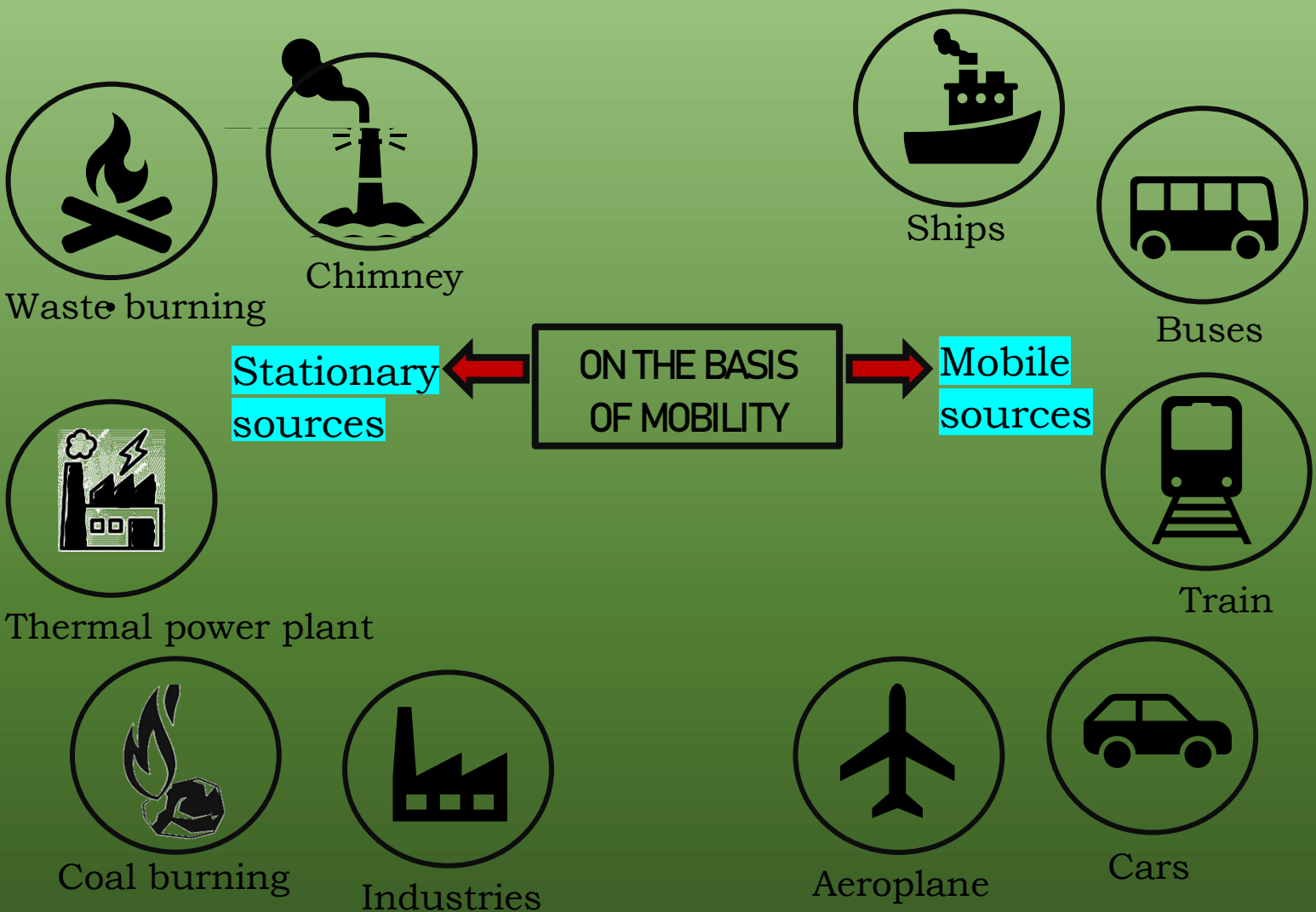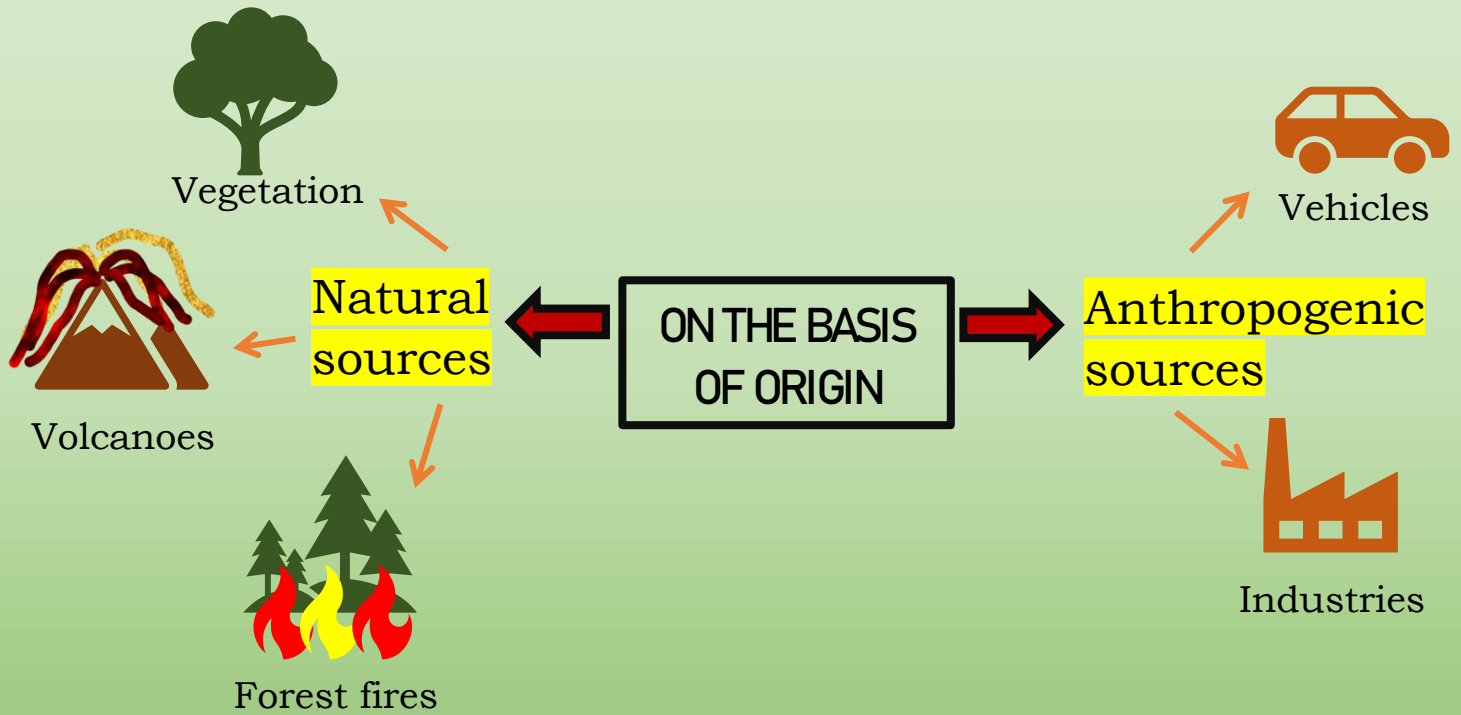
TYPES OF AIR POLLUTANT

