

# RAMAKRISHNA MISSION RESIDENTIAL COLLEGE

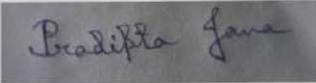


NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE:

AIR POLLUTION IN CITIES AND MEASURES  
TO CONTROL IT

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DEPARTMENT : Physics  
YEAR : 2020  
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## AIR Pollution In Cities and Measures To Control It.

From the beginning of human civilisation man started to exploit the nature. In twenty first century, massive urbanisation not only making disaster to the nature but creating major issues to the man also. In cities this pollution is intensified, specially air pollution. Air pollution is creating major health issues which is a major problem in the planet.

### Air Pollution :-

Air pollution is the presence of substances in the atmosphere that are harmful to the health of humans and other living beings, or caused damage to the climate or different objects.

### Air pollutants in the cities and sources :-

As cities are filled with industries, cars, and people. It is the source almost all kind of pollutants.

Different pollutant and sources are :-

#### ② Carbondioxide (CO<sub>2</sub>) :-

CO<sub>2</sub> is the main 'green house gas' which causes 'global warming'. It reduce the O<sub>2</sub> level in air.

It is mainly produced by cars and industries due to burning of fossil fuel.

### Ⓒ Sulfur Oxides ( $SO_x$ ) :-

$SO_x$  in atmosphere converted to  $H_2SO_4$  in moist. It causes acid rain. It is also poisonous.

It is mainly produced by fossil fuel. Cars and petrochemical industries are common source of it.

### Ⓓ Nitrogen Oxides ( $NO_x$ ) :-

$NO_x$  is a common greenhouse gas and poisonous too.

It is mainly produced by cars.

### Ⓔ Carbonmonoxide (CO) :-

CO is very poisonous gas which may cause death intaked in large amount.

It is produced by the burning of fossil fuel.

### Ⓕ Volatile Organic Compounds (VOC) :-

VOC are well known outdoor air pollutant. They are the organic compound generally used as solvent eg:- Benzene, isoprene, terpenes, methanol etc. They are very poisonous even if taken in small amount. It is proven that they cause cancer.



*Air pollution by cars*

$\text{CH}_4$  is also a VOC which is not poisonous but it is a green house gas.

Mainly house holds, cars and chemical industries, paint are primary source of VOC.

### (vi) SPM (Suspended Particulate Matter) :-

Now-a-days SPM is major pollutant in urban areas. It is the suspended dust particle, asbestos, ash and other harmful particles suspended in air as a ~~solid~~ aerosol.

### (vii) Others :-

CFC, Phosphine, smoke etc are also air pollutant.

### Cause of Pollution in Air in Cities :-

- (i) Cities have very high population densities.
- (ii) ~~Large~~ large number of cars and industries operates in small area.
- (iii) Less regulation of pollution sources.
- (iv) Very poor tree to land ratio.



*Air pollution by industries*

## Effects of Air Pollution!

There are many adverse effects of air pollution which are following!

### ① Smog:

Smoke + fog = Smog. Smog is a intense effect of air pollution. Man-made smog is derived from coal combustion, emission, vehicular emissions, industrial emissions and photochemical reaction.

Due to photochemical reaction smog is composed of ground level Ozone ( $O_3$ ) PAN (Peroxyacetyl nitrate). Smog is a major problem for the cities like 'Los Angeles', 'New Delhi', 'Beijing', 'Lahore' etc.

One of the most dangerous type smog is photochemical smog. It is the chemical reaction of sunlight,  $NO_x$ , VOC in atmosphere, which leaves PAN ground level ozone.

Smog continues to harm human health in cities. It is harmful for senior citizens, children and people with heart and lung conditions such as emphysema, bronchitis and asthma. Smog is responsible for an estimated 9500 pre-mature death in the year 2016 alone.

Smog also causes cancer.



*Smog*

## (ii) Heat Island :-

Due to high concentration of green house gasses and low tree to land ratio, city areas are now heated above the normal temperature. This increases storm and destabilize normal rain wind.

## (iii) Health effects :-

### (a) Mortality :-

World Health Organization estimated in 2014 that every year air pollution causes the premature death of some 7 million people worldwide.

### (b) Cardiovascular disease :-

A 2007 review of evidence found that, ambient air pollution exposure is a risk factor correlating with increased total mortality from cardiovascular events (range: 12% to 14% per  $10 \mu\text{g}/\text{m}^3$  increase)

### (c) Lung disease :-

Research has demonstrated increased risk of developing asthma and COPD from increased exposure to traffic-related air pollution. Additionally, air pollution has been associated with increased hospitalization and mortality from asthma and COPD. Chronic obstructive pulmonary disease (COPD) includes diseases such as chronic bronchitis and emphysema.



*asthma*

## (d) Cancer:

A review of evidence regarding whether ambient air pollution exposure is a risk factor for cancer in 2007 found solid data to conclude that long term exposure to SPM and VOC, increase overall risk of cancer by 6%.

## (e) Affects children and other animals:

Due to pollution children are highly affected. Many diseases and death happen every year due to Air pollution.

Little animals and birds are also very affected, destroying ecological balance.

## (iv) Economic effects:

Air pollution costs the world economy '\$5 trillion' per year as a result of productivity losses and degraded quality of life, according to a study by the World Bank.

## Measures to Control Air Pollution:

Various pollution control technologies and strategies are available to reduce air pollution, which are following-



*lung cancer*

### ① Land-use Planning:-

Using land in proper manner, increase forest areas in cities, removing heavy industry and regulation population density reduce the Air pollution in cities.

### ② Reduction of Fossil Fuel:-

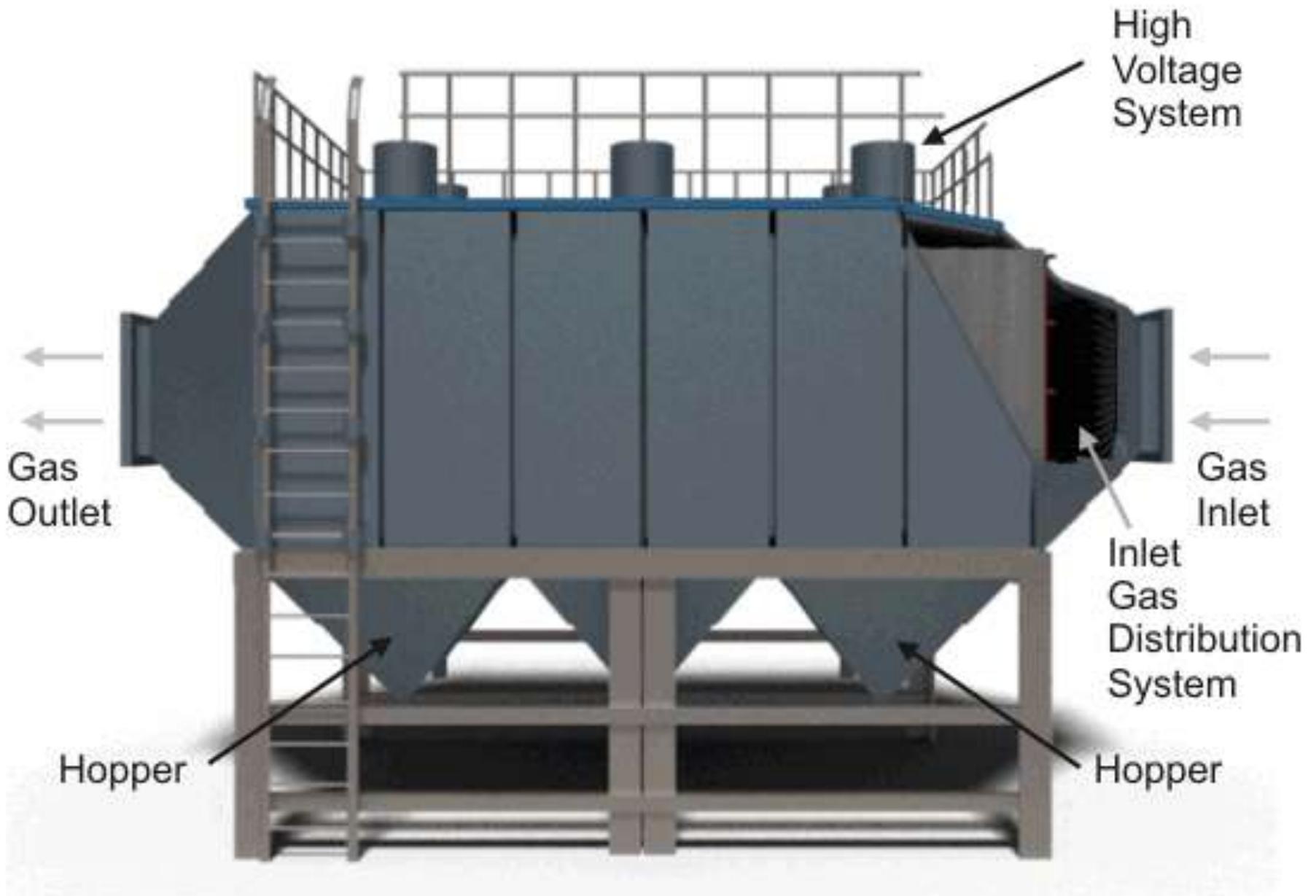
Various efforts are taken to reduce fossil fuel. To reduce air pollution in cities we need to increase the number of solar cells.

### ③ Plantation of trees:-

Trees are very good natural controller of pollutants. Several varieties like snake plant, eucalyptus, agave etc not only absorb  $\text{CO}_2$  but also absorb VOCs.

### ④ Control Devices:-

The following items are commonly used as pollution control devices in industries and transportation. If the devices can be used we can reduce the level of pollution.



*electrostatic precipitator*

## ① Particulate Control:

↳ Mechanical collectors (dust cyclones, multicyclone)

↳ Electrostatic precipitator (ESP) is a particulate control device clean air using induced electrostatic charge

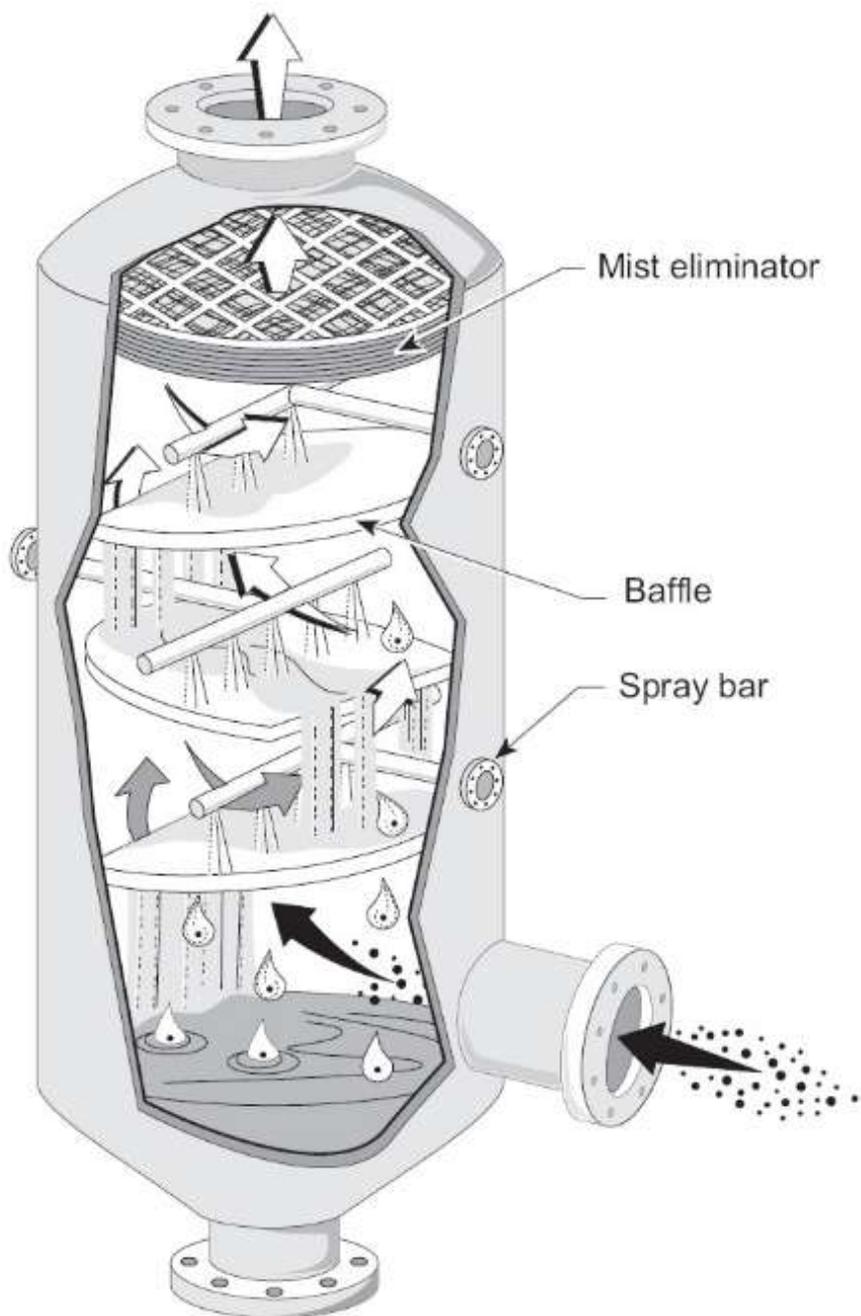
↳ Baghouses are designed to handle heavy dust loads, a dust collector consists of a ~~to~~ blower, dust filter, a filter-cleaning system which removes dust.

↳ Particulate scrubbers is a wet scrubber which remove gasses like  $\text{SO}_x$ ,  $\text{NO}_x$  and  $\text{CO}$ ,  $\text{CO}_2$  as well as SPM

## ② Scrubber:

Scrubber systems are a diverse group of air pollution control devices that can be used to ~~me~~ remove some particles and gasses from industrial exhaust streams. There are different types of scrubber which are:-

- ↳ Baffle spray scrubber
- ↳ Cyclonic spray scrubber
- ↳ Ejector venturi scrubber
- ↳ Mechanically aided scrubber
- ↳ spray tower
- ↳ wet scrubber



*baffle spray scrubber*

### ⊙ NO<sub>x</sub> Control :

There are different tools to control NO<sub>x</sub> emission. Which are

- > Low NO<sub>x</sub> burners
- > selective catalytic reduction
- > Selective non-catalytic reduction
- > NO<sub>x</sub> scrubbers
- > Catalytic converter

### ⊙ VOC abatement :

Many plants absorb VOCs. We can use : activated carbon filter, flares, Thermal oxidizers etc to reduce it.

### ⊙ SO<sub>2</sub> Control :

$SO_2 + H_2O \rightarrow H_2SO_4$  as SO<sub>2</sub> become H<sub>2</sub>SO<sub>4</sub> in moist wet scrubber is useful

### Ⓔ Controlling Vehicle Emission :

Vehicle Emission can be control by using new engines, biofuel, We also need to increase electric cars, odd-Even system employed in Delhi is also a very good technique.

### Ⓕ Public Awareness :

Public Awareness is the key to stop any kind of environmental pollution. Because human is the main cause of pollution. If people are educated to



*Dust cyclone air cleaner*

stop pollution then it is just a matter of  
Awared people.

### ④ Government and Geopolitical steps:-

Government of many countries as well  
as UN have taken steps to reduce air pollution  
If the law suits are effectively implemented  
then we can easily reduce Air pollution  
in cities.

### Conclusion:-

Cities are the economic life lines of  
the country. Educational, economic, industrial  
power houses are majorly located in cities.  
But air pollution causing lots of damage.  
So, we need to reduce air pollution as much  
and as soon as possible to improve our  
lives.

### Acknowledgement :-

I convey my deep sense of gratitude  
to sir for giving me the option to write  
on 'Air Pollution in cities' project. I am also  
very thankful to 'Wikipedia' and 'National  
geographic' community in the internet for  
serving me with gigantic data bases

Date: 14 Nov, 2020

Pradiptha Jana  
signature of  
student

## CERTIFICATE

Certified that the project work submitted by Pradipta Jana is done under the supervision of our honourable sir as a part of curriculum for the partial fulfillment of the class - V<sub>B</sub> 2<sup>nd</sup> semester

Date:-

Signature of  
the Teacher

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## ENVIRONMENTAL STUDIES

PROJECT TITLE:

Air Pollution in cities  
and measures to control it.

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P-①

## ▣ Air Pollution in cities and Measures to control it :- →

### • Air Pollution :- →

Air pollution is the occurrence or addition of foreign particles, gases or pollutants in the air which have an adverse effect on human beings, animals, vegetation etc.

Particulate in air of size  $2.5 \mu\text{m}$  or less in diameter are responsible for causing the greatest harm to human health. (According to Central Pollution Control Board [CPCB])

### • Air Pollution in cities :- →

→ In 1990's, Delhi ranked 4th place among the 41 most polluted cities around the world.

→ In India, Delhi leads the other cities, in its level of air pollution.

→ Air quality and pollution city ranking :- →

- |                            |                     |
|----------------------------|---------------------|
| (1) Delhi (India)          | (4) Hanoi (Vietnam) |
| (2) Lahore (Pakistan)      |                     |
| (3) Ulaanbaatar (Mongolia) |                     |

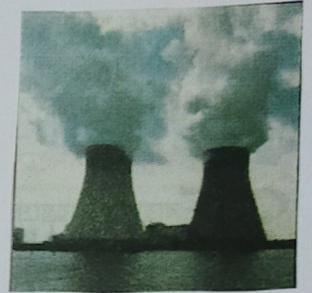
Name :- Pratham Dasgupta  
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P-(2)

• Sources of air pollution :-

(1) Combustion of natural gas, petroleum, coal etc.

(2) Chemical industries that produce pesticides, fertilizers and weedicides etc.



(3) Metallurgical processing Industries

(4) Cosmetic industries.

(5) Welding, Stone crushing etc.



Thermal Power-plant

(6) Processing industries like cotton textiles, asbestos etc.

(7) Pollutants from auto-mobiles, locomotives, aircraft etc.

(8) Smoking in public places.

(9) Smokestack of thermal power plants, smelters and other industries etc.



Use of pesticides

(10) Incomplete or complete combustion of wood and charcoal produce CO, CO<sub>2</sub> etc.

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### ① Primary air pollutants :- $\rightarrow$

Primary air pollutants include directly emitted substances from some of the identifiable sources. The major primary pollutants are  $\text{CO}_2$ ,  $\text{CO}$ ,  $\text{NO}_x$ ,  $\text{SO}_x$ ,  $\text{H}_2\text{S}$ , hydrocarbons, particulate matter, DDT, CFC etc.



### ② Secondary air pollutants :- $\rightarrow$



Vehicles

They are formed by reaction among the primary pollutants. For examples, two primary pollutants namely, nitrogen oxides and hydrocarbons, produced from motor-vehicles react in the presence of sunlight to form Secondary air pollutants. This includes photochemical oxidants such as peroxyacetyl nitrate (PAN) ozone, aldehydes, smog and many others etc.



Fly ash



Spray

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P-④

- Smog :-> It is a dark or opaque fog formed by condensation of water vapours, dust, smoke particles, and also various gaseous pollutants such as  $\text{NO}_2$ ,  $\text{SO}_2$ ,  $\text{H}_2\text{S}$  etc.

(a) Classical Smog :->

It is dark brown and opaque, formed by condensation of water vapours with  $\text{H}_2\text{S}$  and  $\text{SO}_2$  over dust or smoke particles at low temperature.



(b) Photochemical Smog :->

It contains secondary pollutants as well as photochemical oxidants.

It is grey or yellowish brown, opaque smog formed at high temperature over cities and towns due to still air, emission of  $\text{NO}_x$  (nitrogen oxides) and volatile hydrocarbons from auto-mobile exhausts and solar energy.

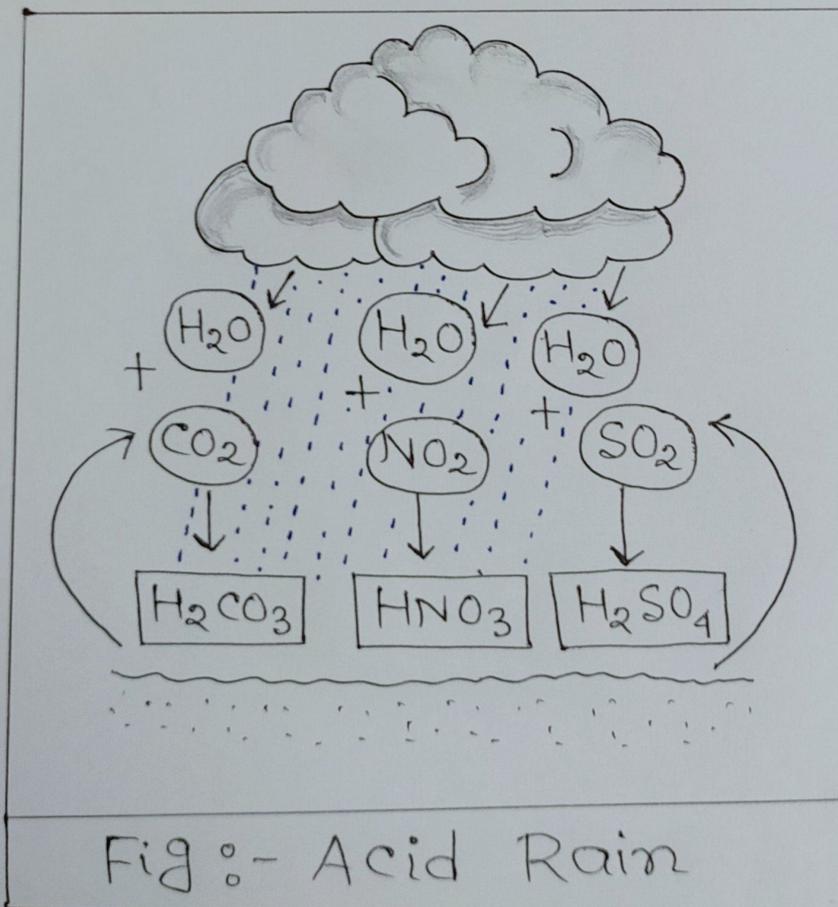
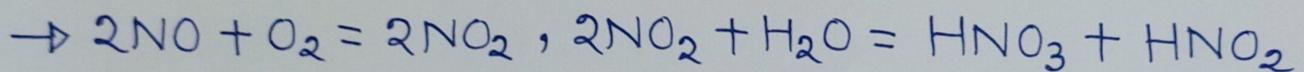
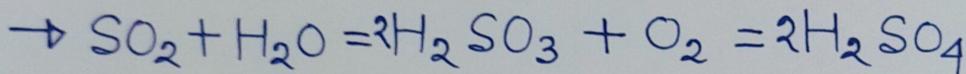


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### • Acid Rain :->

It is the rainfall and other forms of precipitation with a pH (< 5). pH of normal rain is 5.6 - 6.5. Acid rain is caused by large scale emission of acidic gases into the atmosphere.  $\text{SO}_2$  and  $\text{NO}_x$  may react with moisture to form  $\text{H}_2\text{SO}_4$  and  $\text{HNO}_3$  respectively.



(i) Reduces the rate of photosynthesis and growth.

(ii) Increase sensitivity to drought and disease etc.

Marble statues and buildings are corroded by acid rain.

e.g. :- Taj mahal in India is affected by the acid rain.

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• Effects of Air pollution on Human Health in cities :-



(1) CO is highly toxic and impairs respiration. At high concentration, it is proved to be fatal.



Smoking

(2) SO<sub>2</sub> causes irritation of throat and eyes, suffocation and also respiratory diseases etc.



Black Lungs Disease

(3) Particulate matters cause respiratory problem, like silicosis, asbestosis etc.

(4) Nitrogen dioxide causes irritation, bronchitis, oedema of lungs.

(5) Fluorides cause fluorosis, neuro-muscular disorder, dental disorder etc.



Normal lungs

Lungs Cancer

(6) Aerosols (vapour chemicals) cause O<sub>3</sub> depletion leading to Global Warming.

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• Control of air pollution in cities :->  
Some new devices are most widely used for controlling air pollution :-

① Settling chamber :-

To remove the large particulates.

② Bag filters :-> Fabric bags are used to collect the dust like common vacuum cleaner.

③ Gas scrubbers :->

It is used for dissolving gases.

④ Electrostatic precipitators :->

In power plants, charged particulate matters are separated and also collected through pipe.

⑤ Absorption :->

It use activated carbon to capture air pollutants.

⑥ Catalytic combustion :->

Use of catalyst to remove pollutants from the air.