There are two types of air pollutants-

PRIMARY AIR POLLUTANTS-

If an air pollutant is harmful to human health and plant health in its original form as emitted from the source, is called a primary pollutant.
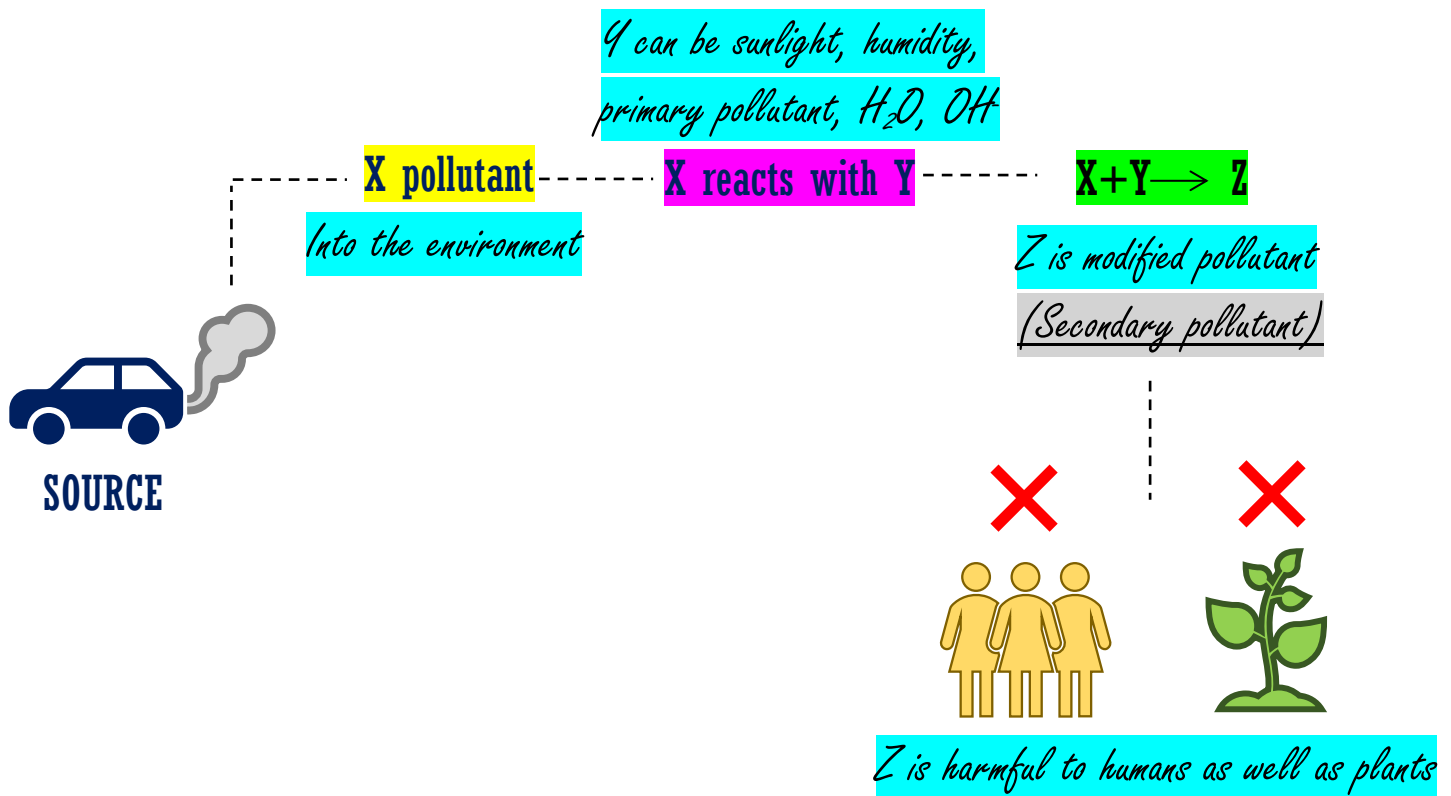
E.g.- $PM_{2.5}$, PM_{10}, NO, SO_2, CO, C_6H_6, VOCs, Hydrocarbons, Formaldehyde, Aldehyde, Ketone, Black carbon, H_2S, BaP, CFCs.

Primary pollutant

X pollutant

Into the environment

SOURCE

The X pollutant is directly harmful to humans and plant health in its original form
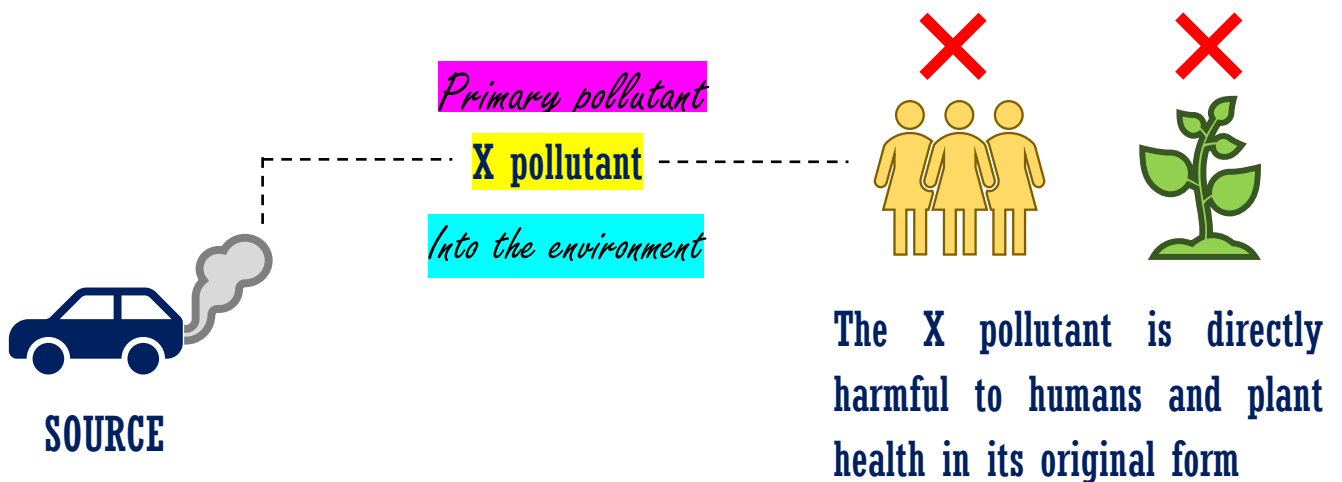
SECONDARY AIR POLLUTANTS-

The pollutant which after emission from the source reacts with other compounds such as primary pollutant/ light/ H_2O vapour and becomes a modified compound that is dangerous for humans and plant health are called a secondary pollutant.

E.g.- Bad Ozone, NO_2, SO_3, HNO_3, H_2SO_4, Acid Rain, PAN, Smog

X pollutant — *Into the environment*

X reacts with Y — *Y can be sunlight, humidity, primary pollutant, H_2O, OH*

X+Y⟶ Z — *Z is modified pollutant (Secondary pollutant)*

Z is harmful to humans as well as plants

SOURCE

HYDROCARBONS

Volatile Organic Compounds (VOCs) or hydrocarbons are organic chemicals that have high vapour pressure at room temperature and low boiling point.

Volatile Organic Compounds

Natural VOCs

VOCs emitted by plants, animals, or microorganisms. These are generally cast in response to –

- Temperature stress
- Heat Stress
- Plant defence against herbivores
- Secondary metabolites of plants

Anthropogenic VOCs

These VOCs are produced because of anthropogenic activities such as the burning of fossil fuel, waste, crop residue, biofuels, biomass combustion, and vehicular emission.

EXAMPLES –

- ✓ Isoprene
- ✓ Terpenes
- ✓ Methanol
- ✓ Limonene- a common biogenic VOCs, is emitted into the atmosphere primarily by trees that grow in coniferous forests.
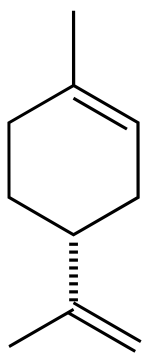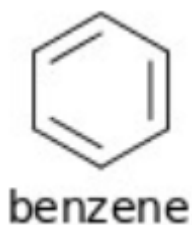
Limonene

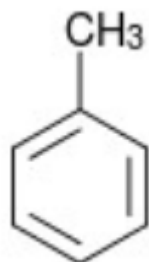Coniferous forest

Anthropogenic VOCs-

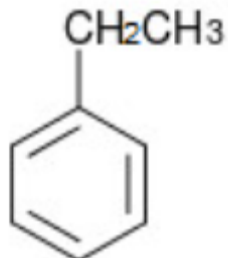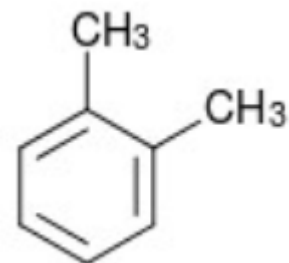| B	T	E	X
Benzene	Toluene	Ethylene	Xylene

benzene

toluene

ethylbenzene

xylene

CARBON MONOXIDE (CO)

- ✓ It is a colourless, odourless, tasteless, poisonous gas.
- ✓ CO is the single largest pollutant in urban areas/ cities, most of which is contributed by motor vehicles.
- ✓ Natural source of CO is the paddy field.

Do you know??

CO is extremely dangerous since its binding capacity to Hb is ~200 times more than oxygen.

CO

Incomplete Combustion of coal

Inhaled by Humans

- ✓ Dizziness
- ✓ Headaches

Hb + CO

COHb

Carboxyhaemoglobin
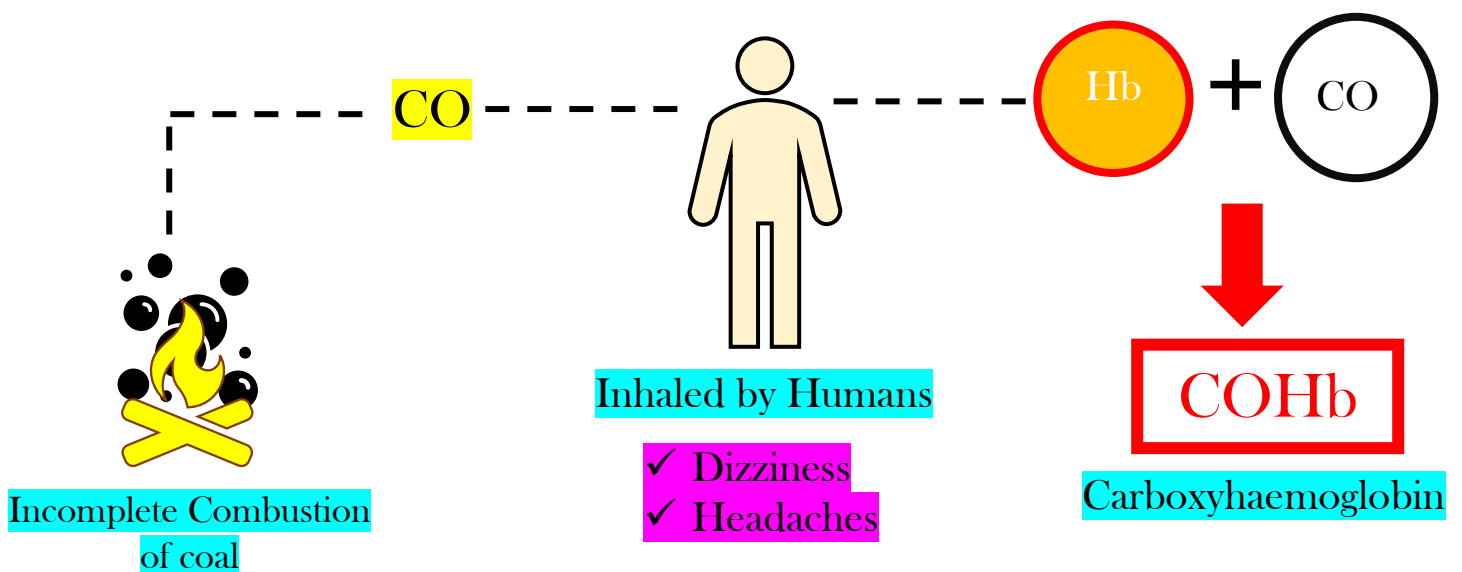
- ✓ Health effects of CO are generally observed even at as low concentration as 1.7% of COHb. And above 60% may cause even death
- ✓ COHb can be removed from blood stream when clean air is breathe in.

SULPHUR DIOXIDE (SO$_2$)

✓ It is a primary polluatant.

✓ Coal has the most amount of sulphur as compared to other fossil fuel.

Coal>Diesel> Petrol> Natural Gas

Sulphur content is 1-6% in coal.

1.3% is bound organically

1-3% is physically tapped on surface

SOURCES OF SO$_2$-

1	2	3
Combustion of coal and other fossil fuel	Vehicular sources	Non-combustion sources
Major source	Diesel vehicles	Petroleum refinery
		Cement production units
		Mineral ore

EFFECTS OF SO$_2$-

✓ On reaction with water, SO$_2$ forms H$_2$SO$_4$, which is highly corrosive and causes <u>strength loss of material</u>, <u>leaf injury</u>, and <u>leaf discolouration</u>.

SMOG- It is a mixture of two words "smoke" and "fog" and it reduces visibility as well as it is unhealthy to plants and humans.

There are two types of smog-

- ✓ PHOTOCHEMICAL SMOG
- ✓ LONDON SMOG

PHOTOCHEMICAL SMOG- It is also called Los Angeles Smog or oxidative smog. It is produced when sunlight reacts with nitrogen oxides (car exhaust, power plants, factory emissions) and at least one VOC (gasoline, paints, many cleaning solvents) in the atmosphere. When sunlight hits these chemicals, they form airborne particles and ground level ozone (bad ozone)- or smog.

==DO YOU KNOW ABOUT THE GREAT LONDON SMOG??==

The great smog of London (1952), covered the city of London for five days (5 Dec to 9 Dec, 1952). It was caused by a combination of industrial pollution and high-pressure weather conditions.

Visibility was so impaired in some parts of London that pedestrians were unable to see their own feet.

NITROGEN OXIDEs (NO_x)

NO_x is the indeterminate mixture of NO (nitric oxide) and NO_2 (nitrogen dioxide).

There are seven oxides of Nitrogen present, out of which only two are major air pollutant.