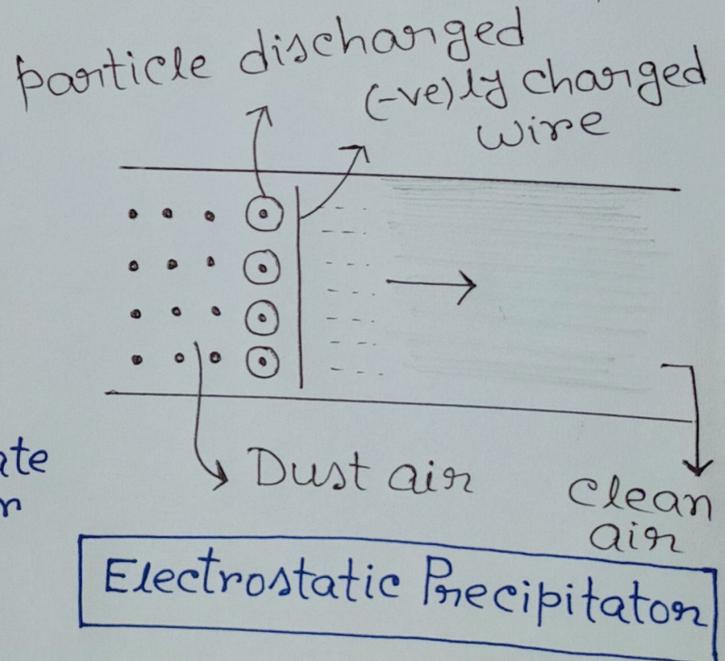
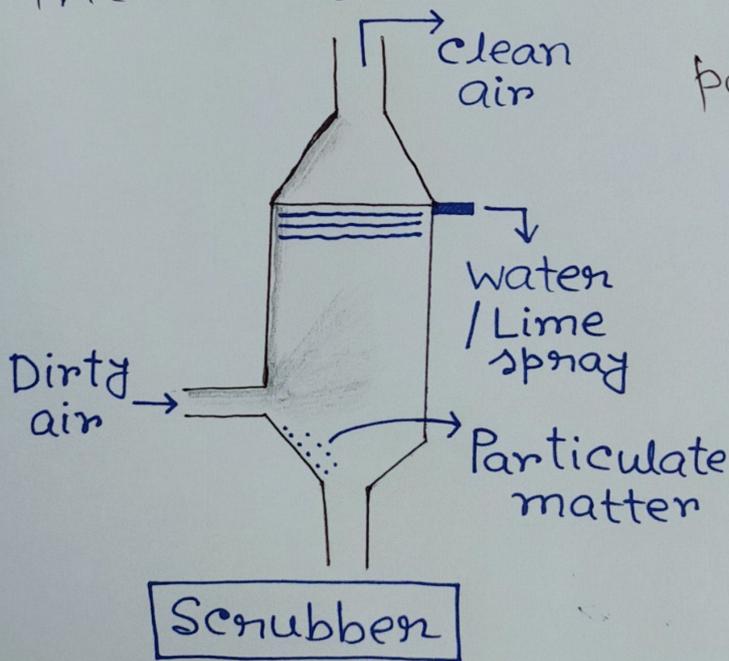
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⑦ Wet Collector :-

It promotes the contact between air and water, and wet particles settle down. Water is introduced through a narrow throat section.

⑧ Cyclonic Separators :-

The dirty air is blasted into a conical cylinder. This creates a violent swirl within the cone, the heavy materials migrate to the wall and exit from the bottom of the cone. The clean air exit out from the top.



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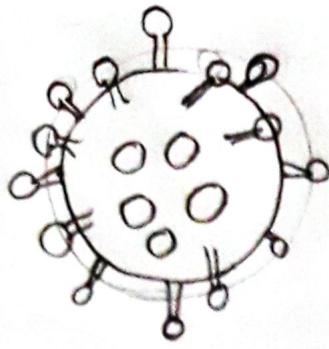
NARENDRAPUR

## ENVIRONMENTAL STUDIES

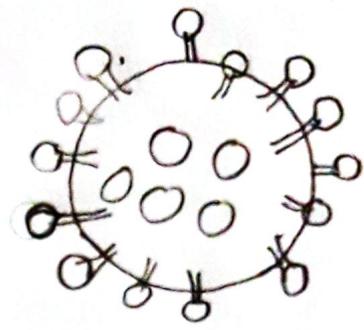
PROJECT TITLE:

Coronavirus pandemic and role of  
Common people to control it.

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YEAR : 2020  
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# CORONA - -VIRUS PANDEMIC



The COVID-19 Pandemic, also known as the Coronavirus pandemic, is an ongoing pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first identified in December 2019 in Wuhan, China.

The outbreak was declared a public health Emergency of International concern in January 2020 and a pandemic in March 2020. As of 9 November 2020, more than 50.3 million cases have been confirmed, with more than 1.25 million deaths attributed to COVID-19, and more than 32.8 million recovered.

# ① What is Pandemic?

A pandemic describes an infectious disease where we see significant and ongoing person to person spread in multiple countries around the world at the same time.

pandemics are more likely if a virus is brand new able to infect people easily and can spread from person-to-person in an efficient and sustained way.

## ① COVID-19 PANDEMIC:

▲ Coronavirus appears to tick all of those boxes.

▲ With no vaccine or treatment that can prevent it.



▲ Yet, containing its spread is vital.

▲ ON 11th March, WHO chief declared COVID-19 a pandemic.

## ① Cause:

As described by U.S National Institutes of Health, it is successor to SARS-CoV-1, the strain that caused the 2002-2004 SARS outbreak.

The virus primarily spreads between people through close contact and via respiratory droplets produced from coughs or sneezes. It is mainly enters human cells by binding to the receptor ACE-2.

## ① Signs and symptoms:

Symptoms of COVID-19 can be relatively non-specific. Two most common symptoms are fever (88%) and dry cough (68%).

Less common symptoms include —

▲ fatigue, loss of sense of smell, loss of taste, shortness of breath, muscle and joint pain, sore throat, headache, vomiting and rash.

Among those who develop symptoms, approximately one in five may become more seriously ill and have difficulty breathing. Emergency symptoms include difficulty breathing.

Further development of the disease can lead to complications including pneumonia, acute respiratory distress syndrome, septic shock and kidney failure.

But most of the COVID positive are asymptomatic.

① Diagnosis :

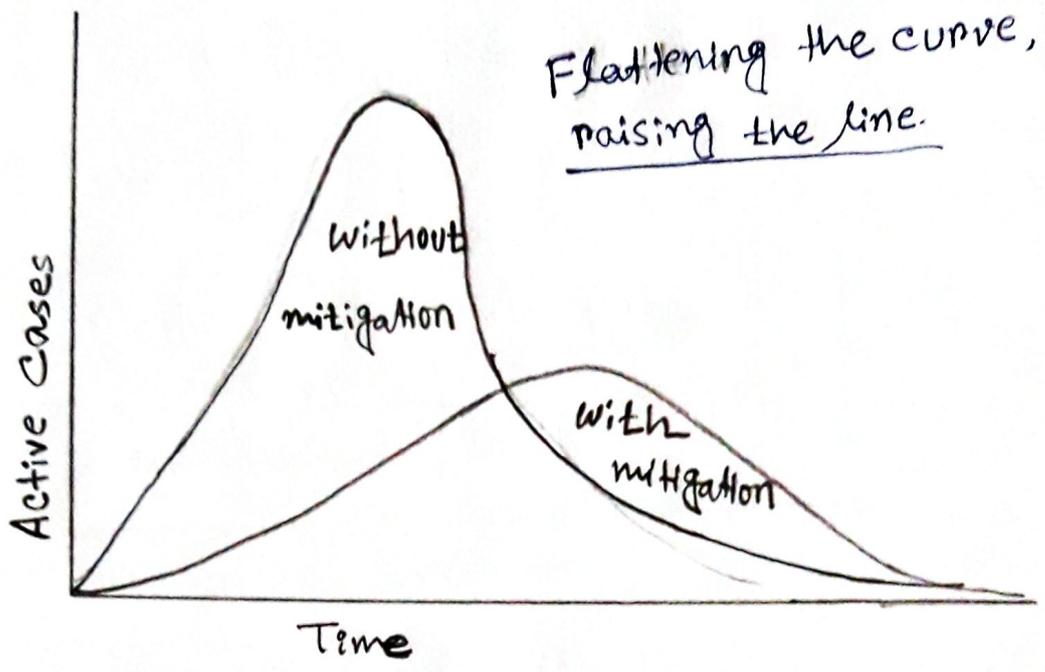
COVID-19 can provisionally be diagnosed on the basis of symptoms and confirmed using RT-PCR testing of infected secretions or CT imaging of the chest.

viral testing :

A number of laboratories have developed serological tests, which detect antibodies produced by the body in response to infection.

# ① Mitigation :

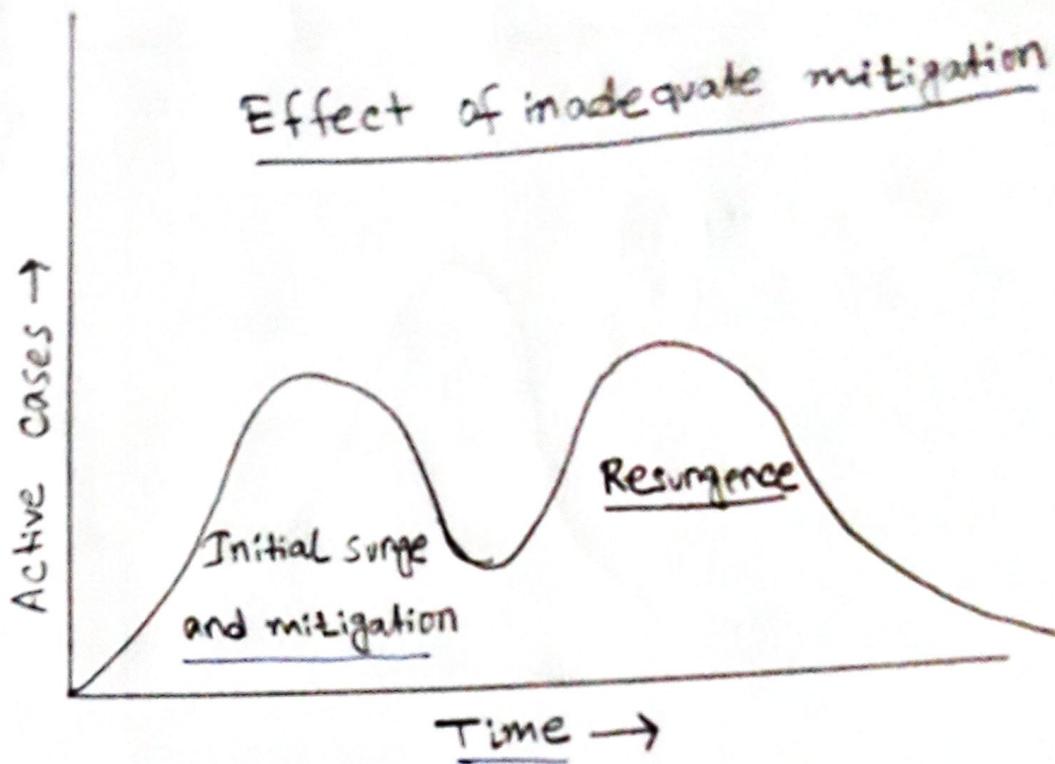
Screening, containment and mitigation.



Goals of mitigation include delaying and reducing peak burden on healthcare (flattening the curve) and lessening overall cases and health impact.

Moreover, progressively greater increase in healthcare capacity (raising the line) such as by increasing bed count, personnel, and equipment, help to meet increased demand.

① hand-hygiene, wearing face masks, self-quarantine, physical distancing, closing schools and cancelling mass gathering events may manage outbreak of virus.



Mitigation attempts that are inadequate in strictness or duration — such as premature relaxation of distancing rules or stay-at-home orders — can allow a resurgence after the initial surge and mitigation.

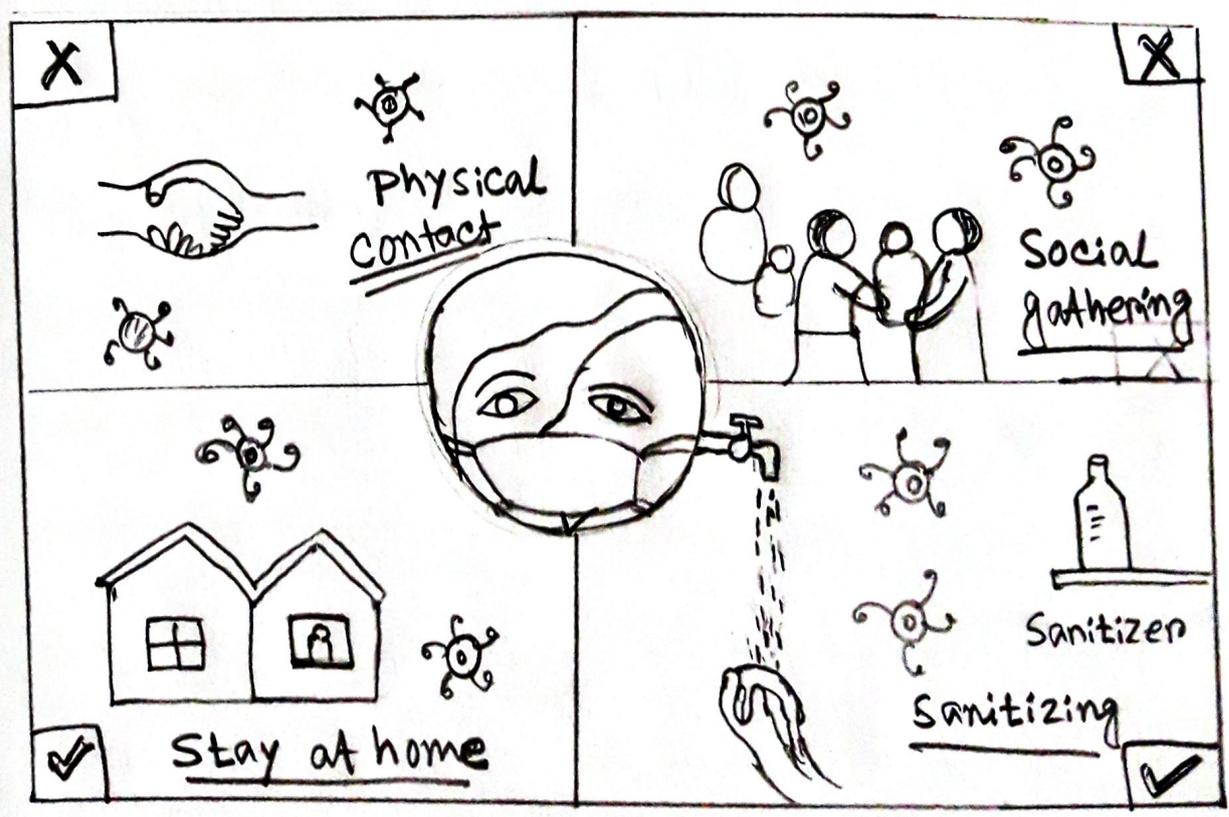
① Strategies in the control of an outbreak are screening, containment (or suppression), and mitigation.

① Contact tracing is an important method for health authorities to determine source of infection.

# Role of Common people to Control COVID-19 Pandemic :

The ongoing COVID-19 pandemic has shown us something that most of us haven't seen in our lifetimes: Large numbers of people unable to have two meals a day.

The lockdown has come with many restrictions to our work. yet, there is plenty we can do to help communities, hold governments accountable, and ensure that the vulnerable have a voice.



## ① Stand in Solidarity with those delivering essential services:

COVID-19 is a high risk disease, and we need to be very careful; we cannot simply lock ourselves in our homes, because then those who are most vulnerable will not survive. Essential services absolutely have to continue. We have to build systems and mechanisms for safe delivery of services, and public servants have to be motivated, and given economic and moral support. Civil society organisations have a huge role to play as well.

We need to chart vital services required today, such as delivering nations and caregiving, and show to the government how people can be employed in these roles. These will not only help communities affected by the pandemic, but the mechanism of doing so might help others in turn.

⑩ Work with the government :

The role of civil society does not stop at putting pressure on the government. There are many areas that the government is unable to reach; we have to reach there. We have to use our transparency and accountability mechanisms to monitor the government's work and make sure state resources are well-used. We also need to proactively find the gaps, and help fill those gaps.

The government structure is working well in some areas and not working in others. In some of those places, the government is itself asking for our help. Given the enormity of the intervention required, the government cannot do it on its own, and civil society cannot replace the vast role.

We must also work with local governments, help people access relief measures down to every rural and urban ward.

## ① Build a network of Civil Society:

Civil society will have to build a network that cuts across the country. We will need to map the different organisations and groups providing relief in every district, block and down to every village. We can do this <sup>if</sup> we have power of civil network.

The strength of civil society lies in knowing and being the small, decentralised units that have taken responsibility for their entire area — identifying the number of people in the area, the relief needed, the gaps in government relief, the challenges on the ground and so on.

## ② Continue Social movements in innovative ways:

We might not be able to organise rallies or protests during the lockdown, but social movements must not stop finding ways to mobilise public opinion. When the lockdown first happened, we have to explore all options that help put

Pressure on the government.

We can engage with the state, send press notes, exchange information within our networks of civil society organisations, and document what's happening on the ground. This way we can raise issues at the state and national level. There are restrictions everywhere, but we cannot stop. We have to be innovative.

① If the government does not listen, we have to make them listen:

Therefore, if the government does not listen, we have to make them listen. I believe the people of this country know how to engage with the government — even when we disagree with our leaders, or they don't listen to us. We live in a constitutional democracy, and the mantle therefore lies with citizens and civil society organisations to recreate society on the principles of equality and solidarity.

In the short term, this means that we need to build a national movement to ensure that everyone gets access to food, livelihood and healthcare.

I believe there is plenty we can do.

- ① We must recognise the contribution of migrant workers, and build respect for them and their work — not as a favour, but as a means to empower them.

We — the common people must continue writing for newspapers and alternative media to highlight the situation of the most vulnerable, and do it in a more organised way, by taking the unheard ~~video~~ voices and disseminating them using our networks. These must not <sup>just</sup> be confined to stories of suffering, but include positive stories and creative practices as well — of people working together despite socio-economic differences.

① How much attention we pay to the millions who have been worst affected by COVID-19 and the lockdown will determine whether or not we come out of the crisis.

Apart from this, each of us needs to think hard of the ways in which we can contribute.

As individuals, we can immediately start looking at those around us — in our villages and our localities.

We don't realise how powerful the middle-class, English-speaking elite in India is; if they raise their voice enough, we will see improved situations around us.

And lastly, we need to amplify voice of common people to ensure that the most vulnerable get the most support

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ENVIRONMENTAL STUDIES

PROJECT TITLE:

The Nitrogen cycle and its  
importance for the living  
being.

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DEPARTMENT : Mathematics  
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SIGNATURE : Pritam Gzain

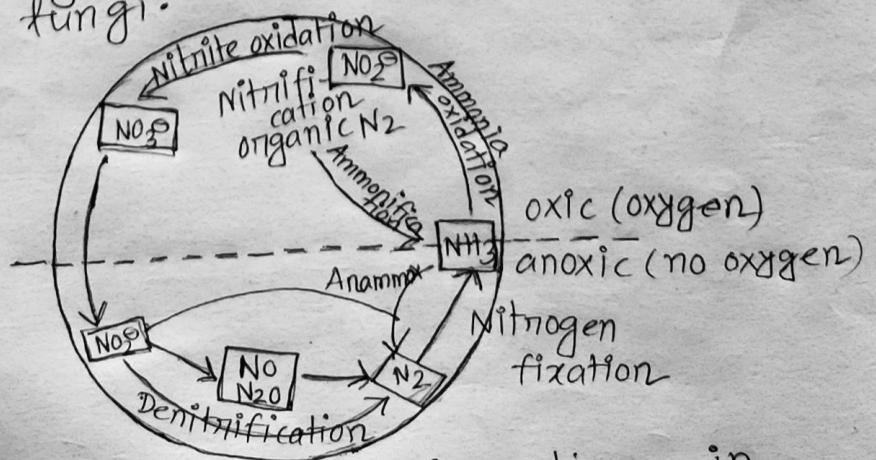
ENVS PROJECTThe Nitrogen cycle and its importance for living being

Nitrogen is one of the primary nutrients critical for the survive of all living organisms. Although the nitrogen is very abundant in the atmosphere, it is largely inaccessible in this form of most organisms. This explores how nitrogen becomes available to organisms and what changes in nitrogen levels as a result of human activity means to local and global ecosystem.

Nitrogen is necessary component of many biomolecules including proteins, DNA and chlorophyll. Although nitrogen is very abundant in the atmosphere as dinitrogen gas ( $N_2$ ), it is largely inaccessible in the form of organisms, making nitrogen a scarce resource and often limiting primary productivity in many ecosystem. Only when nitrogen is converted from dinitrogen gas ( $N_2$ ) into ammonia ( $NH_3$ ) does it become available to primary products, such as plants.

In addition,  $N_2$  &  $NH_3$  / nitrogen exists in many different form, including both inorganic (ammonia, nitrate) and organic (amino & nucleic acid)

The nitrogen undergoes many different transformations in the ecosystem, changing from one form to another as ~~org~~ organisms use it for growth and, in some cases, energy. The major transformations of nitrogen are nitrogen fixation, nitrification, denitrification, anammox, and ammonification. The transformation of nitrogen into its many oxidation states is key to productivity in the biosphere, and is highly dependent on the activities of a diverse assemblage of microorganisms, such as bacteria, archaea, and fungi.

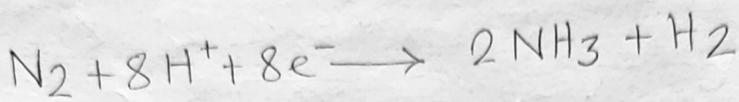


Major transformations in the  $N_2$ -cycle.

Since the mid-1900s, humans have been exerting an ever increasing global nitrogen cycle. Such as making fertilizers and burning fossil fuels, have significantly altered the amount of fixed nitrogen in the Earth's ecosystem. In fact, some predict that by 2030, the amount of nitrogen fixed by human activities will exceed that fixed by microbial process.

### III NITROGEN FIXATION

Nitrogen gas ( $N_2$ ) makes up nearly 80% of the Earth's atmosphere, yet nitrogen is often the nutrient and limits primary production in many ecosystems. Because plants and animals are not able to use nitrogen gas ( $N_2$ ) in this form. For nitrogen to be available to make proteins, DNA, and other biologically important components, it must first be converted into a different chemical form. The process of converting  $N_2$  into biologically available nitrogen is called nitrogen fixation.  $N_2$  is very stable due to the strength of triple bond btw N atoms. It requires large amount of energy. The whole process requires a large amount of energy to break the bonds, eight electrons and least sixteen ATP molecules. Only prokaryotes are able to carry out this energetically demanding process.



Some nitrogen fixing organisms are free living while others are symbiotic nitrogen-fixers, which requires close association with a host to carry out.

Most of the symbiotic associations are very specific and have complex mechanisms that help to maintain the symbiosis.

EX: Root exudates from legumes plants and serve as a signal to certain species of *Rhizobium*, which are nitrogen fixing bacteria.

Some of these bacteria are aerobic, others are anaerobic, some are phototropic, others are chemotropic.

Although there is great physiological and phylogenetic diversity among the organisms that carry out nitrogen fixation they all have a similar enzyme

complex called nitrogenase that catalyzes the reduction of  $\text{N}_2$  to  $\text{NH}_3$  (Ammonia), which can be used as a genetic marker to identify the potential for nitrogen fixation. Some cyanobacteria

have structures called heterocysts that provide a low-oxygen environment for the enzyme and serves as the site where all the nitrogen fixation occurs in these organisms.

Genus	phylogenetic Affiliation	Lifestyle
Nostoc. Anabena	Bacteria (cyano)	free living aerobic phototropic.
Pseudomonas. Azotobacter Methylomonas	Bacteria	free living aerobic. chemoorganotropic
Methanosarcina. Methanococcus.	Archaea	free living anaerobic
Rhizobium, Frankia	Bacteria	symbiotic. aerobic.

⇒ Representative prokaryotes known to carry out the nitrogen-fixation:

### NITRIFICATION

Nitrification is the process that converts ammonia to nitrate and is another important step in the global nitrogen cycle. Most nitrification occurs aerobically and is carried out by prokaryotes. There are two distinct steps of nitrification they are carried out by distinct type of microorganisms. The first step is the oxidation of ammonia to nitrate, which is carried out by microbes known as ammonia-oxidizers. Aerobic ammonia oxidizers convert ammonia to nitrate via intermediate hydroxylamine, a process that requires two enzymes, ammonia monooxygenase and hydroxylamine oxidoreductase. The process generates a very small amount of energy relative to many other types of metabolism.