Primary pollutant

NO

Oxidised

Secondary Pollutant

NO$_2$

Colourless gas not known to cause adverse impact at atmospheric concentration

Harmful to humans

NOx

Thermal NOx
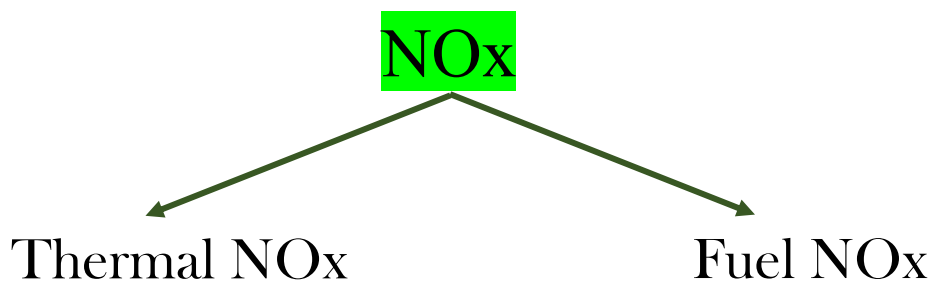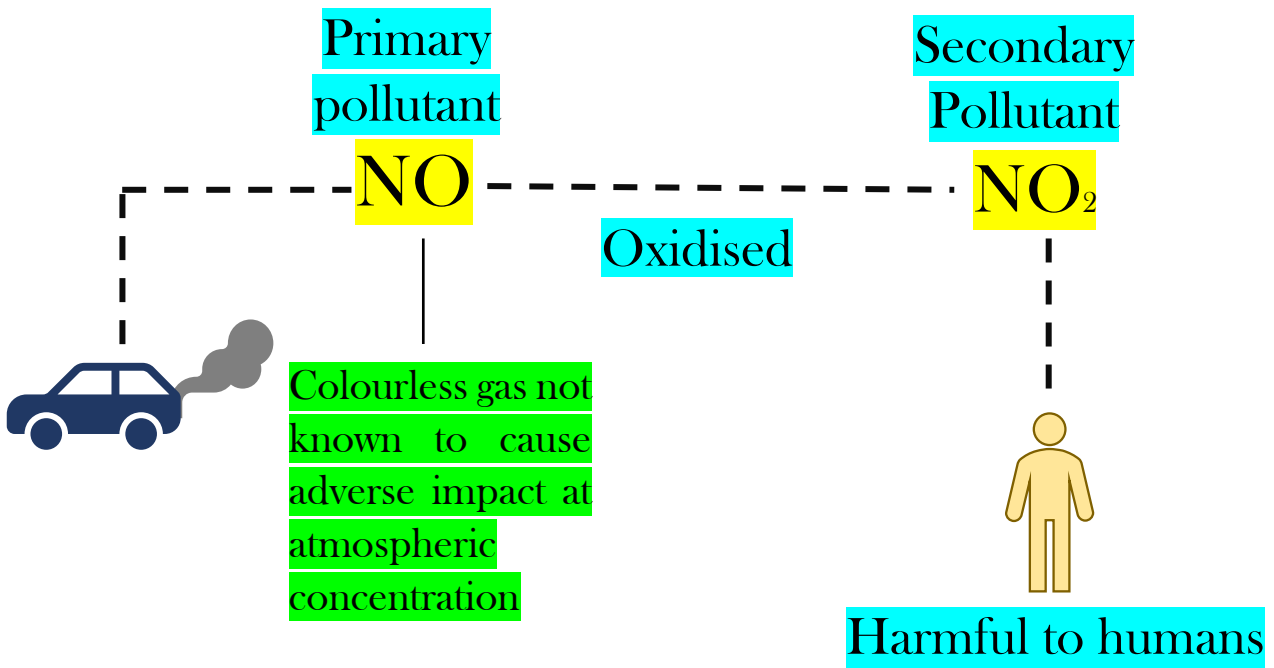
This type of NOx is created when N$_2$ and O$_2$ in the combustion of fuel of air are heated to a high temperature to oxidise nitrogen at high temperature. Nitrogen from air combines with oxygen and gets oxidised to NOx.

Fuel NOx

It results from oxidation of nitrogen compound that are chemically bound in fuel molecules themselves.

It contributes more into NOx production.

```
                          NO₂
                           │
        ┌──────────────────┼──────────────────┐
        │                  │                  │
      HNO₃               PAN                  O₃
        │                  │                  │
   Causes Acid          Causes            Pollutant
      Rain            photochemical       (Tropospheric
                         smog                Ozone)
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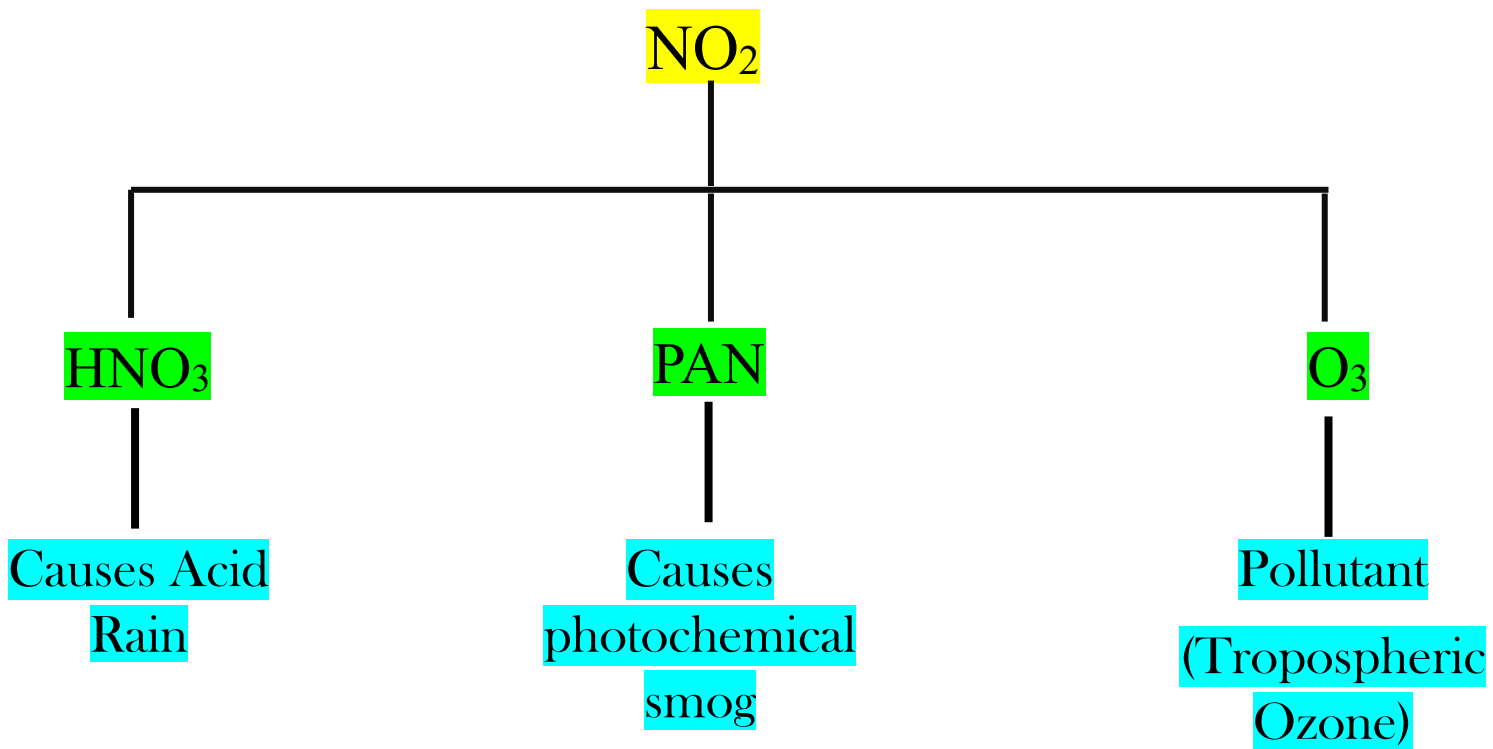
DO YOU KNOW?

Nitrate (NO_3) controls the chemistry of atmosphere at night

HYDROXYL RADICLE (OH⁻)

- It is a natural greenhouse gas.
- It is formed by the photolytic splitting of H_2O.
- **It controls the chemistry of atmosphere in daytime.**
- It is called by various names like- atmospheric detergent, atmospheric scavenger, soap of atmosphere, **reactive oxygen species.**

PARTICULATE MATTER (PM)

Particulate matter is a term used for the mixture of solid particles and liquid droplets found in the air.

Particulate matter includes-

PM_{10}

Inhalable particles with diameter that are generally 10μm or smaller.
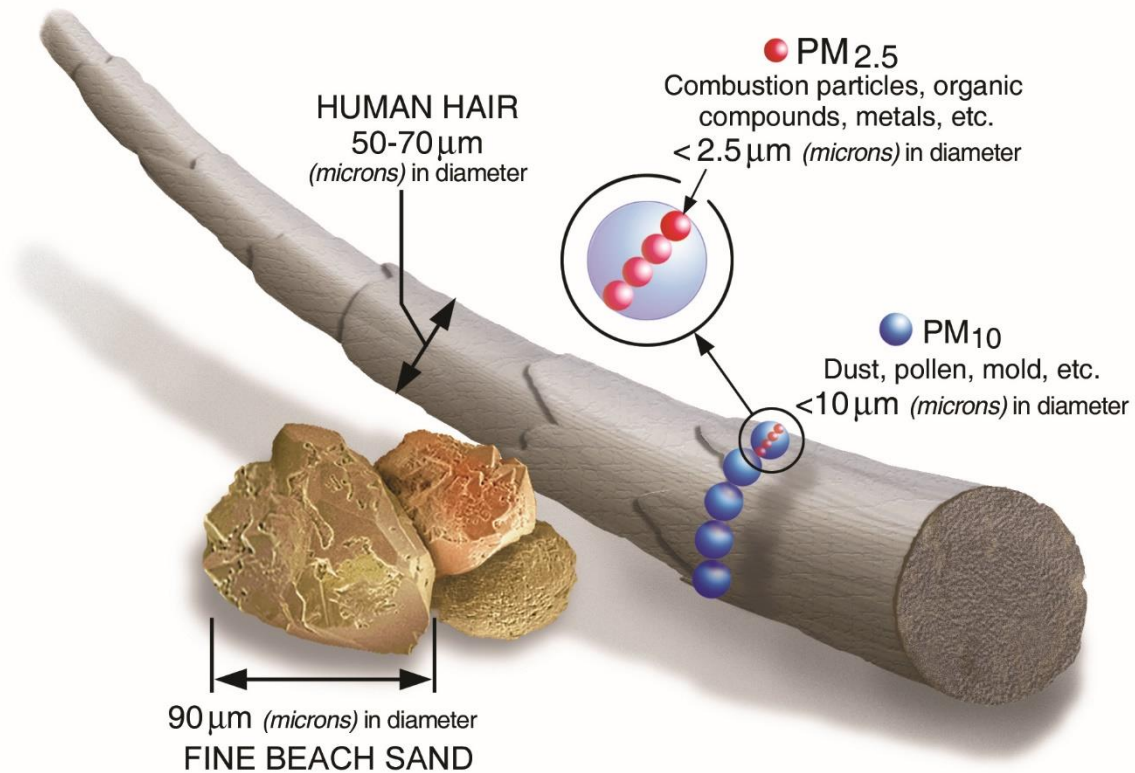
$PM_{2.5}$

Fine Inhalable particles with diameter that are generally 2.5μm or smaller.

$PM_{1.0}$

Ultra Fine Inhalable particles with diameter that are generally 1 μm or smaller.

HOW SMALL IS 2.5 μm???

Average human hair is 70 μm in diameter, **$PM_{2.5}$ (fine particles) is 30 times smaller in size than the average human hair.**

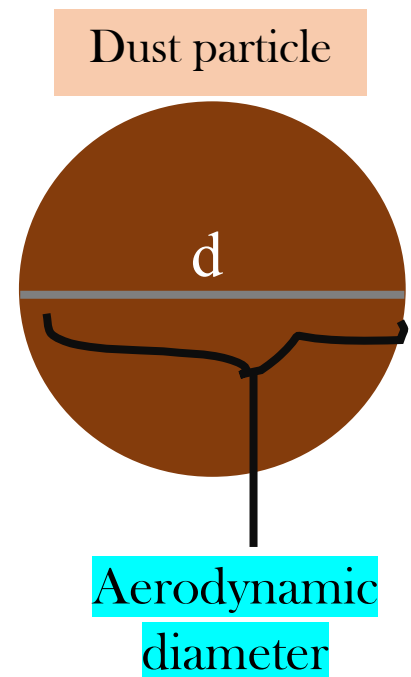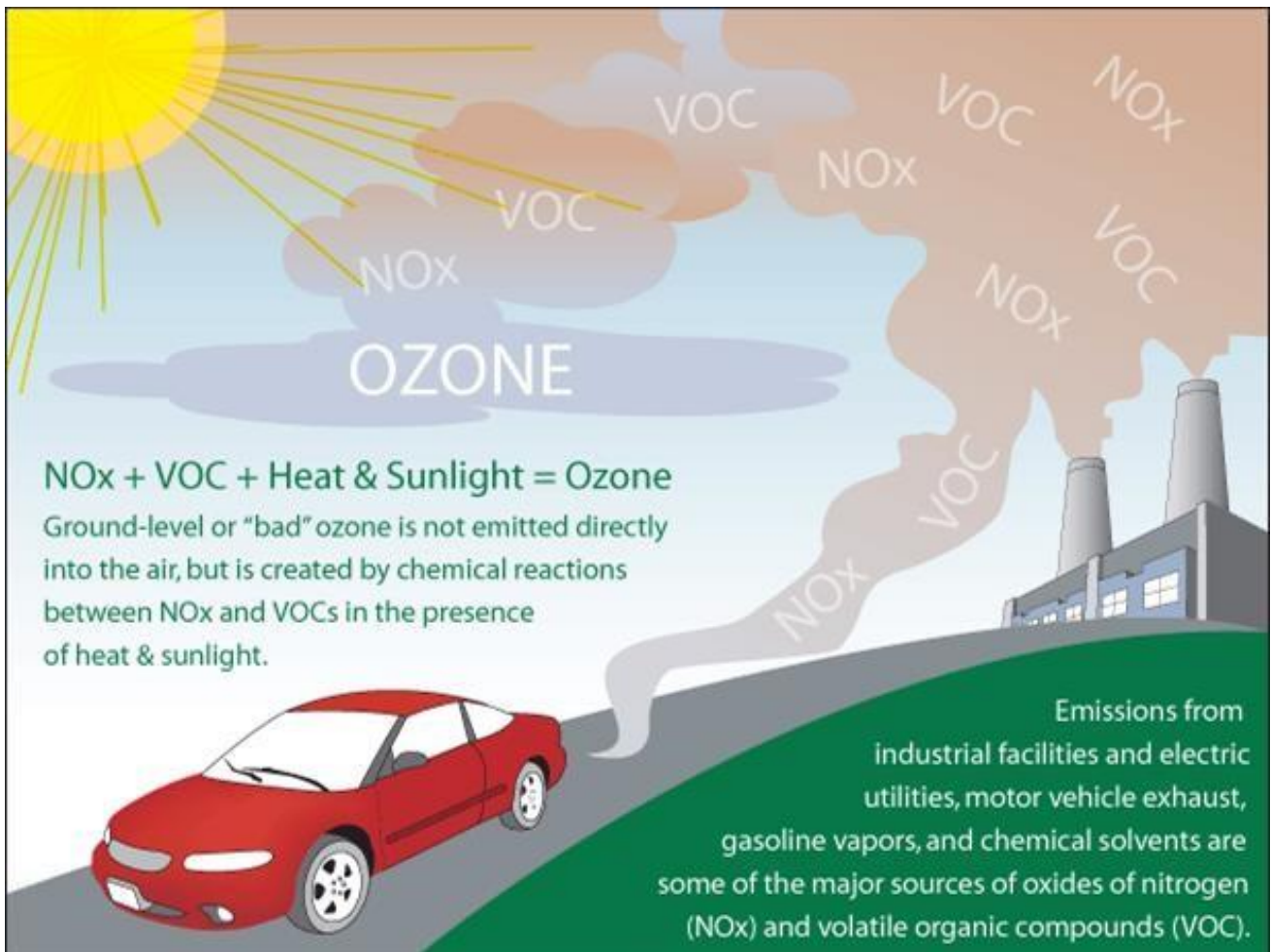Size comparison of **PM** particles

DO YOU KNOW???

The bigger the aerodynamic diameter, larger is the settling velocity. If the settling velocity is large then the settling time is less.

Hence, $PM_{2.5}$ which has smaller aerodynamic diameter than PM_{10} has more settling time and remains in environment for longer duration and is more harmful than PM_{10}.

Dust particle

d

Aerodynamic diameter

TROPOSPHERIC OZONE (BAD OZONE)-

NOx + VOC + Heat & Sunlight = Ozone
Ground-level or "bad" ozone is not emitted directly into the air, but is created by chemical reactions between NOx and VOCs in the presence of heat & sunlight.

Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of oxides of nitrogen (NOx) and volatile organic compounds (VOC).

Source- EPA

Tropospheric ozone/ bad ozone/ ground level ozone is formed by the chemical reaction between NOx and VOCs in the presence of sunlight.

Ground level ozone is harmful to plants and humans and it is also one of the ingredients of smog.