Additionally, aerobic ammonia oxidizers are also autotrophs - fixing  $\text{CO}_2$  to produce organic carbon, much like photosynthetic organisms, but using ammonia as the energy source instead of light.

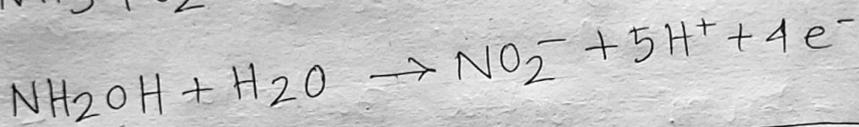
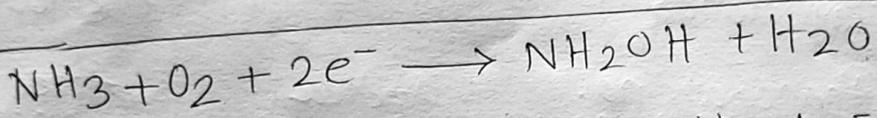
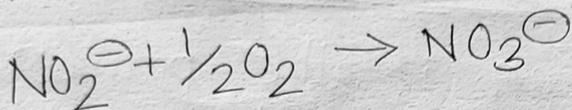


Figure: - chemical reaction of ammonia oxidation carried out by bacteria.

Unlike nitrogen fixation is carried out by many different kinds of microbes, ammonia oxidation is less broadly distributed among prokaryotes. Until recently - it was thought that all ammonia oxidation is carried out by only a few types of bacteria in the genera *Nitrosomonas*, *Nitrosospira*, and *Nitrosococcus*.

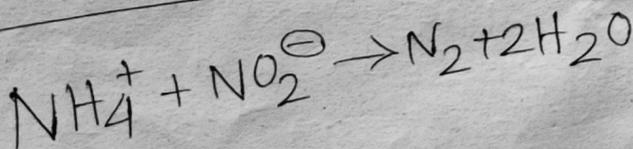
In the second step in nitrification is the oxidation of nitrite ( $\text{NO}_2^-$ ) to nitrate ( $\text{NO}_3^-$ ). This step is carried by completely separate group of prokaryotes, known as nitrite-oxidizing bacteria. Some of the general involved in nitrite oxidation include *Nitrosospira*, *Nitrobacter*, *Nitrococcus*.



chemical reaction of nitrate oxidation

### ANAMMOX

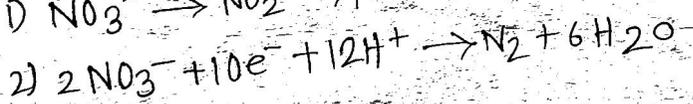
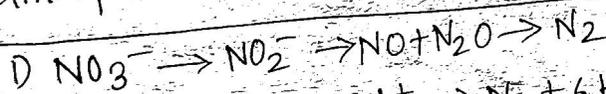
Traditionally, all nitrification ~~was~~ was thought to be carried out under aerobic conditions, but recently a new type of ammonia oxidation occurring under anoxic conditions was discovered by Anammox. Anammox is carried out by prokaryotes belonging to the planctomycetes phylum of Bacteria. Anammox bacteria oxidize ammonia by using nitrite as the electron acceptor to produce gaseous nitrogen. Whether Anammox bacteria is responsible for nitrogen loss in the ocean.



chemical reaction of anaerobic ammonia oxidation

## DENITRIFICATION

Denitrification is the process that converts nitrate to nitrogen gas, thus removing bioavailable nitrogen and returning it to the atmosphere.  $N_2$  is the ultimate and product of denitrification, but other intermediate gaseous forms of nitrogen exist. Some of these gasses, such as nitrous oxide ( $N_2O$ ), are considered as greenhouse gases, reacting with ozone & contribution in air pollution.



### Reactions involved in denitrification

unlike nitrification, denitrification is an anaerobic process, occurring mostly in soils and sediments and anoxic zones in lakes & oceans. Some denitrifying bacteria is *Bacillus*, *Paracoccus* and *Pseudomonas*. Denitrifiers are chemorganotrophs and thus must also be supplied with some form of organic carbon. Denitrification is important in that it removes fixed nitrogen from the ecosystem and returns it to the atmosphere in a biologically inert form ( $N_2$ ).

## AMMONIFICATION

When an organism excretes waste or dies, the nitrogen in its tissues is in the form of organic nitrogen (amino acids, DNA). Various fungi and prokaryotes then decompose the tissue and release nitrogen back into the ~~ecos~~ ecosystem as ammonia in the process known as ammonification.

### ⇒ Ecological Implications of Human Alterations to the $N_2$ -cycle:

Many human activities have a significant impact on the nitrogen-cycle. Burning fossil fuels, application of nitrogen based fertilizers, and other activities can dramatically increase the amount of biologically available nitrogen in an ecosystem. And because nitrogen availability often limits the primary productivity of many ecosystems, large changes in the availability of  $N_2$  can lead to severe alterations of the  $N_2$  cycle in both aquatic and terrestrial ecosystems. Industrial  $N_2$  fixation ~~can~~ has increased exponentially since the 1940s, and human activity has doubled the amount of global nitrogen fixation.

In terrestrial ecosystems, the addition of nitrogen can lead to nutrient imbalance in trees, changes in forest health and declines in biodiversity. With increased nitrogen availability there is often change in carbon storage, thus impacting more processes than just the nitrogen cycle.

In agricultural system, fertilizers are used extensively to increase the plant production, but unused nitrogen, usually in the form of nitrate, can leach out the soil, enter streams and rivers, and ultimately makes its own way into our drinking water.

Much of nitrogen applied to agriculture and urban areas ultimately enters rivers and nearshore coastal system.

In nearshore marine systems, increases in nitrogen can often lead to anoxia (no oxygen) or hypoxia (low oxygen), altered biodiversity, changes in food web structure, and general habitat degradation. One common consequences of increased nitrogen is an increase in harmful algal blooms. Toxic blooms of certain type of dinoflagellates have been associated with high fish and shellfish mortality in some areas.



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE:

Air pollution in cities and measures to  
control it

NAME : Pritam Sadhukhan  
COLLEGE ROLL NO : HUKR/022/19  
DEPARTMENT : History Department  
YEAR : 2020  
SIGNATURE : Pritam Sadhukhan



বিশ্বের অবশেষে স্থাপিত বিহীন জমির :-  
২০০৯ খ্রিস্টাব্দে পরিচালিত

নং	জমির	নং	জমির
<u>১</u>	গাজিপুর, জেলা	<u>২০</u>	শিবপুর, জেলা
<u>২</u>	শোভার, চিত্র	<u>২১</u>	চাকা, বাগলাচালি
<u>৩</u>	কুমিল্লাবালি, পান্ডিতুল	<u>২২</u>	পাটনা, জেলা
<u>৪</u>	মোজালাবাদ, পান্ডিতুল	<u>২৩</u>	পান্ডিতুল, জেলা
<u>৫</u>	দিল্লি, জেলা	<u>২৪</u>	দক্ষিণ আর্সেবোড
<u>৬</u>	নমুজা, জেলা	<u>২৫</u>	কুমিল্লাবালি, জেলা
<u>৭</u>	কুমিল্লাবালি, জেলা	<u>২৬</u>	মির্জাপুর, জেলা
<u>৮</u>	কুমিল্লাবালি, পান্ডিতুল	<u>২৭</u>	কুমিল্লাবালি, পান্ডিতুল
<u>৯</u>	কুমিল্লাবালি, জেলা	<u>২৮</u>	কুমিল্লাবালি, জেলা
<u>১০</u>	কুমিল্লাবালি, জেলা	<u>২৯</u>	মৌলভীবাজার, জেলা
<u>১১</u>	কুমিল্লাবালি, জেলা	<u>৩০</u>	মৌলভীবাজার, জেলা
<u>১২</u>	লাহোর, পান্ডিতুল	<u>৩১</u>	মির্জাপুর, জেলা
<u>১৩</u>	কুমিল্লাবালি, জেলা	<u>৩২</u>	আর্সেবোড, চিত্র
<u>১৪</u>	কুমিল্লাবালি, জেলা	<u>৩৩</u>	আর্সেবোড, চিত্র
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<u>২০</u>	কুমিল্লাবালি, জেলা	<u>৩৯</u>	কুমিল্লাবালি, চিত্র
<u>২১</u>	কুমিল্লাবালি, জেলা	<u>৪০</u>	কুমিল্লাবালি, চিত্র

বাসু-দূর্ভোগের কারণসমূহ :-

কহরাসুড়ুলে বাসু-দূর্ভোগের প্রচুর কারণ আছে যেগুলি অল্পকেনিষ্টে আলোচনা করা হল -

১) জীবাণু স্ফালনীর দূর্ভোগ :- জীবাণুসমূহের অধিকতর বাসু-দূর্ভোগ অধুনা হওয়ায় অল্পকেনিষ্টে জীবাণু স্ফালনীর ক্ষয়ক্ষতির দূর্ভোগ দাঁড়াইয়াছে। কামলা, তেল, ত্যাগোন্নত ইত্যাদি স্ফালনীর ক্ষয়ক্ষতি হওয়ায় উদ্ভিদে অধিকতর বাসু-দূর্ভোগের কারণে উদ্ভিদে অধিকতর জীবাণু স্ফালনীর জীবাণুসমূহের দূর্ভোগ মূলত জীবাণুসমূহের ক্ষয়ক্ষতি কারণে হইয়াছে। অধিকতর জীবাণু স্ফালনীর ক্ষয়ক্ষতি হইয়াছে। অধিকতর জীবাণু স্ফালনীর ক্ষয়ক্ষতি হইয়াছে। অধিকতর জীবাণু স্ফালনীর ক্ষয়ক্ষতি হইয়াছে।

২) কলকারখানার নিষ্কাশিত বর্জ্য :- কলকারখানার উদ্ভিদে অধিকতর বাসু-দূর্ভোগের কারণে কলকারখানার বর্জ্যের ক্ষয়ক্ষতি হইয়াছে। কলকারখানার বর্জ্যের ক্ষয়ক্ষতি হইয়াছে। কলকারখানার বর্জ্যের ক্ষয়ক্ষতি হইয়াছে। কলকারখানার বর্জ্যের ক্ষয়ক্ষতি হইয়াছে।

৩) বন্যাসুড়ুলের দূর্ভোগ :- বন্যাসুড়ুলের দূর্ভোগের কারণে বন্যাসুড়ুলের দূর্ভোগ হইয়াছে। বন্যাসুড়ুলের দূর্ভোগ হইয়াছে। বন্যাসুড়ুলের দূর্ভোগ হইয়াছে। বন্যাসুড়ুলের দূর্ভোগ হইয়াছে।

৪) উদ্ভিদসমূহের আবর্তন দূর্ভোগ :- উদ্ভিদসমূহের দূর্ভোগের কারণে উদ্ভিদসমূহের দূর্ভোগ হইয়াছে। উদ্ভিদসমূহের দূর্ভোগ হইয়াছে। উদ্ভিদসমূহের দূর্ভোগ হইয়াছে। উদ্ভিদসমূহের দূর্ভোগ হইয়াছে।

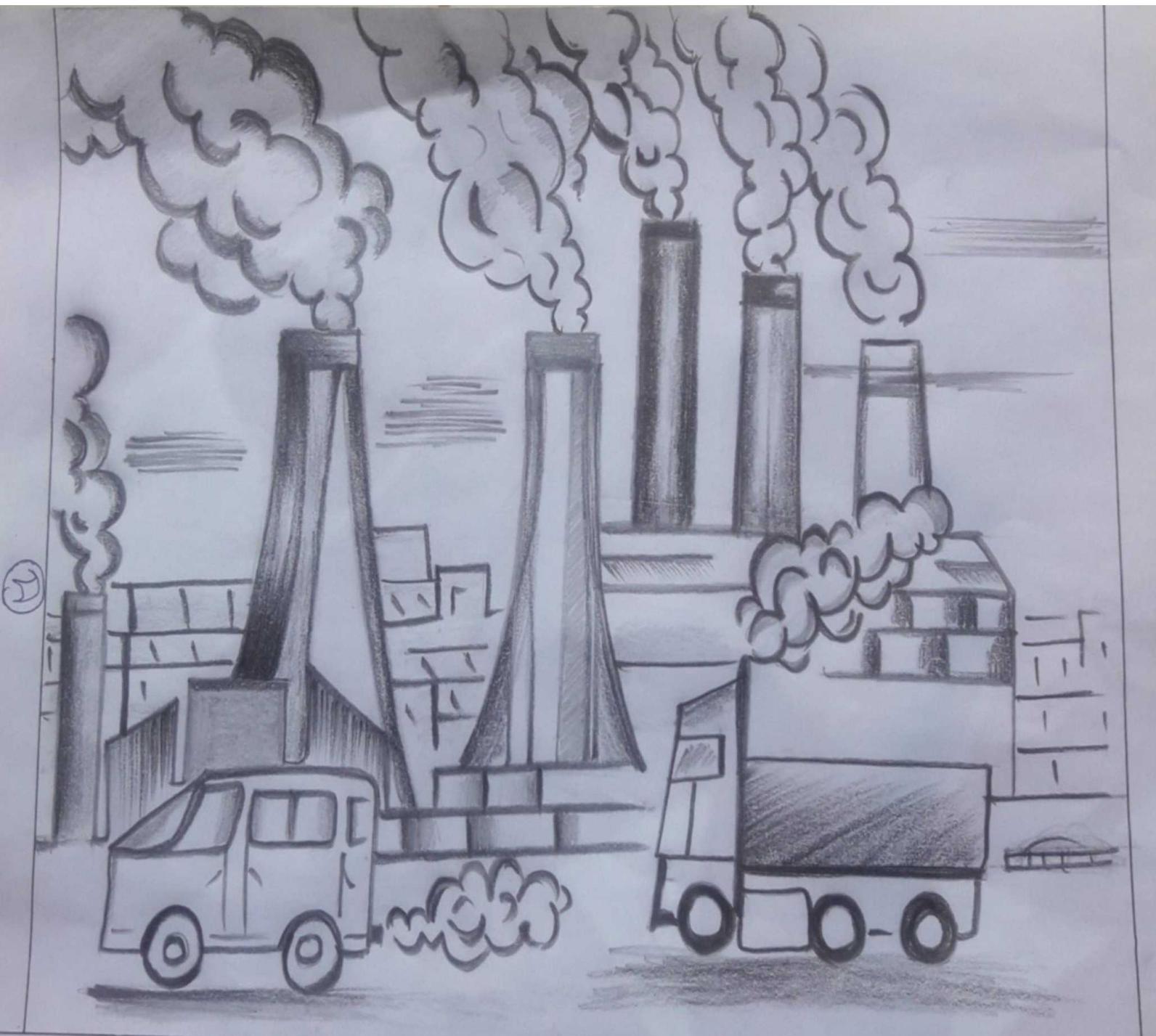
১) কৃষিক্ষেত্র - মঙ্গল দৃশ্যের - মনে অপ্রমাণিত বাসু দুর্গমঃ → "আসুদ্বায়ে" দুর্গমঃ কামী  
 কাল আছে, নতুনের কাম নাগাদ কৃষিকরা - কামিতে কামী বপন করে  
 কিন্তু নতুন কামী বপন করার পূর্বে কৃষিকরা কামিতাকে অধুনা বুলে  
 আনুসঙ্গিক করার জন্য প্রসঙ্গ উক্ত কামিতে, মাতে পুরোত্তা কামিতার  
 কোনো অবিকমিতক না - মাতে উক্ত কামিতাকিতে কৃষিকরা  
 আনুসঙ্গিক করে, আর কামিতাকির এই মতনের - মনে আনুসঙ্গিক  
 দিল্লি নগরীর বাতাসে - স্তমিতকমু - মন ব্যাপকভাবে, অতিবহুর  
 কামিতে দিল্লির বাতাস মেলাবে দুর্গমঃ মন, আর উক্ত  
 কামিতাকিতে এই আনুসঙ্গিকমোহোরুত কারণ আছে, কামিতা  
 কামীর মতে ব্যাপকভাবে আনুসঙ্গিক। মাতে, আর - মনে প্রত্যুত  
 আনুসঙ্গিক আছে - প্রসঙ্গের মতে অত্যন্ত বিস্মিত ব্যাপক নিষ্ঠা মন  
 মা - অতুলন আনুসঙ্গিক ব্যাপক বাসু দুর্গমঃ আটতে পারে।

২) কাকি কোন্দ ও বেদান্তিক বঙ্গ → উক্তকর্ম - মন আনুসঙ্গিক মতে  
 কামলা দৃশ্যের ক্ষেত্রে দ্বিতীয় দেক (প্রথম, চিত), কামলা দৃশ্য  
 অবশেষে - বাকি - প্রসঙ্গ - কাকি কোন্দ - প্রসঙ্গ - মনে ব্যাপক  
 মনে - কামিতাকিতে ব্যাপক নিষ্ঠা মন, মন - মন, নাইদুর্গম  
 "আনুসঙ্গিক, কামিতা - প্রসঙ্গ - আনুসঙ্গিক ইত্যাদি - প্রসঙ্গ - মনে আনুসঙ্গিক  
 আনুসঙ্গিক বাসু দুর্গমঃ আছে।

বাসু দুর্গমের স্তমিতকর প্রভাব :-

১) বিলু বৈশিষ্ট্য → বাসু দুর্গমের - মনে অবশেষে - মন - স্তমিতকর প্রভাব  
 মন - অত্যন্ত - বিলু বৈশিষ্ট্য, বিলু বৈশিষ্ট্য মন - মন - মন  
 ব্যাপক প্রসঙ্গ প্রভাব, মা - আনুসঙ্গিক পরিমানে পরিমানে ও  
 বাসুদুর্গমের কামিতা - প্রসঙ্গ - আনুসঙ্গিক ও - মন - আনুসঙ্গিক পরিমানে  
 মন - মনে অতি মন, আনুসঙ্গিক ক্ষেত্রে - কামিতাকিতে মন  
 নিষ্ঠা - মন - মনে এই - বিলু বৈশিষ্ট্য অতি মন,

২) উলবাসু পরিবর্তন → বাসু দুর্গম ও - বিলু বৈশিষ্ট্যের মনে অপ্রমাণিত  
 আর - মন - স্তমিতকর প্রভাব মন - উলবাসু পরিবর্তন,  
 আনুসঙ্গিক - আনুসঙ্গিক ইতি মনে উলবাসু পরিবর্তন মন, উলবাসু  
 আনুসঙ্গিকের - মনে আনুসঙ্গিক ক্ষেত্রে - মন - আনুসঙ্গিক  
 মন ও - অত্যন্ত উলবাসু ইতি মনে মন - মন - মন  
 মন - মনে আনুসঙ্গিক আছে।



কারখানায় বায়ু দূষণের উৎস সমূহ

৩) স্বাস্থ্য অঙ্গসমূহ অঙ্গজা: → বায়ু-দূষণের-মানে-মানুষের-হৃৎপিণ্ডে  
 ব্যাপক-ক্ষতিকর-প্রভাব-পড়ে, বায়ু-দূষণের-মানে-হৃৎপিণ্ডের  
 বিভিন্ন-অঙ্গসমূহ-আক্রান্ত-হয়, ক্যান্সার-এর-বিভিন্ন  
 ধরারোগ-ব্যবির-অক্ষুণ্ণ-হয়। অছাড়াও-দেখা-মায়-যে-বায়ু-  
 দূষণের-মানে-অনেকগুলো-স্বাস্থ্যকর্মী-ও-হলে-থাকে।

৪) আমিষ ব্রহ্মি: → জিওকেন্দ্র, জাদুকেন্দ্র, পারিকরন ইত্যাদির মানে  
 যে-ক্ষতিকর-গ্যাস-নির্গত-হয়, সেজন্য-আলস-ও-অসুস্থতা,  
 নাইট্রোজেন-আকসিজেন-প্রভৃতি-অইসব-ক্ষতিকর-গ্যাসগুলি-মহান  
 ক্যান্সার-জনিত-ব্যাধির-আলম-সিদ্ধি-হয়, তখন-অসুস্থতা  
 বিস্তারিত-করে-নাইট্রিক-ও-অলিমিটারিক-আমিষ-প্রদূষ-হয়,  
 প্রত্য-প্রকার-মহান-অসুস্থতা-ব্রহ্মি-আকারে-দে-প্রাপ্ত-করে-পড়ে-  
 তখন-অসুস্থতা-অসুস্থ-ব্রহ্মি-বা-আমিষ-ব্রহ্মি-রূপে-দে-প্রাপ্ত-পাতি  
 হয়, আমিষ-ব্রহ্মি-মানে-বিভিন্ন-অসুস্থতার-স্বাস্থ্যকর্মীদের  
 ক্ষতিকর-হয়।

৫) সৌম্য ব্রহ্মি: → কয়লাখুলে-দ্রবিত-সৌম্য-আলম-কঠিনকালে  
 সৌম্য-সিদ্ধি-হয়-ব্রহ্মি-হয়-সৌম্য, এই-সৌম্য  
 মানুষের-স্বাস্থ্যকর্মীদের-অঙ্গসমূহ-সেবে-ক্ষয়-দরে-কঠিনকালে  
 মানবহীন, যখন-চলাচলে-ব্যাপক-প্রতিক্রিয়া-অসুস্থ-করে, মানে  
 কয়লাখুলের-রাসায়নিক-প্রদূষ-মানুষ-হতে-দেখা-মায়।

৬) ওজোন স্তরের ক্ষতি: → বায়ু-দূষণের-ফলে-অসুস্থ-বিভিন্ন-গ্যাস  
 অনেক-অঙ্গসমূহ-অসুস্থতার-ওজোন-স্তরে-আঘাত-করে, তার-ফলে  
 মানে-মানুষের-ক্ষতি-হওয়া-সম্ভব-আরো-বৃদ্ধি-পায়।  
 অসুস্থ-ওজোন-স্তরের-ওজন-ও-ওজোন-স্তরে-বিভিন্ন-অসুস্থ  
 হয়-অনেক-অঙ্গসমূহ।

৭) ভূমিভূগর্ভস্থ-ক্ষতি: → বায়ু-দূষণের-মানে-কোনো-মানুষই-নয়,  
 অসুস্থতা-নানা-প্রকার-ক্ষতির-অক্ষুণ্ণ-হচ্ছে, তাদের-ও  
 বিভিন্ন-প্রকার-ব্যবির-লক্ষণ-দেখা-মাচ্ছে, অছাড়াও-বায়ু-দূষণের-  
 মানে-বিভিন্ন-অঙ্গসমূহ-অনেক-অঙ্গসমূহ-স্বলা-ওকে, মানে-ওকে-ও

বাসু দ্বন্দ্বের প্রতিরোধের উপায়:-

বাসু দ্বন্দ্বের ঋতুসময় - জ্বরকাল - জ্বরকালে তীব্র - বিজড়িত - প্রবল চিন্তার  
সকাল - বিস্ময় - হলে - হাঁড়িতে - অর্থাৎ - অতিশয়ে - অস্বাভাবিক - কিছু  
অস্বাভাবিক - আচরণ - গ্রহণ - করা - বিচিত্র - মনন -

I) ব্যক্তিগত জীবনের পরিমার্জন - চলাচলের ক্ষেত্রে  
শৌক্য - করে - জীবনযাত্রার - ব্যবস্থা - করা,

II) ব্যক্তিগত জীবন - ব্যবস্থার - কারণে - তা - সমাজিক  
কর্মসমূহের - চেম্বার - করা - বিচিত্র,

III) পোশাক - খাদ্য - চর্চা - মানবায়নের - বদলে - ইলেকট্রিক  
জীবন - বা - আর্থিক - ব্যবস্থা - করা - মতো - পারে,

IV) আর্থিক - পরিমার্জন - স্বল্প - বয়সে - করা - মাতে - বাতাস -  
আবহাওয়ার - সারা - হাঁড়ি - ও - কার্য - উদ্দেশ্য - আর্থিক - সারা - প্রকল্প -

V) - মাৎস্য - উৎস - সঞ্চার - জীবন - হাঁড়ি - করা - মতো - সেই  
জীবন - ইতিহাস - করা - করা - বিচিত্র,

VI) - জীবন - স্থানান্তর - ব্যবস্থা - করা - মতো - মতো - জীবন -  
ইতিহাস - ব্যবস্থা - করা - হবে,

VII) - আর্থিক - ও - আর্থিক - উদ্দেশ্য - উদ্দেশ্য - ব্যবস্থা - সমাজিক -  
কর্ম - করা - বিচিত্র,

VIII) - মনন - সঞ্চার - করা - ও - উদ্দেশ্য - তা - করা - করা - বিচিত্র,

IX) - জীবন - মতো - নিষ্ঠা - করা - জ্বরকালে - বাসু -  
দ্বন্দ্বের - সারা - জীবন - করা - মতো - তাই - অর্থাৎ - অস্বাভাবিক  
আচরণ - গ্রহণের - জন্য - জীবন - উদ্দেশ্য - ব্যবস্থা - করা -  
বিচিত্র,

X) - ঋতুসময় - উদ্দেশ্য - মতো - বিস্তার - বিস্তার - দেখে - বাসু - দ্বন্দ্ব -  
কাল - ও - সারা - পরিষ্কার - পরিষ্কার - হাঁড়ি - হোলা - জন্য -  
বস্ত্রের - অ-প্রচলিত - জীবন - মনন - জীবন - জীবন - বাসু - বিস্তার  
জীবন - ইতিহাস - ব্যবস্থা - করা - মতো - শৌক্য - পরিমার্জন -  
হবে,

XI) - অস্বাভাবিক - কালকীর্তন - মনন - মনন - মনন - মনন -  
উদ্দেশ্য - মতো - জীবন - উদ্দেশ্য - মনন - মনন - মনন -

XII) বামু হুম্মিন আম করার জন্য ইচ্ছিত চালিত গাড়ি চালির  
নাহিম অক্ষম অন্তর সীমা পরীক্ষা করা উচিত,

XIII) কোনো গাড়ি ক্রম করার অক্ষম নৃন্যতক হুম্মিন মাঠে অল্প গাড়ি  
ক্রম করা উচিত,

XIV) সখন জাকরা ছব থেকে বোধিত্রে মাত্র জাকাদের অক্ষম লাইপ  
ও মৃগাদের মৃগত বক্ষ করে রাখা উচিত, কারণ এতে  
মৃগালানব মৃগত বক্ষ হয়,

XV) অক্ষম, আবর্তনা ইত্যাদি না প্লাটিনে জেলে অক্ষমিত্রে মেলা উচিত,

XVI) উৎসবের অক্ষম আশ্রমবাহির স্বাধীন মমামোজুব বক্ষ করা  
উচিত,

XVII) অধিবাসি জনসংগঠন অক্ষম ও বামু হুম্মিন প্রতিরোধে  
অন্যসাময়িক উৎসাহ বৃদ্ধির জন্য প্রয়োজনীয় আন্দোলনের অধিকার জন্য  
অক্ষম করা হবে।

বামু হুম্মিন প্রতিরোধে আনুষ্ঠানিক অধিমোজিতা :-

বামু হুম্মিনের কারণে অক্ষম ত্র্যামিন পদক্ষেপ ও হুম্মিন মে অক্ষম  
আনুষ্ঠানিক অধিমোজিতা প্রতিরোধ করে থাকে তাই না, বরং অনেক  
ক্ষেত্রে তা পক্ষবর্তী অধিমোজিতা প্রকরণে প্রতিরোধে হেজের  
হুম্মিনে পড়ে। অধি বরনের ক্ষেত্রে হেজের অধিকারের প্রয়োজনীয়

আন্দোলন অধিমোজিতা আনুষ্ঠানিক অধিমোজিতা ও পারস্পরিক  
অধিমোজিতা আনুষ্ঠানিক, আনুষ্ঠানিক অধিমোজিতা অধিমোজিতা অধিমোজিতা  
অধিমোজিতা হতে পড়ে। বামু হুম্মিন প্রতিরোধে অধিমোজিতা অধিমোজিতা

আনুষ্ঠানিক পদক্ষেপটি হল UNICEE কনভেনশন, মেডানে  
অধিমোজিতা অধিমোজিতা অধিমোজিতা বামু হুম্মিন হুম্মিনে পড়ে। অধিমোজিতা  
আনুষ্ঠানিক ও তা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা

অধিমোজিতা অধিমোজিতা বামু হুম্মিন প্রতিরোধে অধিমোজিতা অধিমোজিতা  
অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা

অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা  
অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা  
অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা অধিমোজিতা



→ ବୃକ୍ଷରୋପନ ବାସୁ ହୁମିନ  
 ପ୍ରତିକୋଷି କାର୍ଯ୍ୟକର୍ତ୍ତ୍ରୀ



-ଶାଳପରିବହନ  
 ପରିବହନ 100  
 ବ୍ୟବହାର  
 ବିପଦ



ଶାଳ ବାଟ ବନ୍ଦ କରାଯାଉ

ବାସୁ ହୁମିନ ପ୍ରତିକୋଷି ରହିତ କାର୍ଯ୍ୟକର୍ତ୍ତ୍ରୀ ନିର୍ଦ୍ଦେଶ

দিল্লিতে বাম দূর্ষিত প্রতিবাদে ব্যবস্থা:-

বাংলাদেশের বাম বামরা অকোংগ্রেস-নাজিবুল্লাহ নামে নামগান্দ দিল্লির আকস্মিক  
সিঁদালাস ঢেকে তালুত অবকাংগ্রেস তরুণ মেয়ে জেই অর্মে কোনো পদক্ষেপ  
গ্রহণ হয় নি, অবকাংগ্রেস অস্বাভাবিক ক্রিয়াকর্ম অবকাংগ্রেস এই ক্ষিপ্ত পদক্ষেপ নিতে  
চলেছে।

অস্বাভাবিক ক্রিয়াকর্ম অবকাংগ্রেস অস্বাভাবিক ক্রিয়াকর্ম জাতিতন্ত্র হুন্ডে দিল্লি  
ও অস্বাভাবিক ক্রিয়াকর্ম বাম দূর্ষিত নামে নামগান্দ দুই সপ্তাহ আইন করা  
হবে। জেই আইন জাতিতন্ত্র রাজধানী প্রনালাস প্রতি বছর জাতিতন্ত্র অস্বাভাবিক  
বাম দূর্ষিত নামগান্দ জাতিতন্ত্র প্রনালাস অস্বাভাবিক ক্রিয়াকর্ম জেই হলে, দিল্লির  
সিঁদালাস অস্বাভাবিক ক্রিয়াকর্ম নামগান্দ, হরিদ্বার, পুন্ড্রপাদেশের মতো পাকিস্তান  
রাজ্য মমলাসের জেই জাতিতন্ত্র অস্বাভাবিক ক্রিয়াকর্ম অস্বাভাবিক ক্রিয়াকর্ম পদক্ষেপ করা  
এই অস্বাভাবিক ক্রিয়াকর্ম।

রাজধানীর বাম দূর্ষিত নিম্নলিখিত সুপ্রিম কোর্ট ১৩ই অক্টোবর, ২০২০ খ্রি  
সংক্রান্ত প্রকৃত দায়, জেই অস্বাভাবিক ক্রিয়াকর্ম দিল্লির দূর্ষিত নতুন  
বাবে বেহেগা বাজিমেছে, নামগান্দ জেই ময় জিই অস্বাভাবিক ক্রিয়াকর্ম  
জাতিতন্ত্র অস্বাভাবিক ক্রিয়াকর্ম দিল্লিতে প্রতিদিন বাজিমেছে অস্বাভাবিক ক্রিয়াকর্ম  
জুই জেই জেই অস্বাভাবিক ক্রিয়াকর্ম অস্বাভাবিক ক্রিয়াকর্ম ১০ শতাংশ  
অস্বাভাবিক ক্রিয়াকর্ম অস্বাভাবিক ক্রিয়াকর্ম দূর্ষিত বাজিমেছে জেই অস্বাভাবিক ক্রিয়াকর্ম  
জুই জেই জেই অস্বাভাবিক ক্রিয়াকর্ম সুপ্রিম কোর্ট লোডুর অস্বাভাবিক ক্রিয়াকর্ম  
জিই অস্বাভাবিক ক্রিয়াকর্ম অস্বাভাবিক ক্রিয়াকর্ম বাজিমেছে জেই অস্বাভাবিক ক্রিয়াকর্ম

দিল্লির দূর্ষিত প্রতিবাদে গ্রহণ পদক্ষেপ ও প্রকৃতি অস্বাভাবিক ক্রিয়াকর্ম  
সিঁদালাস সুপ্রিম কোর্ট দায় প্রকৃতি অস্বাভাবিক ক্রিয়াকর্ম সুপ্রিম কোর্টের  
অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম  
করেছেন, "জেই জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম  
অস্বাভাবিক ক্রিয়াকর্ম হলে" দিল্লির অস্বাভাবিক ক্রিয়াকর্ম দূর্ষিত নামগান্দ  
নামগান্দ অস্বাভাবিক ক্রিয়াকর্ম সুপ্রিম কোর্টের অস্বাভাবিক ক্রিয়াকর্ম  
আইনজীবী বিলাস জিই অস্বাভাবিক ক্রিয়াকর্ম হলে, জেই অস্বাভাবিক ক্রিয়াকর্ম  
বলে, জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম পালটা সুপ্রিম কোর্ট  
জেই জেই জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম হলে, জেই অস্বাভাবিক ক্রিয়াকর্ম  
কামাংগ্রেস নাম, জেই জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম  
অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম  
জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম  
জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম  
জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম জেই অস্বাভাবিক ক্রিয়াকর্ম



RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE:

Nitrogen cycle and its importance for living beings

NAME : Pritam Mondal  
COLLEGE ROLL NO : CSUG/050/19  
DEPARTMENT : Computer Science  
YEAR : 2020  
SIGNATURE : Pritam Mondal.

## Nitrogen cycle and its importance for living beings

### ① Introduction:-

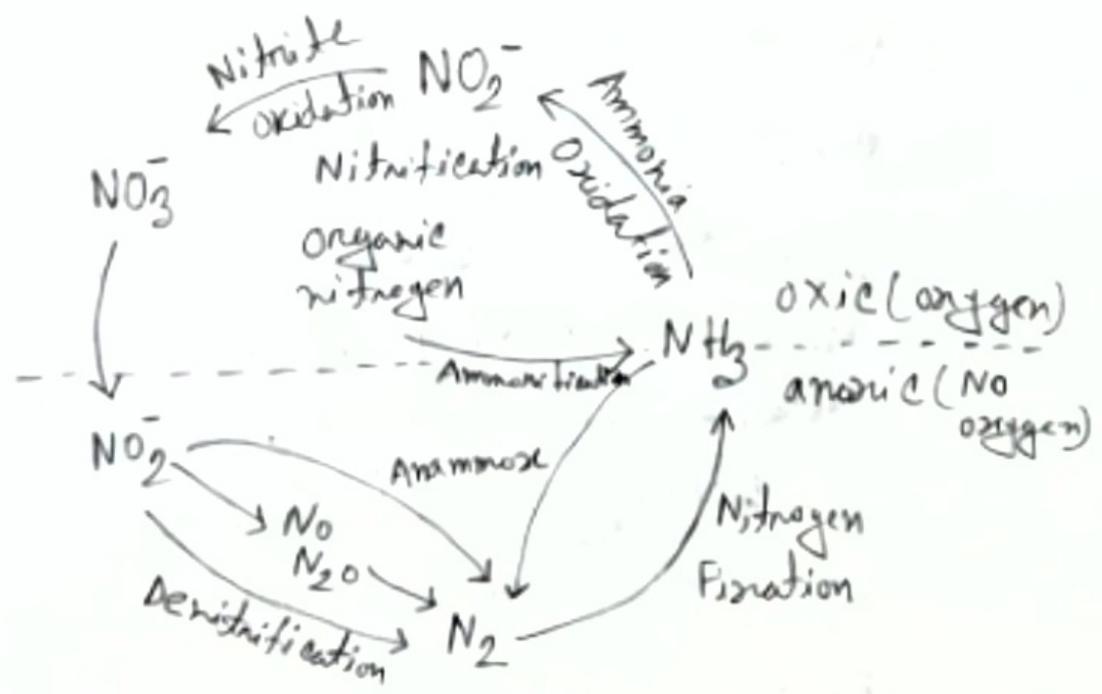
Nitrogen is one of the primary nutrients critical for the survival of all living organisms. It is a necessary component of many biomolecules, including proteins, DNA and chlorophyll. Although nitrogen is very abundant in the atmosphere as dinitrogen gas ( $N_2$ ), it is largely inaccessible in this form to most organisms, making nitrogen a scarce resource and often limiting primary productivity in many ecosystems. Only when nitrogen is converted from dinitrogen gas into ammonia ( $NH_3$ ) does it become available to primary producers, such as plants.

In addition to  $N_2$  and  $NH_3$ , nitrogen exists in many different forms, including both organic and inorganic forms. Thus, nitrogen undergoes many different transformations in the ecosystem, changing from one form to another as organisms use it for growth and energy.

### Nitrogen Cycle :-

"Nitrogen cycle is a biogeochemical process which transforms the inert nitrogen present in the atmosphere to a more usable form for living organisms".

Nitrogen cycle is a biogeochemical process through which nitrogen is converted into many forms, consecutively passing from the atmosphere to the soil to organism and back into the atmosphere. It involves several processes such as nitrogen fixation, nitrification, denitrification, decay and putrefaction.



The nitrogen gas exists in both organic and inorganic forms. Organic nitrogen exists in living organisms, and they get passed through the food chain by the consumption of other living organisms.

Inorganic forms of nitrogen are found in abundance in the atmosphere. This nitrogen is made available to plants by symbiotic which can be converted the inert nitrogen into a usable form - as nitrites and nitrates.

Nitrogen undergoes various types of transformation to maintain a balance in the ecosystem. Furthermore, this process extends to various biomes, with the marine nitrogen cycle being one of the most complicated biogeochemical cycle.

Since the - mid 1900s, humans have been exerting an ever-increasing impact on the global nitrogen cycle. Human activities, such as making fertilizers and burning fossil fuels, have significantly altered the amount of fixed nitrogen in the Earth's ecosystems.

## Stages of Nitrogen Cycle:-

Process of Nitrogen cycle consists of the following steps - Nitrogen fixation, Nitrification, Assimilation, Ammonification and Denitrification. These processes take place in several stages and are explained below:-

### Nitrogen Fixation:-

It is the initial step of the nitrogen cycle. Here, Atmospheric nitrogen ( $N_2$ ) which is primarily available in an inert form, is converted into the usable form - ammonia ( $NH_3$ ).

During the process of Nitrogen Fixation, the inert form of nitrogen gas is deposited into soils from the atmosphere and surface waters, mainly through precipitation. Later, the nitrogen undergoes a set of changes, in which two nitrogen atoms get separated and combine with hydrogen to form ammonia ( $NH_4^+$ ). The entire process of Nitrogen fixation is completed by symbiotic bacteria which are known as Diazotrophs.

Azotobacter and Rhizobium also have a major role in this process. These bacteria consist of a nitrogenase enzyme which has the capability to combine gaseous nitrogen with hydrogen to form ammonia.

### Types of Nitrogen Fixation:-

1. Atmospheric fixation:- A natural phenomenon where the energy of lightning breaks the nitrogen into nitrogen oxides and is then used by plants.

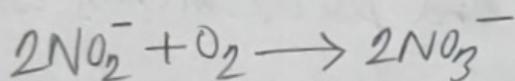
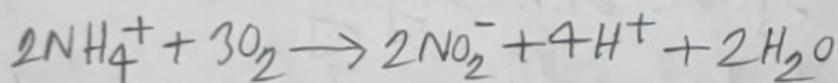
2. Industrial nitrogen fixation:- Is a man made alternative that aids in nitrogen fixation by the use of ammonia. Ammonia is produced by the direct combination of nitrogen and hydrogen and later, it is converted into various fertilisers such as urea.

3. Biological nitrogen fixation:- Bacteria like Rhizobium and blue-green algae transform the unusable form of nitrogen into other compounds that are more readily usable. These nitrogen compounds get fixed in the soil by these microbes.

### ① Nitritication :-

In this process, the ammonia is converted into nitrate by the presence of bacteria in the soil. Nitrites are formed by the oxidation of Ammonia with the help of *Nitrosomonas* bacterium species. Later, the produced nitrites are converted into nitrates by *Nitrobacter*. This conversion is very important as ammonia gas is toxic for plants.

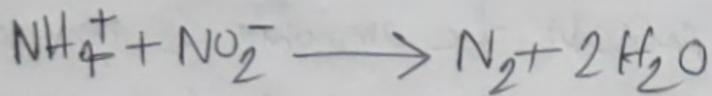
The reaction involved in the process of Nitritication is as follows :-



### ② Assimilation :-

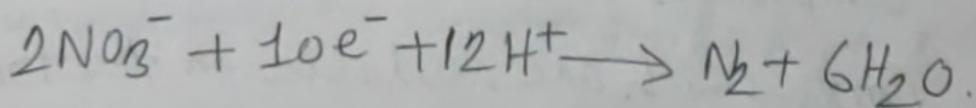
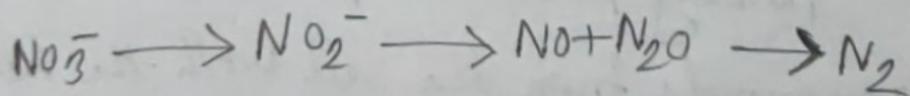
Primary producers - plants take in the nitrogen compounds from the soil with the help of their roots, which are available in the form of ammonia, nitrite ions, nitrate ions or ammonium ions and are used in the formation of the plant and animal proteins. This way, it enters the food

web when the primary consumers eat the plants.



### Denitrification :-

Denitrification is the process in which the nitrogen compounds makes its way back into the atmosphere by converting nitrate ( $\text{NO}_3^-$ ) into gaseous nitrogen ( $\text{N}_2$ ). This process of the nitrogen cycle is the final stage and occurs in the absence of oxygen. Denitrification is carried out by the denitrifying bacterial species - *Chrostridium* and *Pseudomonas*, which will process nitrate to gain oxygen and gives out free nitrogen gas as a byproduct.



## ⑩ Nitrogen is key to life :-

Nitrogen is a key element in the nucleic acids DNA and RNA, which are the most important of all biological molecules and crucial for all living things. DNA carries the genetic information, which means the instructions for how to make up a life form. When plants do not get enough nitroge, they are unable to produce amino acids (substances that contain nitrogen and hydrogen, they are make up many of living cells, muscles and tissue). Without amino acids, plants cannot make the special proteins that the plant cells need to grow. Without enough nitrogen, plant growth is affected negatively. With too much nitrogen plants produce excess biomass on organic matter, such as stalks and leaves, but not enough root structure. In extreme cases, plants with very high levels of nitrogen

absorbed from soils can poison farm animals that eat them.

## ② Importance of nitrogen cycle for living beings:-

- I) Helps plants to synthesise chlorophyll from nitrogen compounds.
- II) Helps in converting inert nitrogen gas into a usable form for the plants through the biochemical process.
- III) In the process of ammonification, the bacteria help in decomposing the animal and plant matter, which indirectly helps to clean up the environment.
- IV) Nitrates and nitrites are released into the soil, which helps in enriching the soil with necessary nutrients required for cultivation.
- V) Nitrogen is an integral component of the cell and it forms many crucial compounds and important biomolecules.

## ② Summary :-

Nitrogen is arguably the most important nutrient in regulation primary productivity and species diversity in both aquatic and terrestrial ecosystems. Microbially-driven processes such as nitrogen fixation, nitrification, and denitrification, constitute the bulk of nitrogen transformations and play a critical role in the fate of nitrogen in the Earth's ecosystems. However, as human populations continue to increase, the consequences of human activities continue to threaten our resources and have already significantly altered the global nitrogen cycle.

# RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE:

WATER POLLUTION AND MEASURES TO CONTROL IT

NAME : Prithvijet Ray  
COLLEGE ROLL NO : MTUG/115/19  
DEPARTMENT : Mathematics  
YEAR : 2020  
SIGNATURE : Prithvijet Ray

## INTRODUCTION

Water pollution is a broad term that describes any kind of contamination of bodies of water such as rivers, lakes or wetlands with substances that can pose threats to human health or the natural environment. Such pollution is a major source of death and disease worldwide, especially in the developed nations. Even in wealthier nations where piped water supplies mean that water pollution poses fewer direct threats to human health, many lakes and rivers are polluted. Examples of water pollution include: chemical or oil spills; industrial waste, fertilizers and pesticides that run off agricultural land into rivers; sewage that enters rivers and seas, heavy metals that leach out of the ground, or plastics that degrade in water. Other forms of water pollution include the presence of microbes that can harm human health, or an excess of suspended particles that can block light and harm aquatic life. These combined forms of water pollution pose grave threats to human health. A 2010 report by the UN Environment Program said that more people now die from contaminated and polluted water than from all forms of violence including wars.

# TYPES OF WATER POLLUTION

There are four types of water pollution. They are: 1) Physical pollution of water, 2) Chemical pollution of water, 3) Biological pollution of water, 4) Physiological pollution of water. They are explained as follows:

## 1) Physical pollution of water:

**Colour:** Colour change may affect the quality of sunlight that penetrates to a given depth inhibiting plant and animal metabolism.

**Turbidity:** Turbidity in water mainly arises from colloidal matter and the degree of turbidity of a water course may be taken as a measure of the intensity of pollution which is unsuitable for industrial purposes and also for domestic use.

**Taste:** Industrial effluents containing Fe, Mn, free chlorine, Phenols and aquatic actinomycetes and the decomposed organic matter, algae, fungi, bacteria and pathogens impart peculiar taste.

**Odour:** Micro-organisms like algae, oscillatoria cause muddy odour, algae, Anabaena produces a strong grassy odour. Protozoa imparts fishy odour to water.

**Foam:** Foam is produced by soaps, detergents and untreated organic effluents from paper and pulp industries.

## 2) Chemical pollution of water:

The chemical pollution of water by organic pollutants or inorganic pollutants or by both causes changes in acidity, alkalinity or pH, dissolved oxygen (D<sub>o</sub>) and other gases in water.

### 3) Biological pollution of water:

Biological pollution is brought about by bacteria, viruses, algae, diatoms like protozoa, rotifers, crustaceans and plant toxins create infections of the intestinal tract, polio and infectious hepatitis.

### 4) Physiological pollution of water:

Physiological pollution of water is caused by chlorine, sulphur dioxide, hydrogen sulphide, ketones, phenols. It makes water taste like medicine and produces offensive odour.

## SOURCES OF WATER POLLUTION

i) Sewage: Municipal sewage consists of the faeces and nitrogenous wastes of animals. It is rich in organic matter and nitrogen compounds. Due to the discharge and untreated or partially treated sewage into the drinking water resources, such as rivers, lakes etc. and as it is allowed to accumulate, it will have

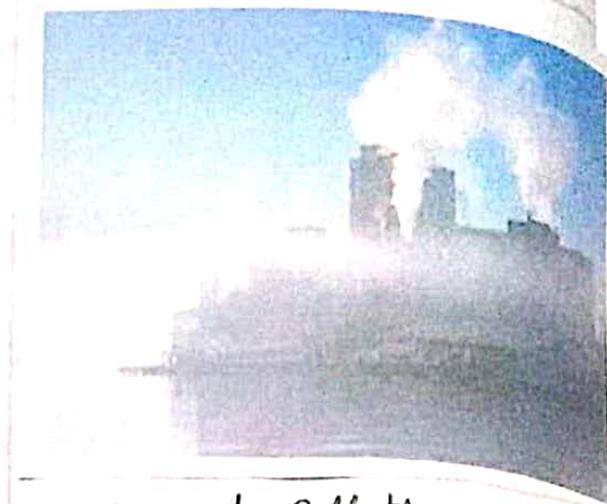


Water pollution by sewage wastes

serious effects in the ecosystem. Bacteria will proliferate enormously causing depletion.

ii) Industrial wastes and effluents: Treated and untreated discharges from fertilizer factories, distilleries, paper mills, etc., are capable of causing dangerous water pollution. There is a depletion in the oxygen content of water. These wastes ~~also~~ alter the temperature of the water and change the colour of the water which sometimes becomes turbid and the surface water is covered with oil-film.

iii) Thermal pollution: The discharge of heat from power station, raises the temperature of the water of river, streams, lakes, estuaries etc. The metabolic rate and oxygen consumption of the micro-organisms is increased. This results in the depletion of oxygen which makes it all the more difficult for the fish or fauna to survive



Thermal Pollution

and some animals are killed outright by the hot water and the entire ecological balance of a water body can be affected by thermal pollution

iv) Mercury pollution: It is the by-product of various chemical processes and a constituent of certain agricultural fungicides. The level of mercury in fresh water lakes and rivers has been rising in recent years. It has also been established that mercury can become highly concentrated in the body of the fishes, probably, several thousand times more than the surrounding water.

v) Silt pollution: Dust and dirt are the components of the soil, which altogether are called silt. Silting can choke rivers and irrigation channels and many edible fishes, such as salmon, are unable to spawn on silted gravel beds. The sand and silt particles carried from the soil to water constitute very harmful or serious pollutant.

vi) Pollution by asbestos: Asbestos is a fibrous material and its full disintegration is almost impossible. The asbestos scraps reach the water bodies and cause pollution. It is supposed that the pollution by asbestos may be a source of gastro-intestinal malady and of the lung SI cancer.

vii) Fertilizers and detergents: In agriculture to increase the yield large amounts of fertilizers and other soil additives are used. Some of these run off the soil through irrigation, rainfall, drainage etc., into streams and rivers and causes environmental pollution.