RISKS OF DIFFERENT CRITERIA POLLUTANTS

POLLUTANT	SOURCE	ENVIRONMENTAL RISK	HUMAN HEALTH RISK
CO	Automobile emissions, fires, industrial processes	Smog formation	Vision problems, heart disease related symptoms such as chest pain, reduce mental and physical capabilities in healthy people
NOx	Automobile emissions, industrial processes	Damage to foliage, smog formation	Inflammation and irritation of breathing passages
SO$_2$	Automobile emissions, industrial processes, fossil fuel combustion	Haze, acid rain formation which ultimately affects building and monuments	Breathing difficulties, particularly for people with asthma and heart disease
O$_3$	NOx and VOCs from automobile and industrial emissions,	Interferes with the ability of certain plants to respire, leading to	Reduce lung function, Inflammation and

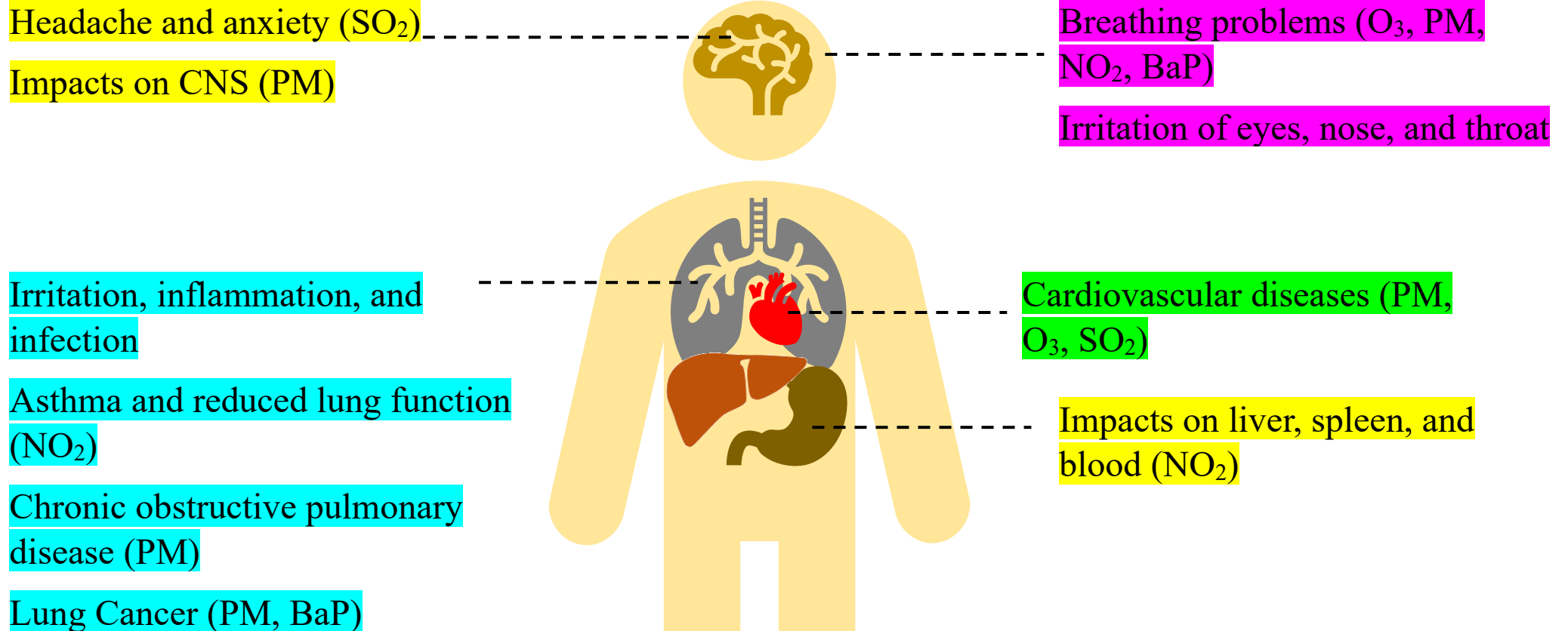|	chemical solvents and gasoline vapours	increased susceptibility to other environmental stressors	irritation of breathing passages
PM	Fire, smokestacks, construction sites, unpaved roads Sources of secondary particles include reactions between gaseous chemicals emitted by power plants and automobiles	Haze formation, damage foliage, changes the pH of waterways	irritation of breathing passages, aggravation of asthma, irregular heartbeat
Pb	Metal processing, waste incineration, fossil-fuel combustion	Loss of biodiversity, decreased reproduction, neurological problems in vertebrates	Adverse impacts upon multiple bodily systems, may contribute to learning disabilities when young children are exposed, cardiovascular effect on adults.

EFFECT OF CRITERIA POLLUTANTS ON HUMAN BEING

Headache and anxiety (SO_2)

Impacts on CNS (PM)

Breathing problems (O_3, PM, NO_2, BaP)

Irritation of eyes, nose, and throat

Irritation, inflammation, and infection

Asthma and reduced lung function (NO_2)

Chronic obstructive pulmonary disease (PM)

Lung Cancer (PM, BaP)

Cardiovascular diseases (PM, O_3, SO_2)

Impacts on liver, spleen, and blood (NO_2)

Source- EEA

INITIATIVES UNDERTAKEN BY INDIAN GOVERNMENT FOR THE MITIGATION OF AIR POLLUTION

✓ National Clean Air Programme (NCAP)

The Central Government has launched National Clean Air Programme (NCAP) under the Central Sector "Control of Pollution" Scheme as a long-term, time-bound, national-level strategy to tackle the air pollution problem across the country in a comprehensive manner with targets to achieve 20% to 30% reduction in PM$_{10}$ and PM$_{2.5}$ concentrations by 2024 keeping 2017 as the base year for the comparison of concentration.

India's NCAP cities (131)

Punjab (9)