Fertilizers and pesticides

## EFFECTS OF WATER POLLUTION

The effect of water pollution depends on the type of pollutants which brings about physical and chemical changes that make the water unfit for drinking and harmful to aquatic life.

1. Effects on Aquatic Ecosystem: Organic and inorganic wastes of water decreases the dissolved  $O_2$  (DO) content of the water. Water having DO content below 4.0 mg/lit is considered to be highly polluted and water having DO content below 8 mg/lit is considered as contaminated water.

DO content of water is considered very important for the survival of aquatic organisms. A number of factors determine the amount of DO present in water. Oxygen consumption by organism and decomposition of organic matter are important factors. BOD is a measure of oxygen required by aerobic decomposers for the biochemical degradation of organic materials (i.e., biodegradable materials) in water. The higher amounts of organic waste increase the rates of decomposition



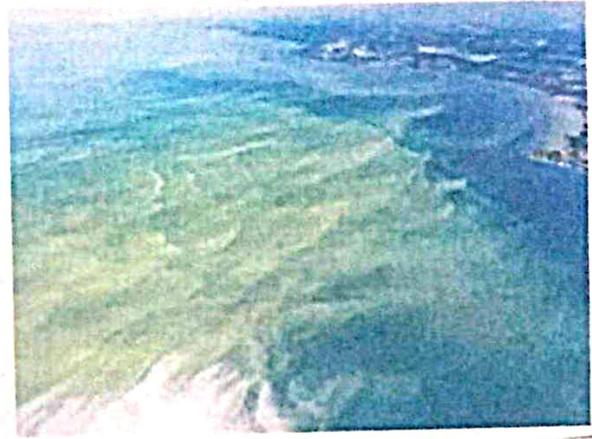
Aquatic pollution

and  $O_2$  consumption, which decreases the DO content of water. The demand for  $O_2$  is directly related to increasing input of organic wastes and is expressed as biological oxygen demand (BOD) of water. It is expressed in milligram of oxygen per litre of water. The higher value of BOD indicates low DO content of water. BOD is not a reliable method of measuring pollution load in water as it is related to biodegradable materials. The contamination of water bodies by pollutants reduces DO content and eliminates sensitive organisms like plankton, molluscs and fish.

2. Biological Magnification: The process through which certain pollutants get accumulated in tissues in increasing concentration along the food-chain is called biological magnification. The non-degradable organo chlorine compounds such as DDT, some other pesticides are the most persistent pesticides. Once they are absorbed by an organism, they get accumulated

in fat-containing tissues of the organisms. A classic example of biological magnification is the accumulation of DDT in the tissues of organisms of aquatic food-chains.

3. Eutrophication: The process of nutrient enrichment of water, which often leads to the loss of species diversity is called eutrophication. The addition of inorganic compounds and decomposition of organic wastes in water bodies increase the nutrient content of water which is responsible for the growth of algae, especially the blue-green algae, and may totally



Algal bloom

cover the water surface. This type of Algal growth is called algal bloom. The algal bloom often releases toxins in water, and inhibits the growth of other algae. Aquatic animals (e.g. fishes) may also die due to toxicity or lack of oxygen.

#### 4. Effects on Human Health:

- i) The water polluted with human wastes and sewage contains pathogens like virus, bacteria, parasitic protozoa and worms which is a source of water-borne diseases like jaundice, cholera, typhoid, amoebiasis etc.
- ii) The water contaminated with heavy metals can cause serious health

problems. Mercury compounds in waste water are converted by bacterial action into extremely toxic methyl mercury, which is responsible for deafness, blurring of vision and mental derangement.

5. Hazards of Groundwater pollution: Groundwater gets contaminated due to seepage from industrial wastes and agricultural run-off.

- i) Presence of high amount of nitrate in drinking water is dangerous for human health and may be fatal for infants. It reacts with haemoglobin to form non-functional methaemoglobin, and impairs <sup>oxygen</sup> transport, which is called methaemoglobinemia or Blue baby syndrome.
- ii) Excess fluoride in drinking water causes teeth deformity, hardening of bones and stiff and painful joints (skeletal fluorosis).
- iii) Over-exploitation of groundwater may lead to leaching of arsenic from soil and rock sources and contaminate groundwater. Arsenicosis is a disease which is created due to the excess amount of arsenic. Chronic exposure to arsenic causes black foot disease. It also causes diarrhoea, peripheral neuropathy, hyperkeratosis and also lungs and skin cancer.

## MEASURES TO CONTROL WATER POLLUTION

The following are the measures that can be taken to control water pollution:

- i) Controlling the amount of nutrients and organic substances entering the lakes.
- ii) Microbial decomposition of bottom sediments by various means.
- iii) Setting up of natural food-webs where fishes are the consumers and which can remove the algae.
- iv) The growth of algae and higher plants can be controlled by the use of appropriate doses of copper sulphate and sodium arsenite.
- v) Removal of asbestos by filtration through diatomaceous earth.
- vi) Disposal of treated municipal waste, regular monitoring of water quality of the rivers and lakes subjected to pollution.
- vii) Location of industrial and municipal disposal sites should be taken decided according to the groundwater levels and flow pattern in the area.
- viii) There should be ban on washing of clothes and laundry alongside the river bank.
- ix) Rain water harvesting should be practiced to prevent the depletion of water table.

x) Improper use of fertilizers, herbicides and pesticides in farming should be stopped and organic methods of farming should be adopted.

### CONCLUSION

Water pollution is a global issue and world community is facing worst results of polluted water. Major sources of water pollution are discharge of domestic and agricultural wastes, population growth, excessive use of pesticides and fertilizers and urbanization. Bacterial, viral and parasitic diseases are spreading through polluted water and affecting human health. So, there should be proper waste disposal system and waste should be treated before entering into river. Educational and awareness programmes should be organized to control the pollution, which has become a necessity in the water scarce regions of the world.

# RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE: CORONA PANDEMIC AND  
ROLE OF COMMON PEOPLE TO CONTROL IT

NAME : Puspendu Rana.  
COLLEGE ROLL NO : PHUGA/209/19  
DEPARTMENT : Physics  
YEAR : 2020  
SIGNATURE : Puspendu Rana

# CORONAVIRUS PANDEMIC

## Introduction:-

Coronavirus Pandemic, it is not just a global pandemic or global health crisis, it's a curse of this new decade that has made the life of every single human being devastated and wrecked. It is not just taking ~~the~~ <sup>our</sup> lives but also causes a great impact on socio-economic side. It shows that we still are not fully capable to tackle this global pandemic which has taken billions of people's lives. It also proves that the present day technologies, medical sciences are not enough to deal with this kind of global pandemic at this huge scale where million of people are getting effected every day. It also causes a huge impact on our everyday's lifestyle imposing limitations and restrictions on our activities, movements and travel. We are locked down in our own houses. The Government offices, schools, colleges, educational sectors, industries are all closed. Railways, Airline services are all declined due to this lockdown. In one word it makes the whole world standstill. Lot of people have lost their jobs, suffering from unemployment which in turn create a great socio-economic disruption and degradation of world's economy. Overall it changes the whole world in every possible

way it can.

The Covid-19 Pandemic, also known as the coronavirus Pandemic, is an ongoing pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first identified in between 6 to 11 December 2019 in Hubei Province, Wuhan, China. The World Health Organisation declared the outbreak a public health emergency of international concern in January 2020 and a pandemic in March 2020. As of 13 November 2020 more than 53 million cases have been confirmed with more than 1.29 million deaths attributed to COVID-19. It's been suspected that around 10% of the global population may have been infected.

### Coronavirus & COVID-19:

Coronaviruses are large family of viruses which may cause illness in humans or animals. In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently discovered coronavirus causes coronavirus disease COVID-19.

Covid-19 disease is caused by SARS-CoV-2 that can trigger what call a respiratory tract infection. It can affect our respiratory tract or lower respiratory tract

It spreads the same way other coronaviruses do, mainly through person-to-person contact. Infections range from mild to deadly.

SARS-CoV-2 is one of the ~~the~~ seven types of coronaviruses, including the one that causes severe diseases like Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The other coronaviruses cause most of the colds that affect us during the year but aren't a serious threat for otherwise healthy people.

It's normal for a virus to change, or mutate, as it infects people. A Chinese study of 103 COVID-19 cases suggests the virus that causes it has done just that. They found two strains, which they named L and S. The S-type is older, but the L-type was more common in early stages of the outbreak.

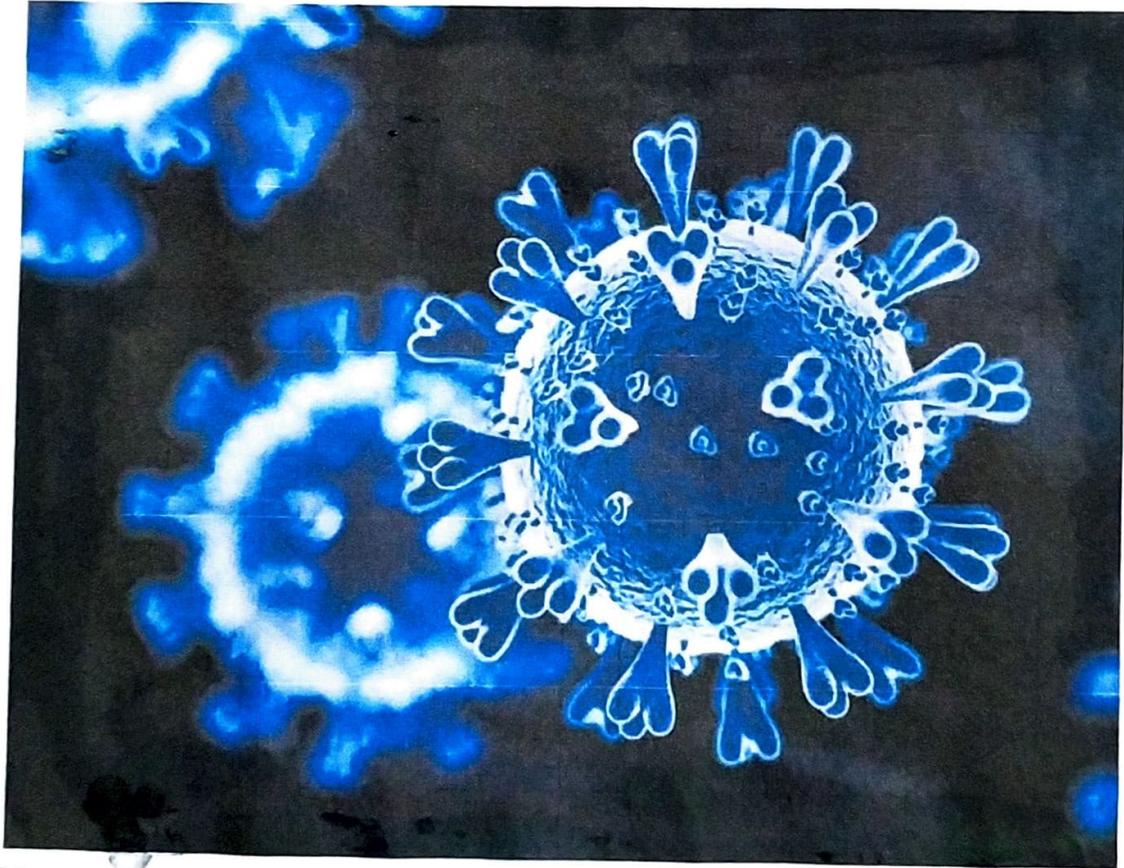
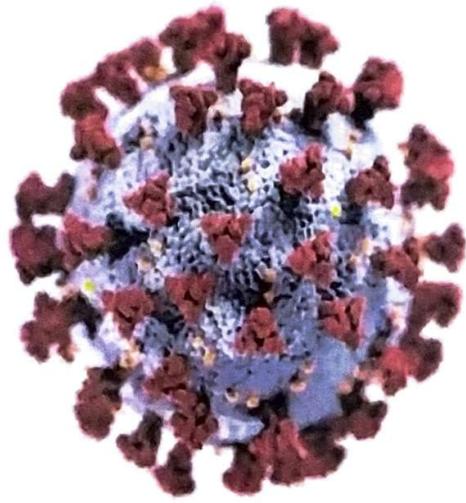
They think one may cause more cases of diseases than the other, but they are still working on what it all means.

Types of coronaviruses:

Human coronaviruses were first found in the mid-1960s. The seven coronaviruses that can impact infect people are:

**COMMON HUMAN CORONAVIRUSES**

- 1. 229E (alpha coronaviruses)
- 2. NL63 (alpha coronavirus)



3. OC43 (beta coronavirus)

4. HKU1 (beta coronavirus)

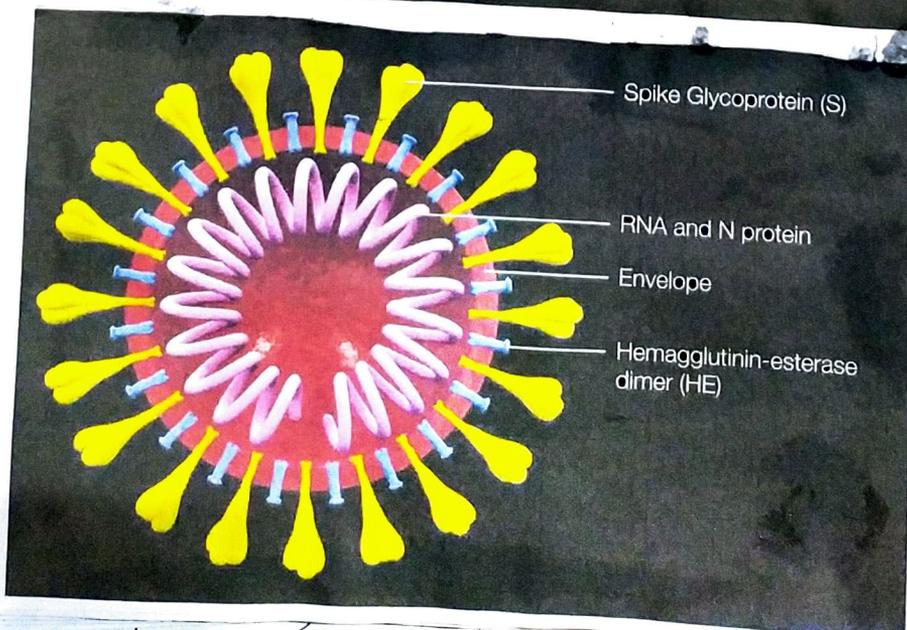
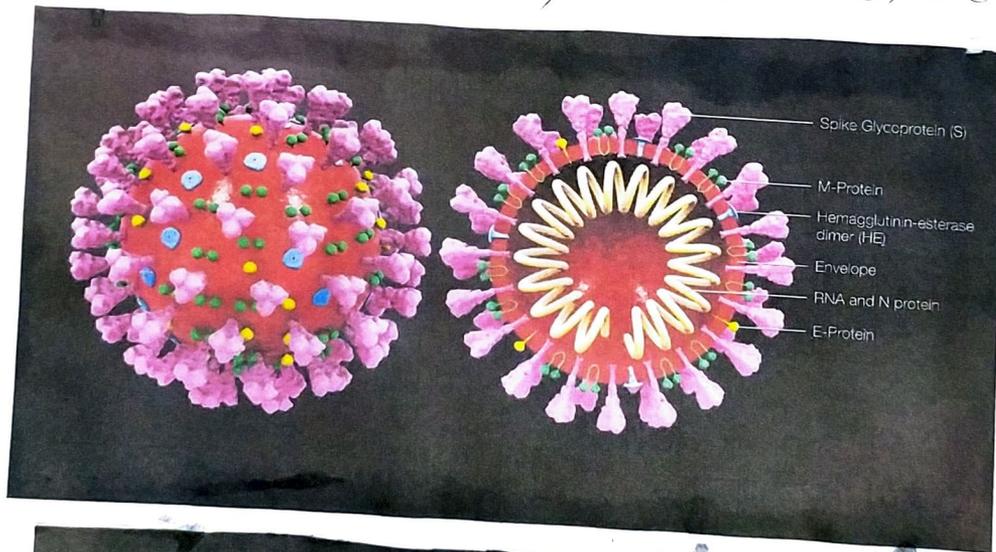
### OTHER HUMAN CORONAVIRUS:

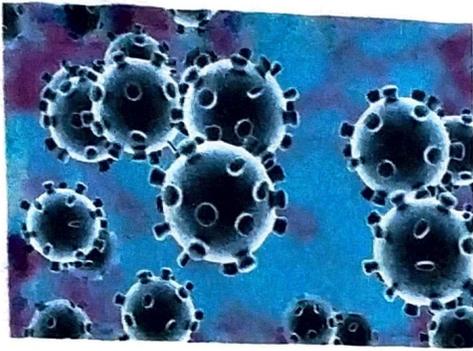
5. MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome or MERS)

6. SARS-CoV (the beta coronavirus that causes Severe Acute Respiratory Syndrome or SARS)

7. SARS-CoV-2 (the novel coronavirus that causes new coronavirus disease 2019 or COVID-19)

People around the world commonly get infected with human coronaviruses, 229E, NL63, OC43, HKU1

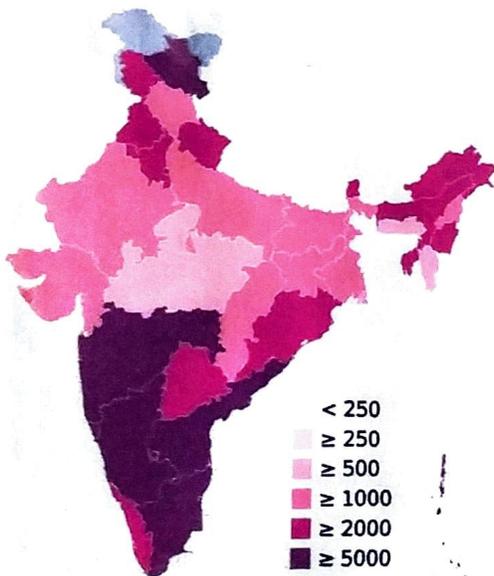




# CORONAVIRUS

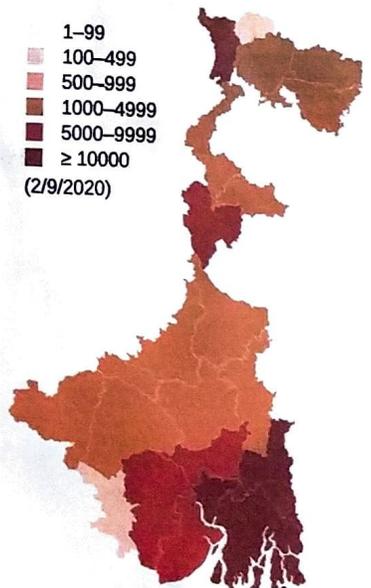


COVID-19 cases across the world



- < 250
- ≥ 250
- ≥ 500
- ≥ 1000
- ≥ 2000
- ≥ 5000

COVID-19 cases in India



- 1-99
  - 100-499
  - 500-999
  - 1000-4999
  - 5000-9999
  - ≥ 10000
- (2/9/2020)

COVID-19 Cases in West Bengal.

## Transmission: How does Coronavirus spread!

By knowing how does coronavirus spread we can take right step so we don't get sick or infect others.

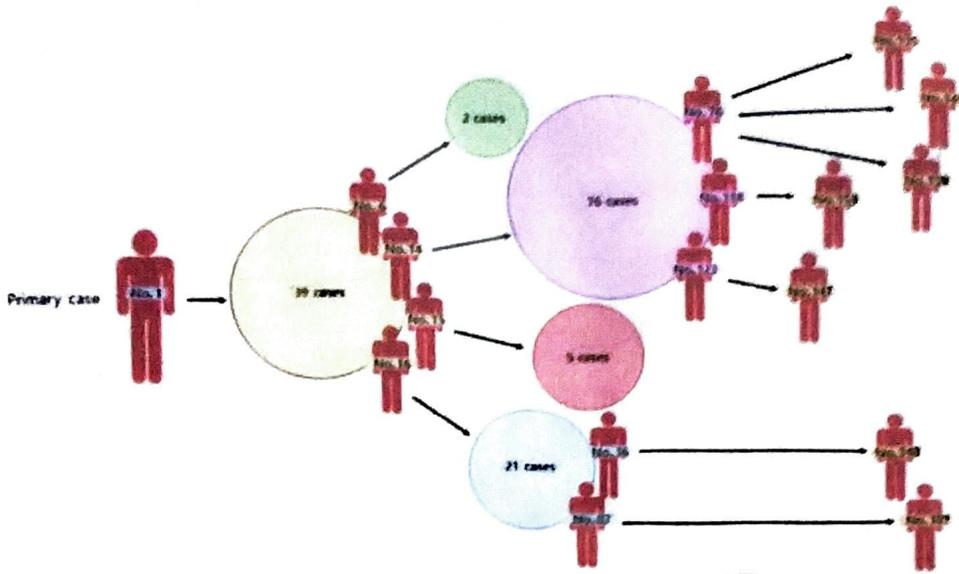
### Person-to-person transmission.

Experts believe the virus that causes COVID-19 spreads mainly from person-to-person. There are several ways this can happen.

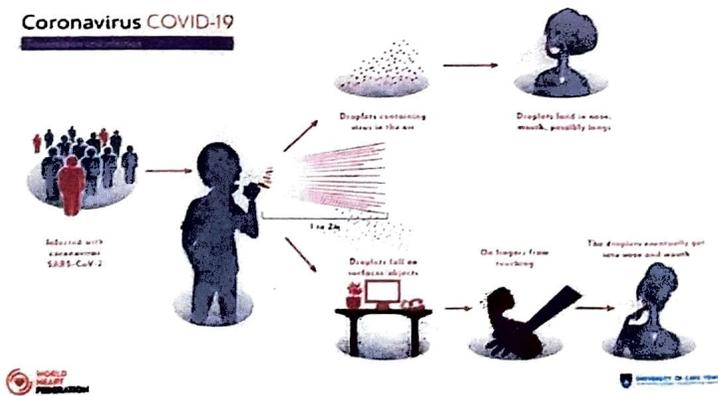
• Droplets or aerosols: When an infected person coughs, sneezes or talks, droplets or tiny particles called aerosols carry the virus into air from their mouth and nose. Anyone who is within 6 feet of that person can breathe it into their lungs.

• Airborne transmission: Researchers show that the virus can live in the air for upto 3 hours. It can get into your lungs if someone who has breathe out and you breathe that air in. Experts are divided on how often the virus spread through the airborne route and how much it contributes to the pandemic.

• Surface Transmission: Another way to catch the new coronavirus is when you touch surfaces that someone who has already got infected with the virus coughed or sneezed on. You may touch a counter top or a door knob that's contaminated and then touch your nose,



### Coronavirus COVID-19



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mouth or eyes. This virus can live on surfaces like plastics or stainless steels for 2 to 3 days. To stop it, clean and disinfect all counters, knobs, and other surfaces that we and our family members touch several times a day.

Fecal-oral: Studies also suggest that virus particles can be found in infected people's poop. But experts aren't sure whether the spread through the contact of infected person's stool. If that person uses the bathroom and doesn't wash their hands, they could infect things and people they touch.

The virus most often spreads through people who have symptoms. But it is also possible to pass it on without showing any signs. Some people who don't know they are infected can give it to others. This is called asymptomatic spread. You can also pass it on before you notice any sign of infection, called presymptomatic spread.

Researches say that on average, every person who has COVID-19 will pass it on to 2 or 2.5 others. One study shows that the number is even higher, with one sick person infecting 4.4 to 6.7 others.

# Symptoms:

COVID-19 affects different people in different ways. Most infected people develop mild to moderate illness and recover without hospitalization.

## Most Common symptoms:

- fever
- dry cough
- tiredness.

## Less common symptoms:

- aches and pains
- sore throat
- diarrhoea
- conjunctivitis
- headache
- loss of taste and smell
- a rash on skin, or discolouration of fingers and toes.

## Serious symptoms:

- difficulty breathing or shortness of breath.
- chest pain or pressure.
- loss of speech or movement

On average it takes 5-6 days - from when someone is infected with the virus for symptoms to show, however it can take upto 14 days.

According to researchers in China, these were the most common symptoms among people who had COVID-19:

- Fever (99%) • Fatigue (70%) • Lack of appetite (40%)
- Body aches (35%) • Shortness of breath (31%) • mucus (27%)

Data collected from many countries around the world suggest that men and women are likely to acquire COVID-19, but men have a higher risk of severe illness and death.

Coronavirus risk factors:

Anyone can get infected of COVID-19, and most infections are mild. The older you are, the higher the risk of severe illness.

We also have higher chance of serious illness if we have one of this health conditions:

- Chronic Kidney disease, • Chronic obstructive pulmonary disease (COPD)
- A weakened immune system because of an organ transplant
- Obesity
- Serious heart conditions such as heart failure or coronary artery disease.
- Sickle cell disease • Type 2 diabetes.

Conditions that could lead to a severe COVID-19 illness include:

- Moderate to severe asthma
- Diseases that affect our blood vessels and blood transport to brain.
- Cystic fibrosis
- High blood pressure
- A weakened immune system because of a blood or bone marrow transplant, HIV, or medications like corticosteroids.
- Dementia
- Liver disease
- Pregnancy
- Damaged or scarred lung tissue (pulmonary fibrosis)
- Smoking
- Thalassemia
- Type 1 diabetes.

Some children and teens who are in the hospital with COVID-19 have an inflammatory syndrome

in children. Doctors think it may be linked to the virus. It causes symptoms similar to those of toxic shock and of Kawasaki disease, a condition that causes inflammation in child's blood vessels

Scientists and researchers show that they are constantly tracking COVID-19 infections and recoveries. But they don't have information about the outcome of every infection. Early estimates predict that the overall COVID-19 recovery rate will be between 97% and 99.75%

India's COVID-19 tally of cases climbed to 87.73 lakh with with 44,684 new infections in a day, while 81,68,572 people have recuperated from the disease so far, bringing the national recovery rate to 93.04% on 14th Nov, Saturday, according to the Union Health Ministry data.

## CORONAVIRUS PREVENTION

To prevent ourselves from getting affected of coronavirus we should maintain the necessary precautions as suggested Health Ministry & WHO. We can take these steps:

1. Washing hands often with soap and water or clean them with an alcohol based

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This kills viruses on our hands.

• PRACTICE SOCIAL DISTANCING. Because we can have and spread the virus without knowing it, we should stay home as much as possible. If we do have to go out, we should stay at least 6 feet away from others.

• COVERING OUR NOSE AND MOUTH IN PUBLIC. If we have COVID-19, we can spread it, even if we don't feel sick. Wear a cloth and face covering mask to protect others. This isn't a replacement of social distancing. We still need to keep a 6-foot distance between ourselves and people around us. We shouldn't use a face mask meant for health workers. And don't put a face mask/covering on anyone who is:

- Under 2 years old
- Having trouble breathing
- Unconscious or can't remove mask on their own for other reasons.

• NOT TOUCHING FACES. Coronaviruses can live on surface we touch several times. If they get on our hands and we touch our eyes, nose or mouth, they can get into our body.

• CLEAN AND DISINFECTANT. We can clean first with soap and water, but disinfect so surfaces we touch often, like tables, door knobs, light switches, toilets, faucets and sinks. Use a mix

o) household bleach and water (1/3 cup bleach per gallon of water, or 1 teaspoon of water bleach per quart of water) or a household cleaner that's approved to treat SARS-CoV-2. We can check the Environmental Protection Agency (EPA) website to see if ours made the list. wearing gloves when we clean and throw them away after we done.

• COVER COUGHS AND SNEEZES :

We should always cover our mouth and nose with a tissue when we cough or sneeze or use the inside of our elbow and shouldn't spit.

Throw used tissues in the trash.

Immediately wash our hands with soap and water for at least 20 seconds. If soap and water are not readily available, we should clean our hands with a hand sanitizer that contains at least 60% alcohol.

• Monitoring Our Health on Daily Basis :

We should be alert for symptoms. Watching fever, cough, shortness of breath or other symptoms of COVID-19

o Especially important if we are running essential errands, going into the office or workplace, and in settings where it may be difficult to keep a physical distance of 6 feet.

Taking own temperature if symptoms develop.

- Temperature shouldn't be taken within 30 minutes of exercising or taking medications that can lower temperature, like acetaminophen.

## CORONAVIRUS TREATMENT :

There's no specific treatment for COVID-19. People who get a mild case need care to ease their symptoms, like rest, fluids, and fever control.

Take over-the-counter medicine for a sore throat, body aches, and fever. But don't give aspirin to children & or-teen who are younger than 19.

We might ~~hear~~ have heard that we shouldn't take ibuprofen to treat COVID-19 symptoms. But the National Institute of Health says people who have the virus can use non steroid anti-inflammatory drugs (NSAIDs) or acetaminophen as usual.

Antibiotics won't help because they treat bacteria not viruses. If it is heard that people with COVID-19 getting antibiotics, it's for an infection that came along with the disease.

People with severe symptoms need to be cared for in the hospital.

The anti-viral medication called remdesivir (velcovy) is first medication to get FDA approval for treatment

of patients hospitalized with COVID-19. Originally developed to treat Ebola, evidences to show that those treated with remdesivir recovered in about 11 days, compared to 15 days for those who were treated with placebo.

Many clinical trials are underway way to explore treatments used for the condition that could fight with COVID-19 and to develop new ones.

For instance, trials are underway for tocilizumab, another medication used to treat autoimmune conditions. And the FDA is also allowing clinical trials and hospitals to use of blood plasma from people who've had COVID-19 and recovered to help others build immunity. This is called convalescent plasma. Currently, evidence of its effectiveness is limited.

It may have heard a lot about the anti-malarial drugs hydroxychloroquine and chloroquine. The FDA originally granted emergency use of the drugs but later rescinded it because studies didn't show that the drugs worked against COVID-19 or that their benefits outweigh the risks.

A variety of steroid medications are being used including dexamethasone which is used to treat conditions such as ~~arthritis~~ arthritis, blood/hormone/immune system disorders, allergic reactions. More studies on effectiveness are still being

conducted. There is no cure but researchers are trying hard to find one.

CORONAVIRUS VACCINE :

There's no vaccine but intense research to create one has been underway around the world since scientists shared the virus's genetic makeup since January 2020. Vaccine testings in human started with record speed in March 2020. More than 100 vaccine projects are in various phases of development.

Predictions are the vaccine could be ready before the end of 2020, the pharmaceutical companies have made a joint declaration that their vaccine will not be released until safety is assured. Still vaccines for children unlikely will be available soon.

GLOBAL IMPACT OF COVID-19 :

The COVID-19 pandemic has led to a dramatic loss of human life worldwide and presents an unprecedented challenge to public health, food system and world of work. The economic and social disruption caused by the pandemic is devastating: tens of millions of people are at a risk of falling into extreme poverty, while the number of undernourished people, currently estimated at nearly 690 Million, could increase by upto 132 million by the end of the year.

Millions of enterprises face an existential threat. Nearly half of the world's 3.3 billion global workforce are at a risk of losing their livelihoods. Informal economy workers are particularly vulnerable because the majority lack social protection and access to quality health care and have lost access of productive assets. Without the means to earn an income during lock downs, many are unable to feed themselves and their families. For most, no income means no food, or at best, less food or less nutritious food.

The pandemic has been effecting the entire food system and has laid bare its fragility. Borders close, trade restrictions and confinement measures have been preventing farmers from accessing markets, including for buying inputs and selling their produce, and agricultural workers from harvesting crops, thus disrupting domestic and international food supply chains and reducing access to healthy, safe and diverse diets. The pandemic has decimated jobs and placed millions of livelihoods at risk. As breadwinners lose jobs, fall ill and die, the food security and nutrition of millions of men and women are under threat with those in low-income countries,

(16)

particularly the most marginalized populations, which include small-scale farmers and indigenous peoples, being hardest hit.

Millions of agricultural workers - waged and self-employed - while feeding the world, regularly face high level of working poverty, malnutrition and poor health and suffer from a lack of safety and labour protection as well as other types of abuse. With low and irregular income and a lack of social support, many of them are spurred to continue working, often in unsafe conditions, thus exposing themselves and their families to additional risks. Further when experiencing income losses, they may resort to negative coping strategies, such as distress sale of assets, predatory loans or child labour. Migrant agricultural workers are particularly vulnerable, because they face risk in their transport, working and living conditions and struggle to access support measures put in place by governments. Guaranteeing the safety and health of agri-food workers - from primary workers to those involved in food processing, transport and retail, including street food vendors - as well as better income and protection, will be critical to saving lives and protecting public health, people's livelihoods and food security.

In COVID-19 crisis food security, public health, and employment and labour issues, in particular workers' health and safety, converge. Adhering to workplace

safety and ~~had~~ health practices and ensuring access to decent work and the protection of labour rights in all industries will be crucial in addressing the human dimension of the crisis. Immediate and purposeful actions to save life and livelihoods should include extending social protection towards universal health coverage and income support for those most affected. These includes workers in the informal economy and poorly protected and low-paid jobs, including youth, older workers, and migrants. Particular attention must be paid to the situation of women, who are over-represented in low-paid jobs and care roles. Different forms of support are key, including cash transfer, child allowances and healthy schools meals, shelter and food relief initiatives, support for employment retention and recovery, and financial relief for businesses, including micro, small and medium-sized enterprises. In designing and implementing such measures it is essential that governments ~~take~~ work closely with employers and workers.

Countries dealing with existing humanitarian crises or emergencies are particularly exposed to the effects of COVID-19. Responding swiftly to the pandemic, while assuring that humanitarian and recovery assistance reaches those most

in need, is critical.

Now is the time for global solidarity and support, with the most vulnerable in our societies, particularly in the emerging and developing world. Only together we can overcome the intertwined health and social and ~~eco~~ economic impact of the pandemic and prevent its escalation into a protracted humanitarian and food security catastrophe, with the potential loss of already achieved development gains.

We must recognize the opportunity to build back better, as noticed in the Policy Brief issued by the United Nations secretary general. We are committed to pooling our expertise and experience to support countries in their crisis response measures and efforts to achieve the Sustainable Development Goals. We need to develop long-term sustainable strategies to address the challenges facing the health and agri-food sectors. Priority should be given to underlying food security and malnutrition challenges, tackling rural poverty, in particular through more and better jobs in rural economy, extending social protection to all, facilitating self-migration pathways and promoting the formalisation of informal economy.

We must rethink the future of our environment and tackle ~~at~~ climate changes and environmental degradation with ambition and urgency. Only then we can protect health, livelihoods, food security and nutrition of all people and ensure that our 'new normal' is a better one.

### Social Impact of the COVID-19 Pandemic:

The COVID-19 pandemic has had far-reaching consequences beyond of the spread of the disease itself and efforts to quarantine it, including political, cultural and social implications.

#### Educational Impact:

The pandemic has affected ~~of~~ the educational systems worldwide, leading to the widespread closures to schools and colleges and universities. According to a data released on 25<sup>th</sup> March, schools and university ~~at~~ closures due to COVID-19 were implemented nationwide in 165 countries. Including localized closures, this affects over 1.5 billion students worldwide, accounting of ~~87%~~ for 87% of enrolled learners.

#### Religious Impact:

The pandemic has impacted religions in various ways, including the cancellation of worship services of various faiths, the closures of Sundays.

Schools, as well as the cancellation of pilgrimages surrounding observances and festivals. Many churches, synagogues, mosques and temples have offered worships to livestream amidst the pandemic. Relief wings of religious organizations have dispatched medical supplies and other aid to affected areas. Adherents of many religions have gathered together to pray for an end to the pandemic, for those who affected by it, as well as for the God they believe in to give physicians and scientists to give the wisdom to combat the disease; in United States, Trump designated 15 March 2020 as a National Day of Prayers for "God's healing hand to be placed on the people of our nation."

### Psychological impact :

On 18th March 2020, the WORLD HEALTH ORGANISATION issued a report related to mental health and psychosocial issues by addressing instructions and some social considerations during this COVID-19 outbreak.

• Suicide: The coronavirus pandemic has been followed by a concern for a potential spike in suicides, exacerbated by social isolation due to quarantine and social-distancing guidelines, fear, and unemployment and financial factors.

## Risk Perception:

Chaos and negative effects of COVID-19 may have made a catastrophic future seem less remote and action to prevent it more necessary. However, it may also have the opposite effect by having minds focus on the more immediate threat of the pandemic rather than the climate crisis or the prevention of other disasters.

## COVID-19 Outbreak in India:

The COVID-19 pandemic in India is a part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020. India currently has largest number of confirmed cases in Asia, and has the second highest confirmed cases in the world, after United States, with more than 8.8 million reported cases of COVID-19 infection, more than 4 lakh deaths and more than 8.2 million recovered. By mid of November 2020 India had approached in position of conducting highest numbers of daily tests in the world which subsequently translated into highest numbers

of daily ~~cases~~ new cases in world and has sustained highest number of daily cases spike since then.

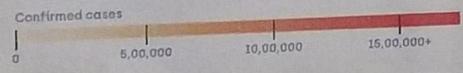
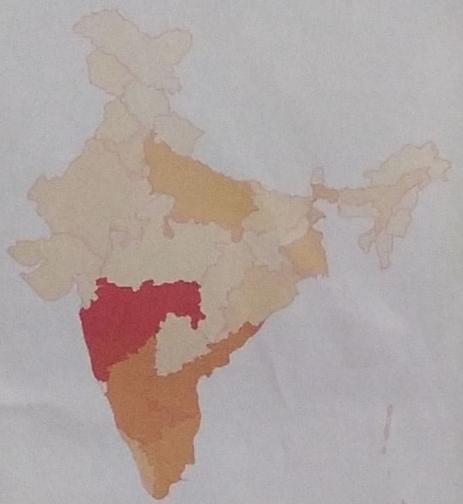
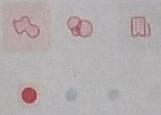
### India

Last Updated on 15 Nov, 3:34 PM IST

Tested  
**12,48,36,819**  
As of 14 November  
per source

### India

**88,19,636**  
Confirmed



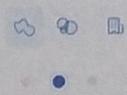
### India

Last Updated on 15 Nov, 3:34 PM IST

Tested  
**12,48,36,819**  
As of 14 November  
per source

### India

**4,74,741**  
Active



COVID-19

Active cases of COVID-19 in INDIA as of 14th november.

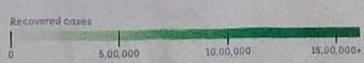
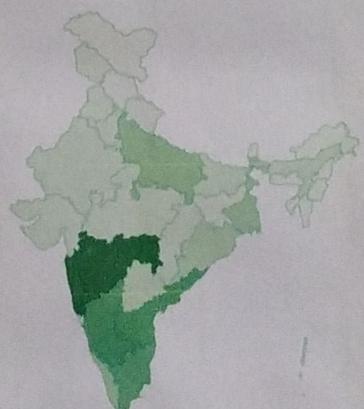
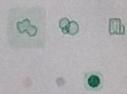
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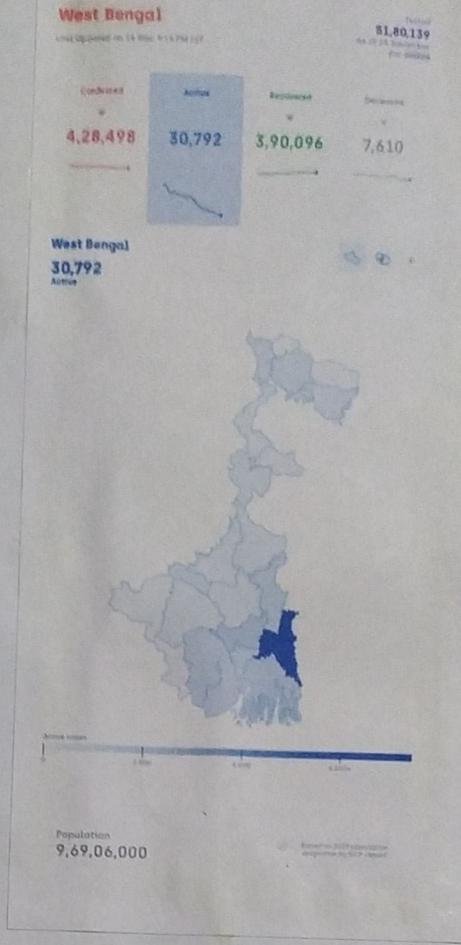
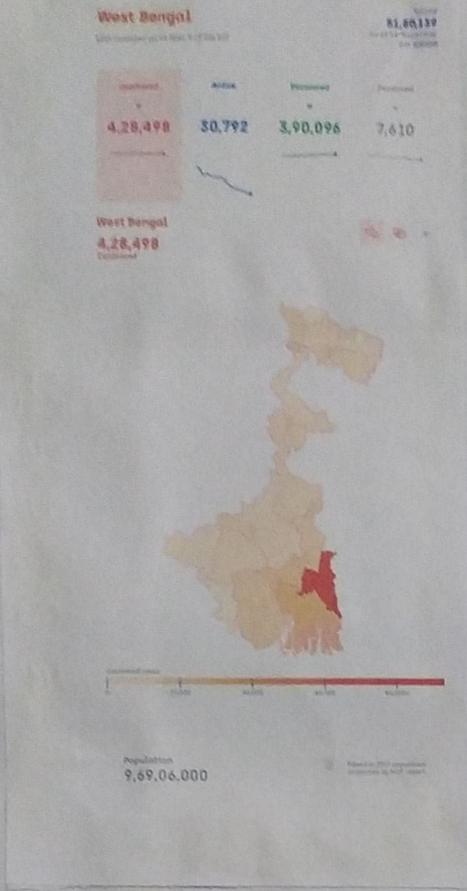
### India

**82,13,146**  
Recovered



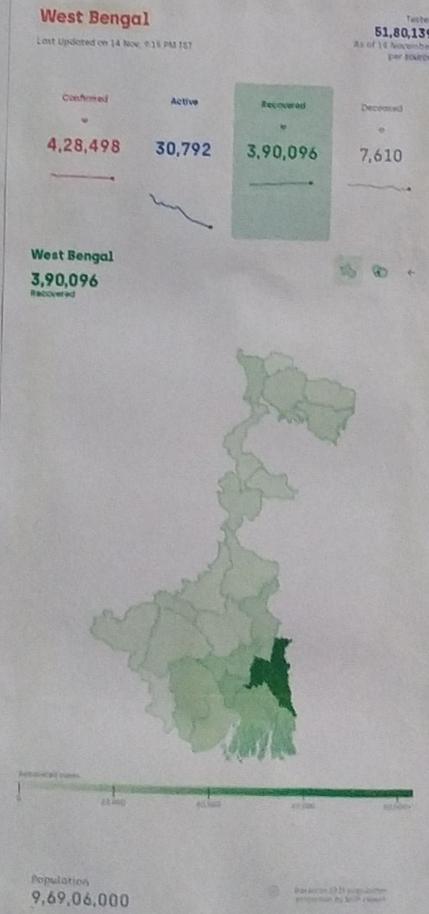
Total no of Confirmed cases of COVID-19 in India as of 14<sup>th</sup> november

Total no of recovered cases in INDIA



Total no of Active Cases in West Bengal.

Total no of confirmed cases in West Bengal



Total no of recovered cases in West Bengal.

## Role of Common People to Control COVID-19

To expect our people to show conformity to the preventive measures against COVID-19, announced by the Indian Government, is, in fact, to expect a little too much. Some of the mandatory measures such as wearing a mask in public spaces, social distancing, self-isolation or quarantining (in both symptomatic and asymptomatic cases) and getting tested if showing symptoms are some of important guidelines we are expected to follow. Apart from this we are also expected to wash our hands frequently; sanitize our living or work places, including the surfaces we frequently touch during the course of our activities.

Though some people follow these guidelines scrupulously, a majority of Indians don't think twice before flouting them. We often notice how social distancing isn't always maintained when people are present in public spaces. Something as simple as a mask is often not shown worn because people say it's unhealthy and that it's not going to make much of a difference. There have been other more disturbing violations such as people escaping from hospitals while quarantined or others turning violent when questioned.

(25)

why they were not following the protocol. Initially when the pandemic had just struck, people also made a deliberate attempt to hide their symptoms or contact history. Cases of mass congregations, parties, get-togethers too were reported.

This brings us to a pertinent question: How are people expected to conduct themselves in critical times? Are we, as a society, expected to behave responsibly or irresponsibly? Even when things are normal, we Indians, take special delights in flouting norms or rules, without bothering about our communities and adopting a 'me first' approach, not thinking twice about jumping the queue or red-lights or worrying about accidents or inconvenience caused to others.

We also have no respect for the law of the land, a fact demonstrated by the Indian Police using lathis to force the people to stay indoors during ~~the~~ lockdown. It was only the fear of the rod, not concern for others, that kept people from stepping out of their homes. Things got so bad that even government had to threaten its own defaulting citizens with legal action, that too to help them stay alive and healthy!

It is quite evident that a society that doesn't follow rules and shows scant regard for the principle of collective social responsibility and welfare in the normal times, is bound to flounder in times of a crisis as severe as this.

In such crucial times, what we need to understand is that our actions have consequences, not only for us, but also for others. A single mistake in the form of socially irresponsible behaviour won't only cost us dear, but also take a heavy toll on our fellow citizens, our neighbours and our community. This kind of lack of social responsibility has, unfortunately, been demonstrated by all sections of our society, illiterate, semi-literate, educated, highly skilled professionals. This is a moment of reckoning for all of us, and we must think on how we can help not only ourselves but also those around us.

~~After few of laws~~ After all, fear of law can't become a governing principle of regulating human behaviour in a society. Ultimately, all civilized societies, depend on the awareness of individual citizens and also on their ability to conduct themselves in a free, fair, yet responsible manner. How long can the fear be used as a deterrent to prevent dangerous and threatening behaviour in the face of COVID-19 Pandemic.

It is time, we citizen understand our own role and responsibility in limiting the spread and transmission of COVID-19. The government is doing what it can but when it is such a grave situation, all of us must come together and realise our social responsibilities. All it requires some deep introspection and cultivation of discipline, respect for the law of the land and an ability to feel for and connect with our fellow citizens.

And yet, this is too serious to be left to the discretion or whims of the individuals. In order to achieve this social objective, if we have to reboot our educational system, it is well worth the effort. We can incorporate the community welfare practices into our education system, right from the primary stage to the university level. This will help our future citizens to develop a strong sense of ethics.

- Ruspendu Rana.  
 PHUOI/20/19.

# RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE: CORONA PANDEMIC AND  
ROLE OF COMMON PEOPLE TO CONTROL IT

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YEAR : 2020  
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# CORONAVIRUS PANDEMIC

## Introduction:-

Coronavirus Pandemic, it is not just a global pandemic or global health crisis, it's a curse of this new decade that has made the life of every single human being devastated and wrecked. It is not just taking ~~the~~ <sup>our</sup> lives but also causes a great impact on socio-economic side. It shows that we still are not fully capable to tackle this global pandemic which has taken billions of people's lives. It also proves that the present day technologies, medical sciences are not enough to deal with this kind of global pandemic at this huge scale where million of people are getting effected every day. It also causes a huge impact on our everyday's lifestyle imposing limitations and restrictions on our activities, movements and travel. We are locked down in our own houses. The Government offices, schools, colleges, educational sectors, industries are all closed. Railways, Airline services are all declined due to this lockdown. In one word it makes the whole world standstill. Lot of people have lost their jobs, suffering from unemployment which in turn create a great socio-economic disruption and degradation of world's economy. Overall it changes the whole world in every possible

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way it can.

The Covid-19 Pandemic, also known as the coronavirus Pandemic, is an ongoing pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first identified in between 6 to 11 December 2019 in Hubei Province, Wuhan, China. The World Health Organisation declared the outbreak a public health emergency of international concern in January 2020 and a pandemic in March 2020. As of 13 November 2020 more than 53 million cases have been confirmed with more than 1.29 million deaths attributed to COVID-19. It's been suspected that around 10% of the global population may have been infected.

### Coronavirus & COVID-19:

Coronaviruses are large family of viruses which may cause illness in humans or animals. In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently discovered coronavirus causes coronavirus disease COVID-19.

Covid-19 disease is caused by SARS-CoV-2 that can trigger what call a respiratory tract infection. It can affect our respiratory tract or lower respiratory tract

It spreads the same way other coronaviruses do, mainly through person-to-person contact. Infections range from mild to deadly.

SARS-CoV-2 is one of the ~~the~~ seven types of coronaviruses, including the one that causes severe diseases like Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The other coronaviruses cause most of the colds that affect us during the year but aren't a serious threat for otherwise healthy people.

It's normal for a virus to change, or mutate, as it infects people. A Chinese study of 103 COVID-19 cases suggests the virus that causes it has done just that. They found two strains, which they named L and S. The S-type is older, but the L-type was more common in early stages of the outbreak.