Amritsar, Dera Bassi, Gobindgarh, Jalandhar, Khanna, Ludhiana, Naya Nangal, Pathankot/Dera Baba, Patiala

Haryana (1)
Faridabad

Chandigarh (1)
Chandigarh

Delhi (1)
Delhi

Rajasthan (5)
Alwar, Jaipur, Jodhpur, Kota, Udaipur

Gujarat (4)
Ahmedabad, Rajkot, Surat, Vadodara

Maharashtra (19)
Akola, Amravati, Aurangabad, Badlapur, Chandrapur, Jalgaon, Jalna, Kolhapur, Latur, Mumbai, Nagpur, Nashik, Navi Mumbai, Pune, Sangli, Solapur, Thane, Ulhasnagar, Vasai Virar

Karnataka (4)
Bengaluru, Devanagere, Gulburga, Hubli-Dharwad

Tamil Nadu (4)
Chennai, Madurai, Thoothukudi (Tuticorin), Tiruchirapally (Trichy)

Jammu & Kashmir (2)
Jammu, Srinagar

Himachal Pradesh (7)
Baddi, Damtal, Kala Amb, Nalagarh, Paonta Sahib, Parwanoo, Sunder Nagar

Uttarakhand (3)
Dehradun, Kashipur, Rishikesh

Bihar (3)
Gaya, Muzaffarpur, Patna

Odisha (7)
Angul, Balasore, Bhubneshwar, Cuttack, Kalinga Nagar, Rourkela, Talcher

Telangana (4)
Hyderabad, Nalgonda, Patencheru, Sangareddy

Andhra Pradesh (13)
Anantapur, Chitoor, Eluru, Guntur, Kadapa, Kurnool, Nellore, Ongole, Rajahmundry, Srikakulam, Vijayawada, Vishakhapatnam, Vizianagaram

Uttar Pradesh (17)
Agra, Prayagraj (Allahabad), Anpara, Bareily, Firozabad, Gajraula, Ghaziabad, Gorakhpur, Jhansi, Kanpur, Khurja, Lucknow, Meerut, Moradabad, Noida, Raebareli, Varanasi

Assam (5)
Guwahati, Nagaon, Nalbari, Sibsagar, Silchar

Meghalaya (1)
Byrnihat

Nagaland (2)
Dimapur, Kohima

Madhya Pradesh (7)
Bhopal, Dewas, Gwalior, Indore, Jabalpur, Sagar, Ujjain

Chhattisgarh (3)
Bhilai, Korba, Raipur

West Bengal (6)
Asansol-Ranigunj, Barrackpore, Durgapur, Haldia, Howrah, Kolkata

Jharkhand (3)
Dhanbad, Jamshedpur, Ranchi

Source- Urban Emissions

Presently there are 131 non-attainment cities (NAC) identified based on ambient air quality data for the period 2011 – 2015 and WHO report 2014/2018. The city-specific Action Plans have been approved for all the NAC for implementation on the ground.

✓ Graded Response Action Plan (GRAP)

GRAP was notified on January 12, 2017, for the prevention, control, and abatement of air pollution in Delhi and NCR. It identifies graded measures and implementing agencies for response to four AQI categories, namely, Moderate to Poor, Very Poor, Severe, and Severe + or Emergency.

| CATEGORY	ACTION PLAN
Moderate to Poor PM2.5—61-120 µg/m3 PM10—101-350 µg/m3	➤ Stop garbage burning, impose heavy fines ➤ Enforce pollution regulations in all industries ➤ Do periodic mechanised road sweeping ➤ Stop plying of visibly polluting vehicles ➤ Enforce SC order on diversion, ban on crackers ➤ Ensure fly ash ponds are watered every alternate day from Mar – May ➤ Use apps to inform people and register complaints