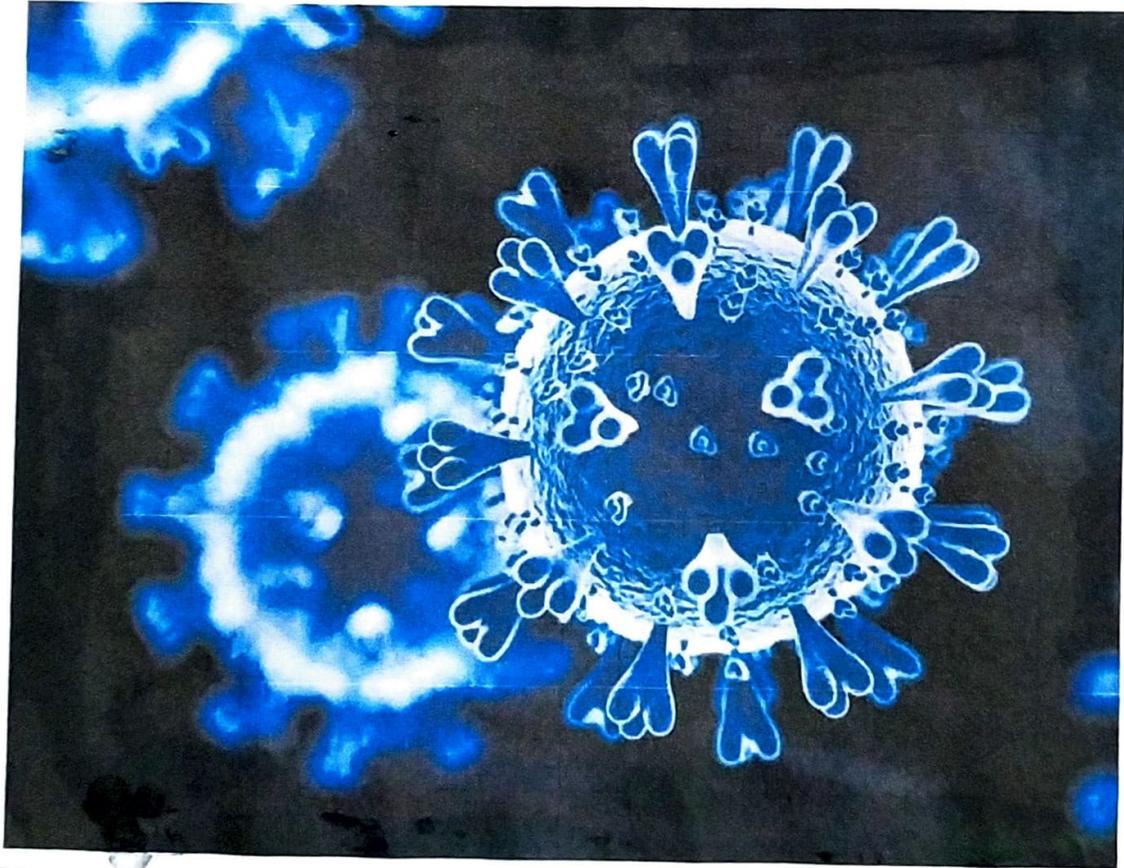
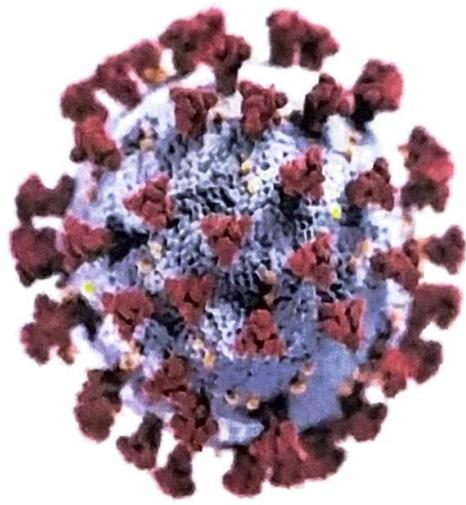
They think one may cause more cases of diseases than the other, but they are still working on what it all means.

Types of coronaviruses:

Human coronaviruses were first found in the mid-1960s. The seven coronaviruses that can impact infect people are:

**COMMON HUMAN CORONAVIRUSES**

1. 229E (alpha coronaviruses)
2. NL63 (alpha coronavirus)



3. OC43 (beta coronavirus)

4. HKU1 (beta coronavirus)

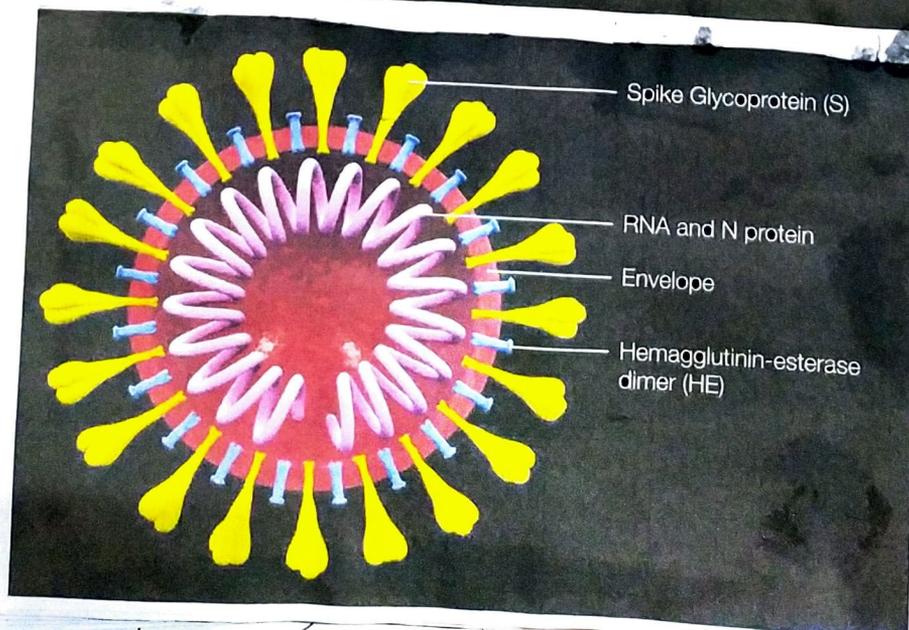
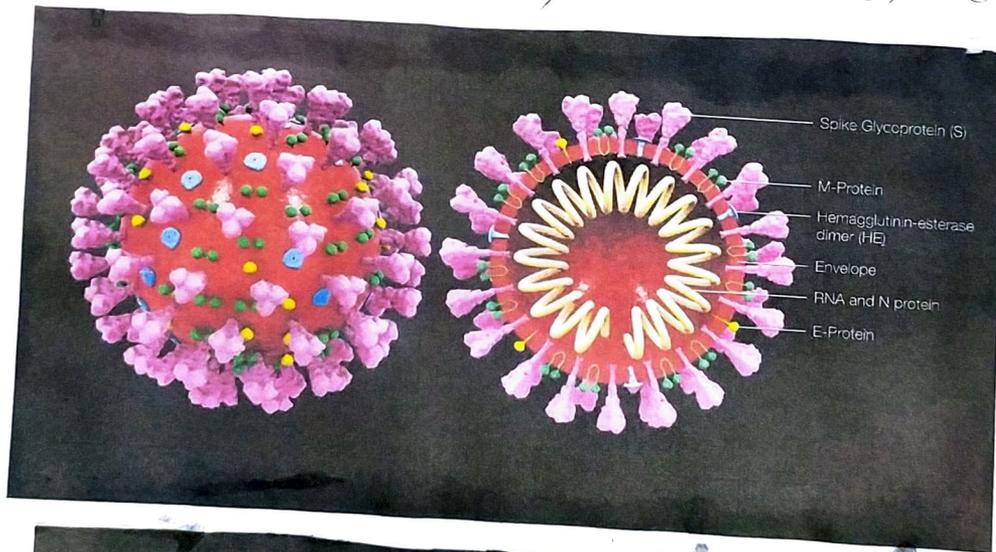
### OTHER HUMAN CORONAVIRUS:

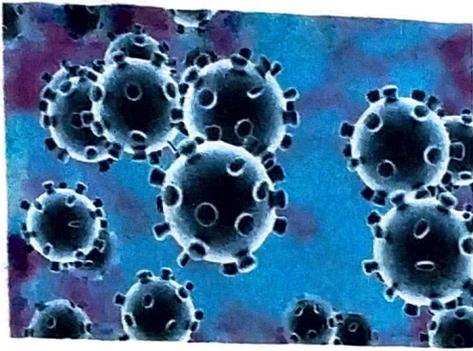
5. MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome or MERS)

6. SARS-CoV (the beta coronavirus that causes Severe Acute Respiratory Syndrome or SARS)

7. SARS-CoV-2 (the novel coronavirus that causes new coronavirus disease 2019 or COVID-19)

People around the world commonly get infected with human coronaviruses, 229E, NL63, OC43, HKU1

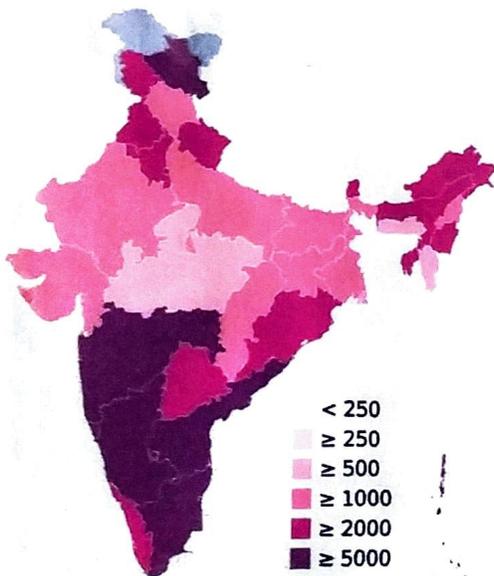




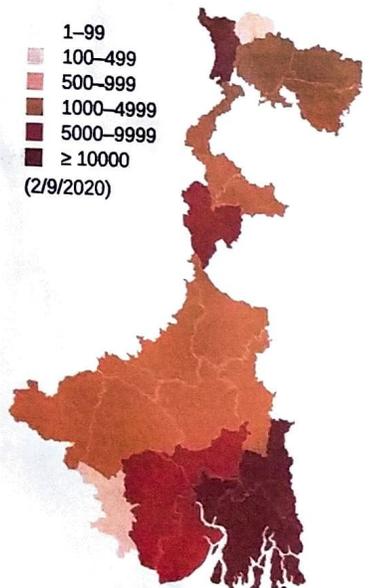
# CORONAVIRUS



COVID-19 cases across the world



COVID-19 cases in India



COVID-19 Cases in West Bengal.

## Transmission: How does Coronavirus spread!

By knowing how does coronavirus spread we can take right step so we don't get sick or infect others.

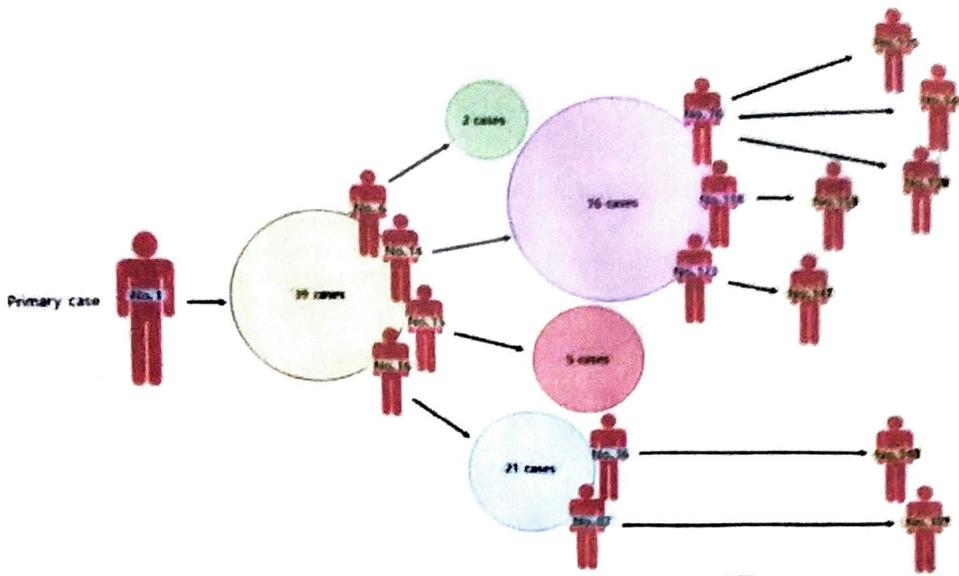
### Person-to-person transmission.

Experts believe the virus that causes COVID-19 spreads mainly from person-to-person. There are several ways this can happen.

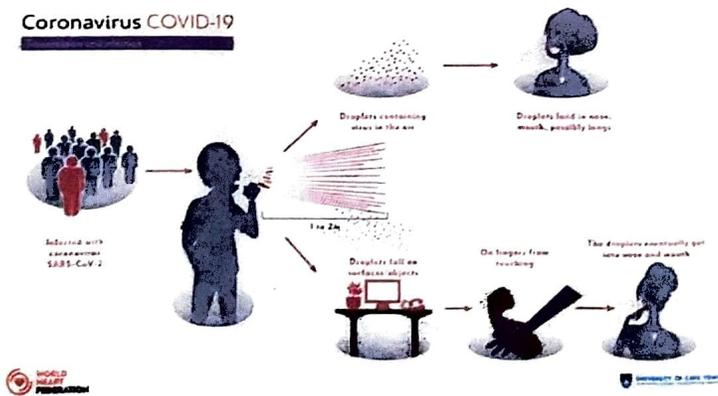
- Droplets or aerosols: When an infected person coughs, sneezes or talks, droplets or tiny particles called aerosols carry the virus into air from their mouth and nose. Anyone who is within 6 feet of that person can breathe it into their lungs.

- Airborne transmission: Researchers show that the virus can live in the air for upto 3 hours. It can get into your lungs if someone who has breathe out and you breathe that air in. Experts are divided on how often the virus spread through the airborne route and how much it contributes to the pandemic.

- Surface Transmission: Another way to catch the new coronavirus is when you touch surfaces that someone who has already got infected with the virus coughed or sneezed on. You may touch a counter top or a door knob that's contaminated and then touch your nose,



### Coronavirus COVID-19



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mouth or eyes. This virus can live on surfaces like plastics or stainless steels for 2 to 3 days. To stop it, clean and disinfect all counters, knobs, and other surfaces that we and our family members touch several times a day.

Fecal-oral: Studies also suggest that virus particles can be found in infected people's poop. But experts aren't sure whether the spread through the contact of infected person's stool. If that person uses the bathroom and doesn't wash their hands, they could infect things and people they touch.

The virus most often spreads through people who have symptoms. But it is also possible to pass it on without showing any signs. Some people who don't know they are infected can give it to others. This is called asymptomatic spread. You can also pass it on before you notice any sign of infection, called presymptomatic spread.

Researches say that on average, every person who has COVID-19 will pass it on to 2 or 2.5 others. One study shows that the number is even higher, with one sick person infecting 4.4 to 6.7 others.

# Symptoms:

COVID-19 affects different people in different ways. Most infected people develop mild to moderate illness and recover without hospitalization.

## Most Common symptoms:

- fever
- dry cough
- tiredness.

## Less common symptoms:

- aches and pains
- sore throat
- diarrhoea
- conjunctivitis
- headache
- loss of taste and smell
- a rash on skin, or discolouration of fingers and toes.

## Serious symptoms:

- difficulty breathing or shortness of breath.
- chest pain or pressure.
- loss of speech or movement

On average it takes 5-6 days - from when someone is infected with the virus for symptoms to show, however it can take upto 14 days.

According to researchers in China, these were the most common symptoms among people who had COVID-19:

- Fever (99%) • Fatigue (70%) • Lack of appetite (40%)
- Body aches (35%) • Shortness of breath (31%) • mucus (27%)

Data collected from many countries around the world suggest that men and women are likely to acquire COVID-19, but men have a higher risk of severe illness and death.

Coronavirus risk factors:

Anyone can get infected of COVID-19, and most infections are mild. The older you are, the higher the risk of severe illness.

We also have higher chance of serious illness if we have one of this health conditions:

- Chronic Kidney disease,
- Chronic obstructive pulmonary disease (COPD).
- A weakened immune system because of an organ transplant
- Obesity.
- Serious heart conditions such as heart failure or coronary artery disease.
- Sickle cell disease
- Type 2 diabetes.

Conditions that could lead to a severe COVID-19 illness include:

- Moderate to severe asthma.
- Diseases that affect our blood vessels and blood transport to brain.
- Cystic fibrosis
- High blood pressure.
- A weakened immune system because of a blood or bone marrow transplant, HIV, or medications like corticosteroids.
- Dementia
- Liver disease
- Pregnancy
- Damaged or scarred lung tissue (pulmonary fibrosis)
- Smoking
- Thalassemia
- Type 1 diabetes.

Some children and teens who are in the hospital with COVID-19 have an inflammatory syndrome

in children. Doctors think it may be linked to the virus. It causes symptoms similar to those of toxic shock and of Kawasaki disease, a condition that causes inflammation in child's blood vessels

Scientists and researchers show that they are constantly tracking COVID-19 infections and recoveries. But they don't have information about the outcome of every infection. Early estimates predict that the overall COVID-19 recovery rate will be between 97% and 99.75%

India's COVID-19 tally of cases climbed to 87.73 lakh with 44,684 new infections in a day, while 81,68,572 people have recuperated from the disease so far, bringing the national recovery rate to 93.04% on 14th Nov, Saturday, according to the Union Health Ministry data.

## CORONAVIRUS PREVENTION

To prevent ourselves from getting affected of coronavirus we should maintain the necessary precautions as suggested Health Ministry & WHO. We can take these steps:

1. Washing hands often with soap and water or clean them with an alcohol based

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This kills viruses on our hands.

• PRACTICE SOCIAL DISTANCING. Because we can have and spread the virus without knowing it, we should stay home as much as possible. If we do have to go out, we should stay at least 6 feet away from others.

• COVERING OUR NOSE AND MOUTH IN PUBLIC. If we have COVID-19, we can spread it, even if we don't feel sick. Wear a cloth and face covering mask to protect others. This isn't a replacement of social distancing. We still need to keep a 6-foot distance between ourselves and people around us. We shouldn't use a face mask meant for health workers. And don't put a face mask/covering on anyone who is:

- Under 2 years old
- Having trouble breathing
- Unconscious or can't remove mask on their own for other reasons.

• NOT TOUCHING FACES. Coronaviruses can live on surface we touch several times. If they get on our hands and we touch ~~to~~ our eyes, nose or mouth, they can get into our body.

• CLEAN AND DISINFECTANT. We can clean first with soap and water, but disinfect so surfaces we touch often, like tables, door knobs, light switches, toilets, faucets and sinks. Use a mix

o) household bleach and water (1/3 cup bleach per gallon of water, or 1 teaspoon of water bleach per quart of water) or a household cleaner that's approved to treat SARS-CoV-2. We can check the Environmental Protection Agency (EPA) website to see if ours made the list. <sup>wearing gloves</sup> when we clean and throw them away <sup>after</sup> we done.

• COVER COUGHS AND SNEEZES :

We should always cover our mouth and nose with a tissue when we cough or sneeze or use the inside of our elbow and shouldn't spit.

Throw used tissues in the trash.

Immediately wash our hands with soap and water for at least 20 seconds. If soap and water are not readily available, we should clean our hands with a hand sanitizer that contains at least 60% alcohol.

• Monitoring Our Health on Daily Basis :

We should be alert for symptoms. Watching fever, cough, shortness of breath or other symptoms of COVID-19

o Especially important if we are running essential errands, going into the office or workplace, and in settings where it may be difficult to keep a physical distance of 6 feet.

Taking own temperature if symptoms develop.

- Temperature shouldn't be taken within 30 minutes of exercising or taking medications that can lower temperature, like acetaminophen.

## CORONAVIRUS TREATMENT :

There's no specific treatment for COVID-19. People who get a mild case need care to ease their symptoms, like rest, fluids, and fever control. Take over-the-counter medicine for a sore throat, body aches, and fever. But don't give aspirin to children & or teen who are younger than 19.

We might ~~hear~~ have heard that we shouldn't take ibuprofen to treat COVID-19 symptoms. But the National Institute of Health says people who have the virus can use non steroid anti-inflammatory drugs (NSAIDs) or acetaminophen as usual.

Antibiotics won't help because they treat bacteria not viruses. If it is heard that people with COVID-19 getting antibiotics, it's for an infection that came along with the disease.

People with severe symptoms need to be cared for in the hospital.

The anti-viral medication called remdesivir (velcovy) is first medication to get FDA approval for treatment.

of patients hospitalized with COVID-19. Originally developed to treat Ebola, evidences to show that those treated with remdesivir recovered in about 11 days, compared to 15 days for those who were treated with placebo.

Many clinical trials are underway way to explore treatments used for the condition that could fight with COVID-19 and to develop new ones.

For instance, trials are underway for tocilizumab, another medication used to treat autoimmune conditions. And the FDA is also allowing clinical trials and hospitals to use of blood plasma from people who've had COVID-19 and recovered to help others build immunity. This is called convalescent plasma. Currently, evidence of its effectiveness is limited.

It may have heard a lot about the anti-malarial drugs hydroxychloroquine and chloroquine. The FDA originally granted emergency use of the drugs but later rescinded it because studies didn't show that the drugs worked against COVID-19 or that their benefits outweigh the risks.

A variety of steroid medications are being used including dexamethasone which is used to treat conditions such as ~~arthritis~~ arthritis, blood/hormone/immune system disorders, allergic reactions. More studies on effectiveness are still being

conducted. There is no cure but researchers are trying hard to find one.

CORONAVIRUS VACCINE :

There's no vaccine but intense research to create one has been underway around the world since scientists shared the virus's genetic makeup since January 2020. Vaccine testings in human started with record speed in March 2020. More than 100 vaccine projects are in various phases of development.

Predictions are the vaccine could be ready before the end of 2020, the pharmaceutical companies have made a joint declaration that their vaccine will not be released until safety is assured. Still vaccines for children unlikely will be available soon.

GLOBAL IMPACT OF COVID-19 :

The COVID-19 pandemic has led to a dramatic loss of human life worldwide and presents an unprecedented challenge to public health, food system and world of work. The economic and social disruption caused by the pandemic is devastating: tens of millions of people are at a risk of falling into extreme poverty, while the number of undernourished people, currently estimated at nearly 690 million, could increase by upto 132 million by the end of the year.

Millions of enterprises face an existential threat. Nearly half of the world's 3.3 billion global workforce are at a risk of losing their livelihoods. Informal economy workers are particularly vulnerable because the majority lack social protection and access to quality health care and have lost access of productive assets. Without the means to earn an income during lock downs, many are unable to feed themselves and their families. For most, no income means no food, or at best, less food or less nutritious food.

The pandemic has been effecting the entire food system and has laid bare its fragility. Borders close, trade restrictions and confinement measures have been preventing farmers from accessing markets, including for buying inputs and selling their produce, and agricultural workers from harvesting crops, thus disrupting domestic and international food supply chains and reducing access to healthy, safe and diverse diets. The pandemic has decimated jobs and placed millions of livelihoods at risk. As breadwinners lose jobs, fall ill and die, the food security and nutrition of millions of men and women are under threat with those in low-income countries,

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particularly the most marginalized populations, which include small-scale farmers and indigenous peoples, being hardest hit.

Millions of agricultural workers - waged and self-employed - while feeding the world, regularly face high level of working poverty, malnutrition and poor health and suffer from a lack of safety and labour protection as well as other types of abuse. With low and irregular income and a lack of social support, many of them are spurred to continue working, often in unsafe conditions, thus exposing themselves and their families to additional risks. Further when experiencing income losses, they may resort to negative coping strategies, such as distress sale of assets, predatory loans or child labour. Migrant agricultural workers are particularly vulnerable, because they face risk in their transport, working and living conditions and struggle to access support measures put in place by governments. Guaranteeing the safety and health of agri-food workers - from primary workers to those involved in food processing, transport and retail, including street food vendors - as well as better income and protection, will be critical to saving lives and protecting public health, people's livelihoods and food security.

In COVID-19 crisis food security, public health, and employment and labour issues, in particular workers' health and safety, converge. Adhering to workplace

safely and ~~had~~ health practices and ensuring access to decent work and the protection of labour rights in all industries will be crucial in addressing the human dimension of the crisis. Immediate and purposeful actions to save life and livelihoods should include extending social protection towards universal health coverage and income support for those most affected. These includes workers in the informal economy and poorly protected and low-paid jobs, including youth, older workers, and migrants. Particular attention must be paid to the situation of women, who are over-represented in low-paid jobs and care roles. Different forms of support are key, including cash transfer, child allowances and healthy schools meals, shelter and food relief initiatives, support for employment retention and recovery, and financial relief for businesses, including micro, small and medium-sized enterprises. In designing and implementing such measures it is essential that governments ~~take~~ work closely with employers and workers.

Countries dealing with existing humanitarian crises or emergencies are particularly exposed to the effects of COVID-19. Responding swiftly to the pandemic, while assuring that humanitarian and recovery assistance reaches those most

in need, is critical.