Very Poor PM2.5—121-250µg/m3 PM10—351-430 µg/m3	➤ Stop use of diesel gensets ➤ Enhance parking fee by 3-4 times ➤ Increase bus and Metro services ➤ Stop use of coal/firewood in hotels and restaurants ➤ RWAs to provide electric heaters to security staff to stop bonfires ➤ Issue media alerts and advisories
Severe PM2.5—250 µg/m3 PM10—430µg/m3	➤ Close hot mix plants, stone crushers ➤ Shut down Badarpur power plant and maximise generation from natural gas-based plants ➤ Intensify public transport ➤ Mechanised cleaning of road and sprinkling of water
Emergency PM2.5—300µg/m3 PM10—500 µg/m3 *(persist for 48 hours or more)*	➤ Stop entry of trucks except those carrying essential commodities ➤ Stop construction ➤ Introduce odd-even scheme without exemptions ➤ Task Force to decide on additional steps

✓ SAMEER APP

SAMEER app is an official app by the Indian Central Pollution Control Board. It provides hourly updates for all cities and small towns across the country. It is a useful tool for accurate air quality information across India. The app features official data from the CPCB observatories on an hourly basis.The interactive map layout brings the air quality information on a single map with the appropriate color, AQI number across all the cities. The natives of India can also register complaints related to air pollution from within the app.
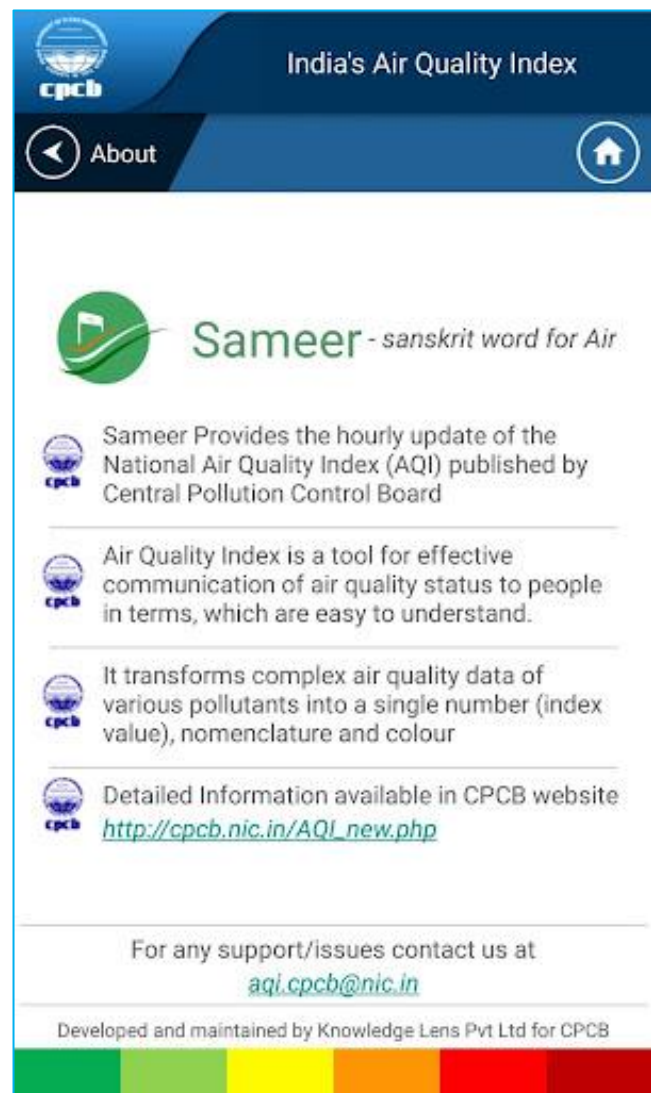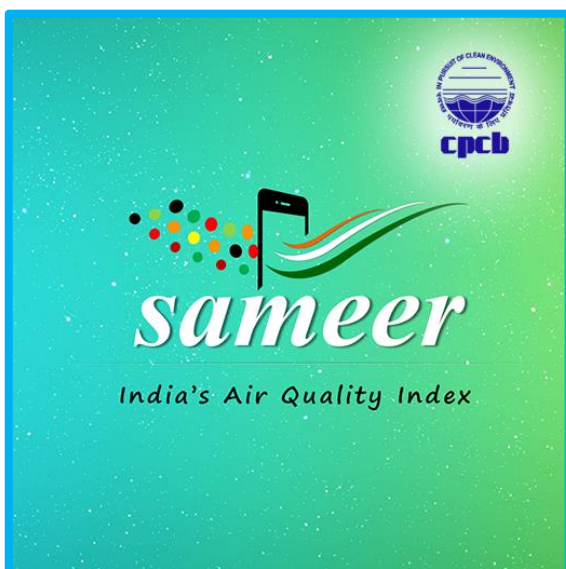
✓ CONTINUOUS AMBIENT AIR QUALITY MONITORING STATIONS (CAAQMS)

Presently there are 525 CAAQMS in India as per the CPCB portal. Continuous Ambient Air Quality Monitoring Stations (CAAQMS) use high-end technology for automated data collection and its transfer and analytics at the central server. It provides real-time data on ambient air quality.
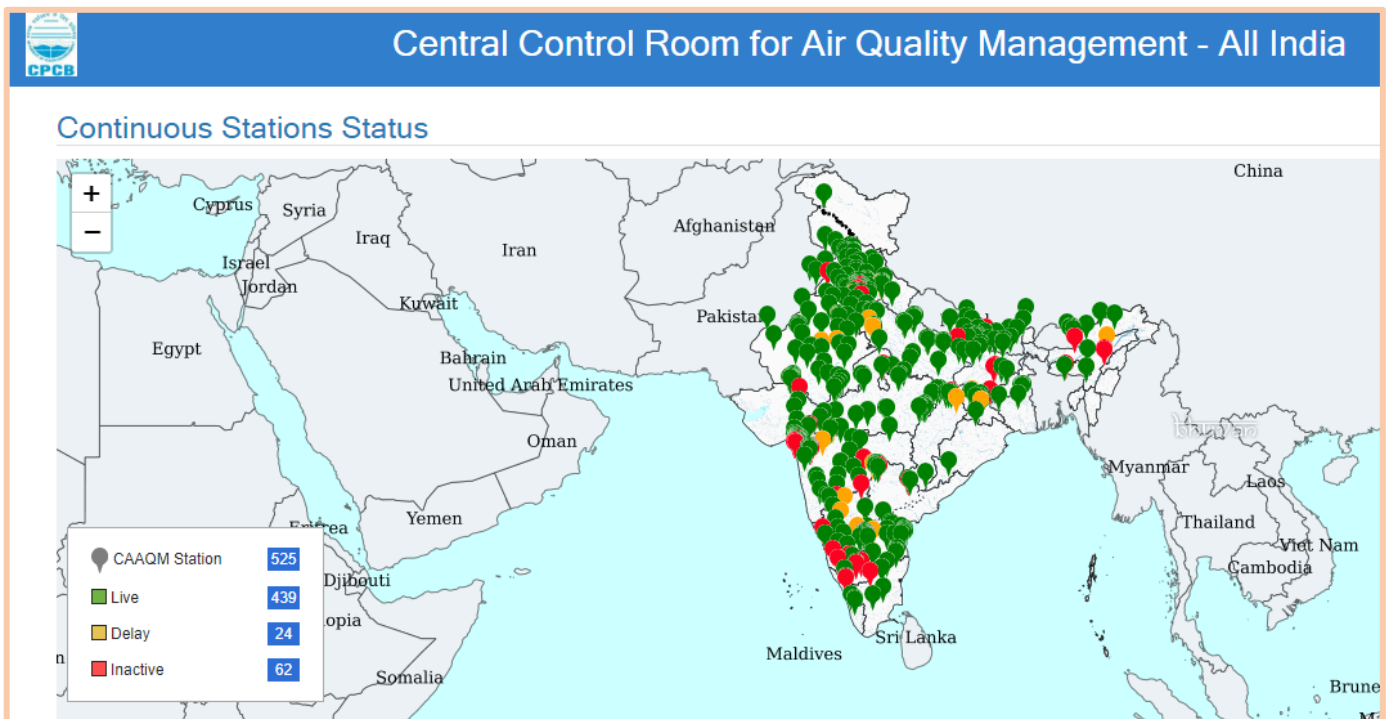
✓ NATIONAL GREEN CORPS (NGC)

Under the NGC programme, about one lakh schools have been identified as Eco-clubs, wherein, nearly thirty lakh students are actively participating in various environment protection and conservation activities, including issues related to air pollution.

National Green Corps

✓ PEOPLE PARTICIPATION AND AWARENESS

Ministry is promoting people participation and awareness building among citizens for environmental conservation that focus on the promotion of cycling, saving water and electricity, growing trees, proper maintenance of vehicles, following lane discipline, and reducing congestion on roads by carpooling etc.
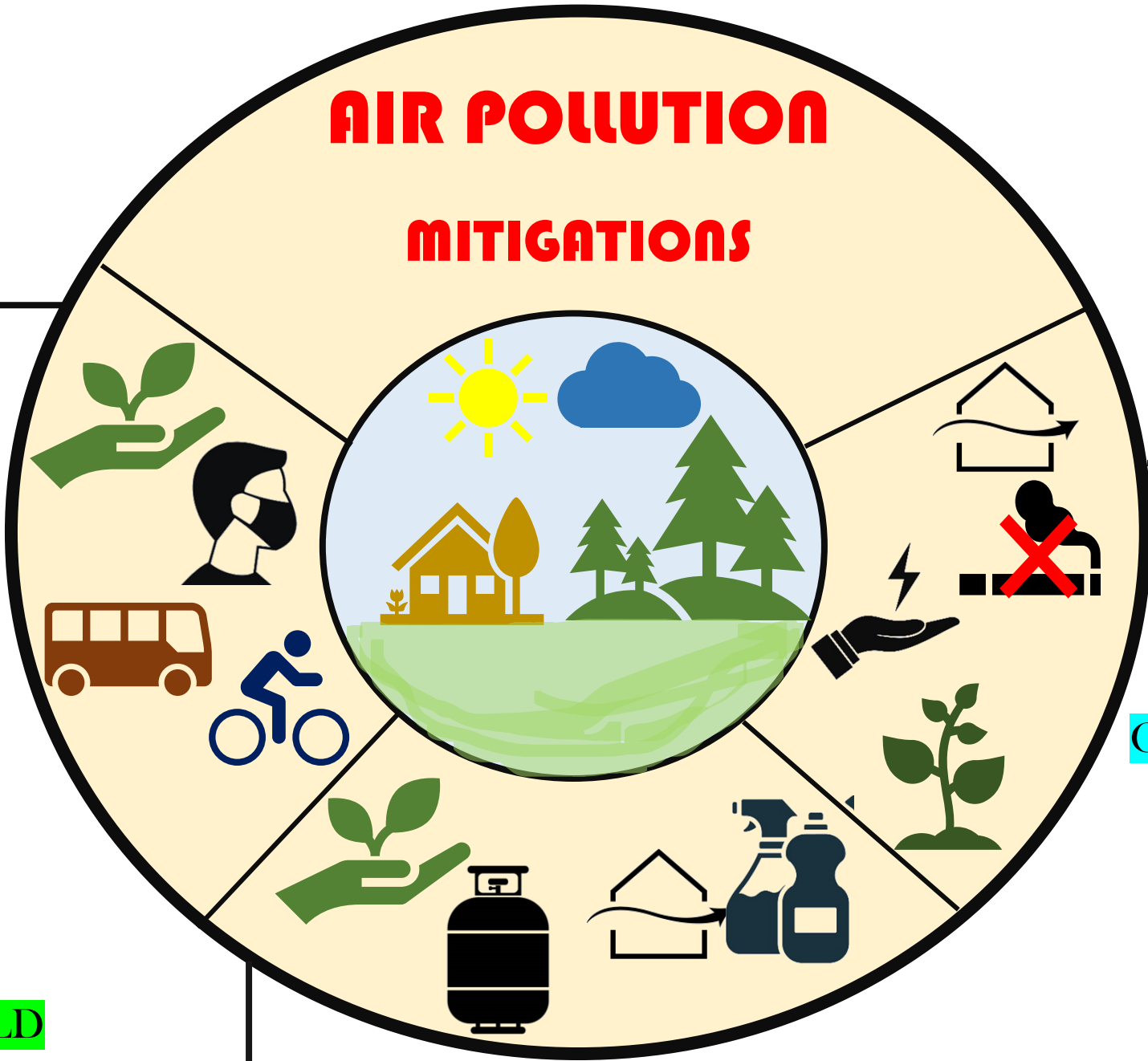
AIR POLLUTION-

THE INVISIBLE THREAT