Now is the time for global solidarity and support, with the most vulnerable in our societies, particularly in the emerging and developing world. Only together we can overcome the intertwined health and social and ~~eco~~ economic impact of the pandemic and prevent its escalation into a protracted humanitarian and food security catastrophe, with the potential loss of already achieved development gains.

We must recognize the opportunity to build back better, as noticed in the Policy Brief issued by the United Nations secretary general. We are committed to pooling our expertise and experience to support countries in their crisis response measures and efforts to achieve the Sustainable Development Goals. We need to develop long-term sustainable strategies to address the challenges facing the health and agri-food sectors. Priority should be given to underlying food security and malnutrition challenges, tackling rural poverty, in particular through more and better jobs in rural economy, extending social protection to all, facilitating self-migration pathways and promoting the formalisation of informal economy.

We must rethink the future of our environment and tackle ~~at~~ climate changes and environmental degradation with ambition and urgency. Only then we can protect health, livelihoods, food security and nutrition of all people and ensure that our 'new normal' is a better one.

### Social Impact of the COVID-19 Pandemic:

The COVID-19 pandemic has had far-reaching consequences beyond of the spread of the disease itself and efforts to quarantine it, including political, cultural and social implications.

#### Educational Impact:

The pandemic has affected ~~of~~ the educational systems worldwide, leading to the widespread closures to schools and colleges and universities. According to a data released on 25<sup>th</sup> March, schools and university ~~at~~ closures due to COVID-19 were implemented nationwide in 165 countries. Including localized closures, this affects over 1.5 billion students worldwide, accounting of ~~87%~~ for 87% of enrolled learners.

#### Religious Impact:

The pandemic has impacted religions in various ways, including the cancellation of worship services of various faiths, the closures of Sundays.

Schools, as well as the cancellation of pilgrimages surrounding observances and festivals. Many churches, synagogues, mosques and temples have offered worships to livestream amidst the pandemic. Relief wings of religious organizations have dispatched medical supplies and other aid to affected areas. Adherents of many religions have gathered together to pray for an end to the pandemic, for those who affected by it, as well as for the God they believe in to give physicians and scientists to give the wisdom to combat the disease; in United States, Trump designated 15 March 2020 as a National Day of Prayers for "God's healing hand to be placed on the people of our nation."

### Psychological impact :

On 18th March 2020, the WORLD HEALTH ORGANISATION issued a report related to mental health and psychosocial issues by addressing instructions and some social considerations during this COVID-19 outbreak.

• Suicide: The coronavirus pandemic has been followed by a concern for a potential spike in suicides, exacerbated by social isolation due to quarantine and social-distancing guidelines, fear, and unemployment and financial factors.

## Risk Perception:

Chaos and negative effects of COVID-19 may have made a catastrophic future seem less remote and action to prevent it more necessary. However, it may also have the opposite effect by having minds focus on the more immediate threat of the pandemic rather than the climate crisis or the prevention of other disasters.

## COVID-19 Outbreak in India:

The COVID-19 pandemic in India is a part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020. India currently has largest number of confirmed cases in Asia, and has the second highest confirmed cases in the world, after United States, with more than 8.8 million reported cases of COVID-19 infection, more than 4 lakh deaths and more than 8.2 million recovered. By mid of November 2020 India had approached in position of conducting highest numbers of daily tests in the world which subsequently translated into highest numbers

of daily ~~cases~~ new cases in world and has sustained highest number of daily cases spike since then.

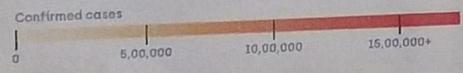
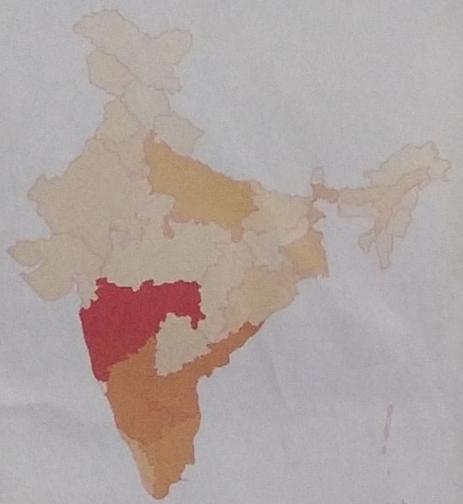
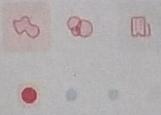
### India

Last Updated on 15 Nov, 3:34 PM IST

Tested  
**12,48,36,819**  
As of 14 November  
per source

### India

**88,19,636**  
Confirmed



### India

Last Updated on 15 Nov, 3:34 PM IST

Tested  
**12,48,36,819**  
As of 14 November  
per source

### India

**4,74,741**  
Active



COVID-19

Active cases of COVID-19 in INDIA as of 14th november.

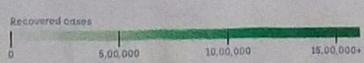
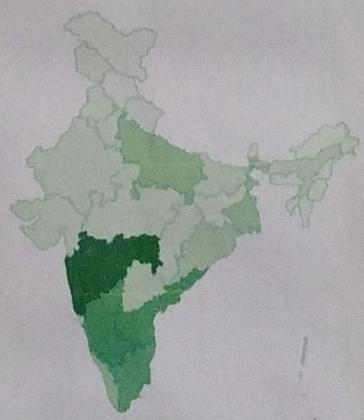
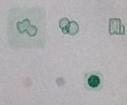
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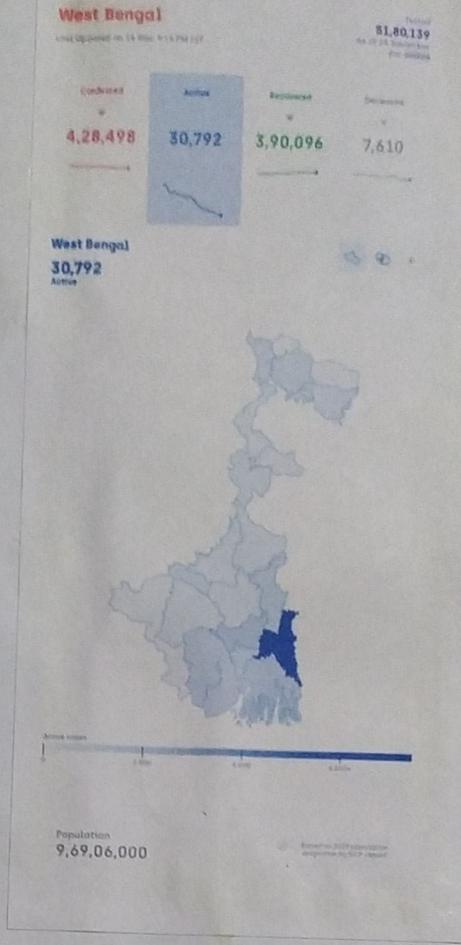
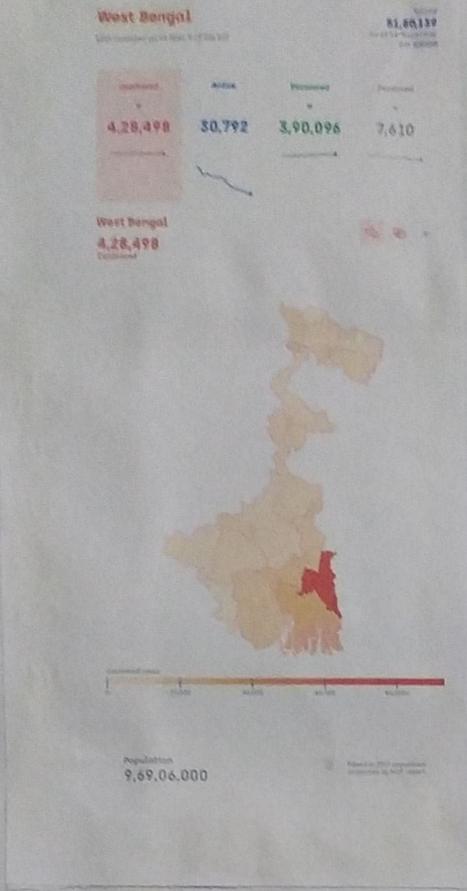
### India

**82,13,146**  
Recovered



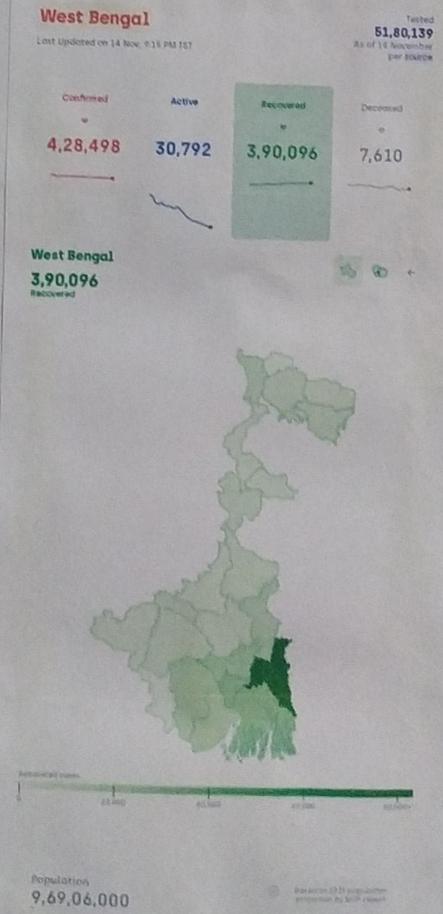
Total no of Confirmed cases of COVID-19 in India as of 14<sup>th</sup> november

Total no of recovered cases in INDIA



Total no of Active Cases in West Bengal.

Total no of confirmed cases in West Bengal



Total no of recovered cases in West Bengal.

## Role of Common People to Control COVID-19

To expect our people to show conformity to the preventive measures against COVID-19, announced by the Indian Government, is, in fact, to expect a little too much. Some of the mandatory measures such as wearing a mask in public spaces, social distancing, self-isolation or quarantining (in both symptomatic and asymptomatic cases) and getting tested if showing symptoms are some of important guidelines we are expected to follow. Apart from this we are also expected to wash our hands frequently; sanitise our living or work places, including the surfaces we frequently touch during the course of our activities.

Though some people follow these guidelines scrupulously, a majority of Indians don't think twice before flouting them. We often notice how social distancing isn't always maintained when people are present in public spaces. Something as simple as a mask is often not shown worn because people say it's unhealthy and that it's not going to make much of a difference. There have been other more disturbing violations such as people escaping from hospitals while quarantined or others turning violent when questioned.

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why they were not following the protocol. Initially when the pandemic had just struck, people also made a deliberate attempt to hide their symptoms or contact history. Cases of mass congregations, parties, get-togethers too were reported.

This brings us to a pertinent question: How are people expected to conduct themselves in critical times? Are we, as a society, expected to behave responsibly or irresponsibly? Even when things are normal, we Indians, take special delights in flouting norms or rules, without bothering about our communities and adopting a 'me first' approach, not thinking twice about jumping the queue or red-lights or worrying about accidents or inconvenience caused to others.

We also have no respect for the law of the land, a fact demonstrated by the Indian Police using lathis to force the people to stay indoors during ~~the~~ lockdown. It was only the fear of the rod, not concern for others, that kept people from stepping out of their homes. Things got so bad that even government had to threaten its own defaulting citizens with legal action, that too to help them stay alive and healthy!

It is quite evident that a society that doesn't follow rules and shows scant regard for the principle of collective social responsibility and welfare in the normal times, is bound to flounder in times of a crisis as severe as this.

In such crucial times, what we need to understand is that our actions have consequences, not only for us, but also for others. A single mistake in the form of socially irresponsible behaviour won't only cost us dear, but also take a heavy toll on our fellow citizens, our neighbours and our community. This kind of lack of social responsibility has, unfortunately, been demonstrated by all sections of our society, illiterate, semi-literate, educated, highly skilled professionals. This is a moment of reckoning for all of us, and we must think on how we can help not only ourselves but also those around us.

~~After few of laws~~ After all, fear of law can't become a governing principle of regulating human behaviour in a society. Ultimately, all civilized societies, depend on the awareness of individual citizens and also on their ability to conduct themselves in a free, fair, yet responsible manner. How long can the fear be used as a deterrent to prevent dangerous and threatening behaviour in the face of COVID-19 Pandemic.

It is time, we citizen understand our own role and responsibility in limiting the spread and transmission of COVID-19. The government is doing what it can but when it is such a grave situation, all of us must come together and realise our social responsibilities. All it requires some deep introspection and cultivation of discipline, respect for the law of the land and an ability to feel for and connect with our fellow citizens.

And yet, this is too serious to be left to the discretion or whims of the individuals. In order to achieve this social objective, if we have to reboot our educational system, it is well worth the effort. We can incorporate the community welfare practices into our education system, right from the primary stage to the university level. This will help our future citizens to develop a strong sense of ethics.

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# RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE:

Corona Pandemic and Role of  
Common People to Control it.

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COLLEGE ROLL NO : STUG/41/2019  
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YEAR : 2020  
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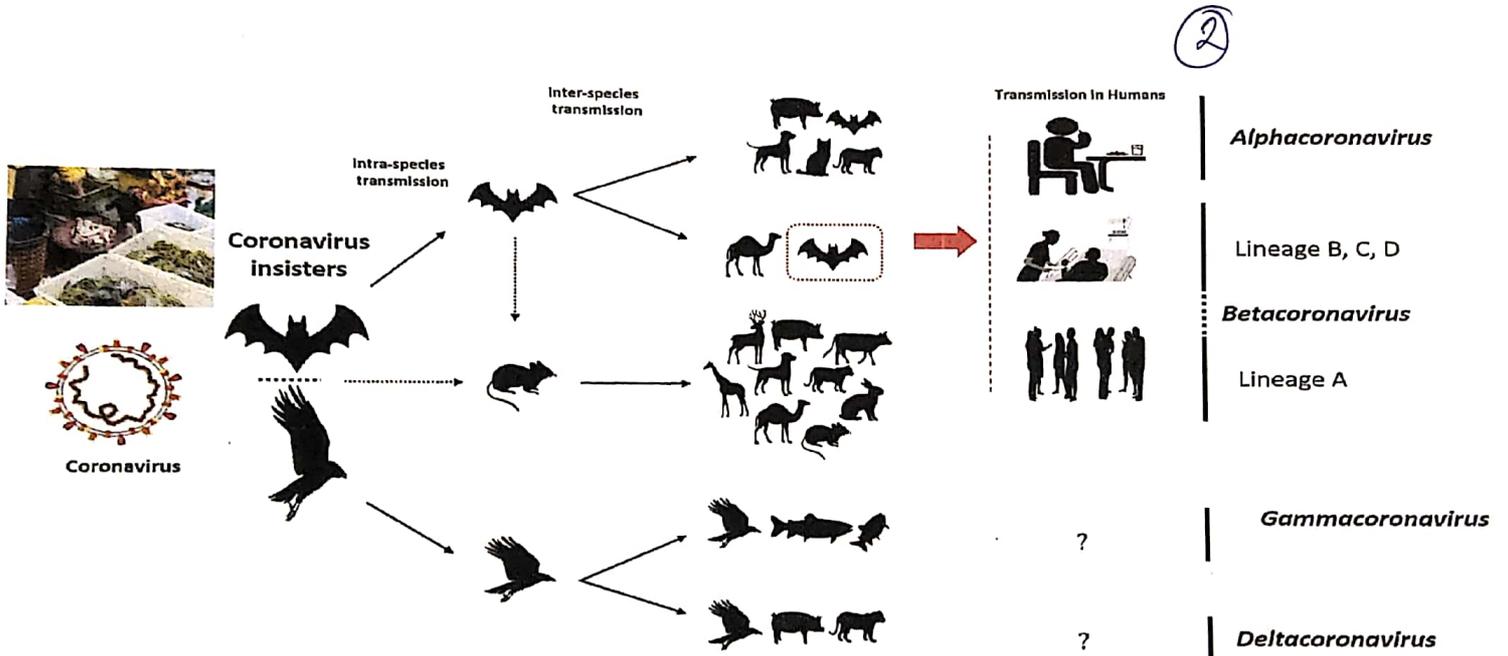
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## Introduction to Covid-19 Pandemic

The world health organisation (WHO) has declared the coronavirus disease 2019 (Covid-19) a pandemic. A global coordinated effort is needed to stop the further spread of the virus. The last pandemic reported in the world was H<sub>1</sub>N<sub>1</sub> flu pandemic in 2009.

On 31st December 2019, a cluster of cases of pneumonia of unknown cause, in the city of Wuhan, Hubei province in China, was reported to the World Health Organisation. In January 2020, a previously unknown new virus was identified, subsequently named the 2019 novel coronavirus, and samples obtained from cases and analysis of the virus' genetics indicated that this was the cause of the outbreak. The novel coronavirus disease named [Covid-19] by WHO in February 2020. The virus referred to as SARS-CoV-2 and the associated disease is Covid-19.



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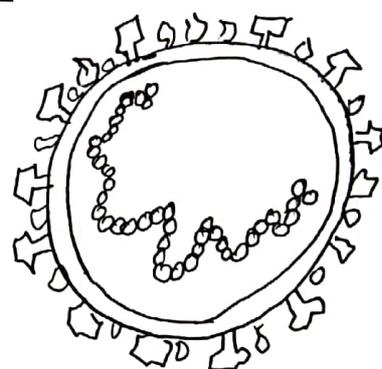
How the virus started spreading

## Characteristics of Covid-19 :-

Covid-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.

### ① Most common symptoms :-

- ▶ Fever
- ▶ Dry cough
- ▶ Tiredness.



Corona Virus

### ② Less common symptoms :-

- ▶ aches and pains
- ▶ sore throat
- ▶ conjunctivities.
- ▶ headache
- ▶ Loss of taste or smell
- ▶ a rash on skin or discolouration of fingers

### ③ Serious symptoms :-

- ▶ difficulty breathing or shortness of breath
- ▶ chest pain
- ▶ loss of speech or movement.

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Covid-19 Treatment

## What Do we Know about Covid-19?

- 1) It is called Covid-19 disease which is caused by SARS-CoV-2 virus
- 2) The symptoms of this disease are fever, cough, difficulty in breathing etc.
- 3) If you have fever or cough or difficulty in breathing, inform the ANM workers immediately or at the phone no. provided by state government (1800313444222)

## Who is likely to be infected (Who is suspect)?

A person with administrative illness who has a history of fever and difficulty breathing - such as coughing or sneezing and in the 14 days prior to the onset of symptoms, the person has been living or travelling in an officially declared Covid affected area or if a person with a respiratory illness comes in contact with a person infected with the virus 2019 (Covid-19) for sure within 14 days before the onset of symptoms of anger or.

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Quarantine Center for  
Covid-19 Suspects

a person with severe respiratory illness who has a fever and difficulty in breathing in administration any of the symptoms, such as cough, severe shortness of breath and is in need of hospitalization or a person who is infected by the virus Covid-19 confirmed by lab. whether or not there are signs of symptoms

Who is a contact will be identified:-

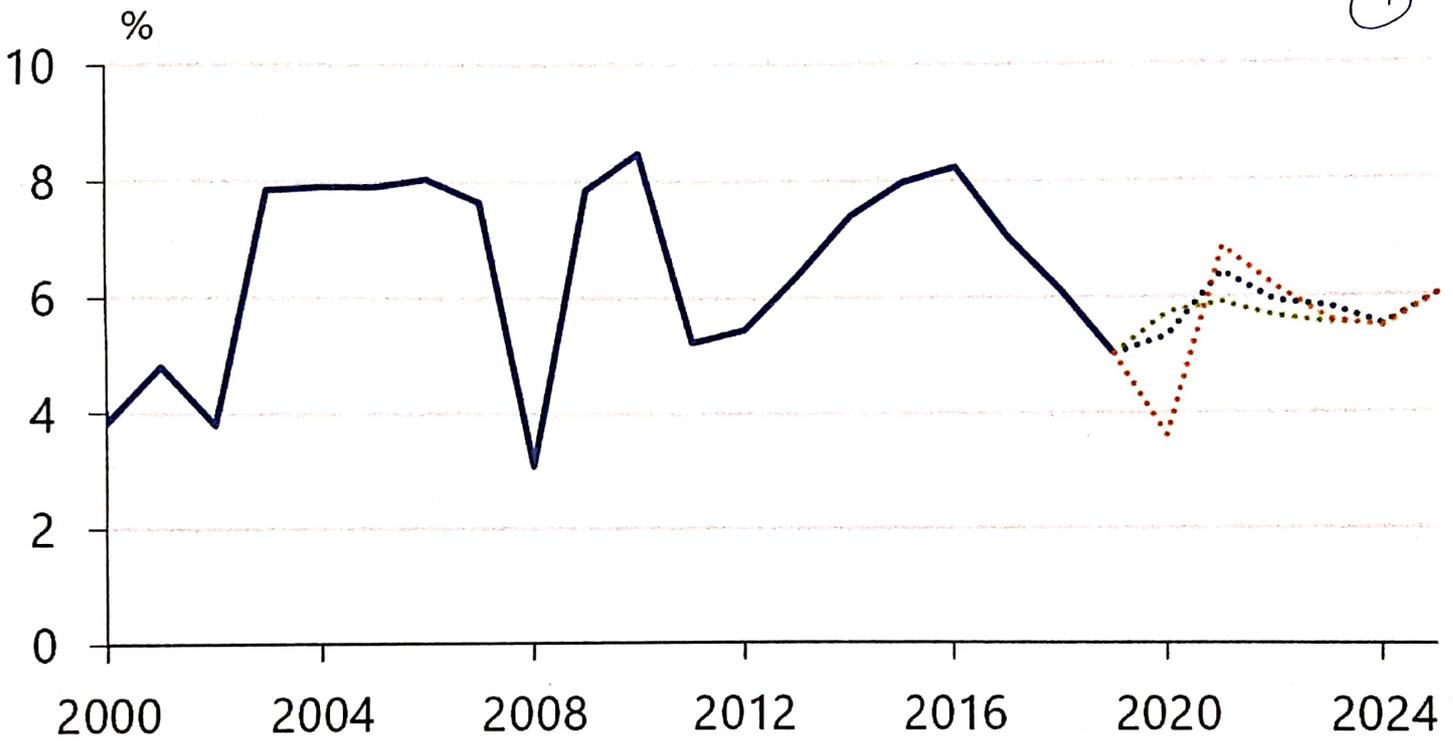
- 1) Without proper protection, the virus will spread in the same house as the person is infected with Covid-19.
- 2) The persons who are staying in a closed environment with a patient infected with Covid-19
- 3) Travelling with a person with symptoms (less than 1 meter), then the person spotted as a infected person.
- 4) The persons who are serving a corona patient can be infected.

## Present Affect on Global Economy due to Covid-19 :-

A global debt crisis is unlikely in the next years or two—assuming economies and private-sector demand recover, S&P Global Ratings said in report. The rebound in economies is predicted on wide availability of Covid-19 vaccine by mid-2021.

Central Banks become gold sellers for the first time in a decade as some producing nations exploited near record prices to soften the blow from the pandemic. Net sales tons of billion in the third quarter compare with purchases of 141.9 tons of a year ago. According to a report by the World Gold Council.

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— GDP India

..... Base line scenario (with COVID-19)

..... No COVID-19

..... Risk scenario: pandemic

Economy after Covid-19

# The Rise and Impact of Covid-19 in India

The coronavirus disease pandemic, which originated in the city of Wuhan, China has quickly spread to various countries with many cases having been reported world wide. As of May 2020 in India, 55,342 positive cases have been reported. India, with a population of more than 1.24 billion is the second largest population in the world. Multiple strategies would be highly necessary to handle the current outbreak, these include, computational modeling, statistical tools, and quantitative analysis. To control the spread as well as the rapid development of a new treatment. The Ministry of Health and Family welfare of India has raised awareness about the recent outbreak and has taken necessary actions to control the spread of covid-19. This outbreak is intertrialy linked to the economy of the nation, as it has dramatically impeded industrial sectors because people world wide are currently cautious about engaging business in the affected regions India's tally of coronavirus cases number 8.09 million, according to government data Deaths rate rise to 121,090 as of 30 october.

## Key Messages to spread for prevention of Covid-19 :-

► How to avoid getting Covid-19 or spreading it? →

### ① Social Distancing :-

- 1) Avoid gathering such as melas, haat, gathering religious places, social functions etc.
- 2) Maintain a safe distance of at least one meter between you and other people when in public places, especially if they are having symptoms such as cough, fever etc. to avoid direct contact.
- 3) Stay at home as much as possible.
- 4) Avoid physical contact like handshake, handholding, hugs etc.
- 5) Avoid touching surfaces in public places such as stairs handle, table etc.

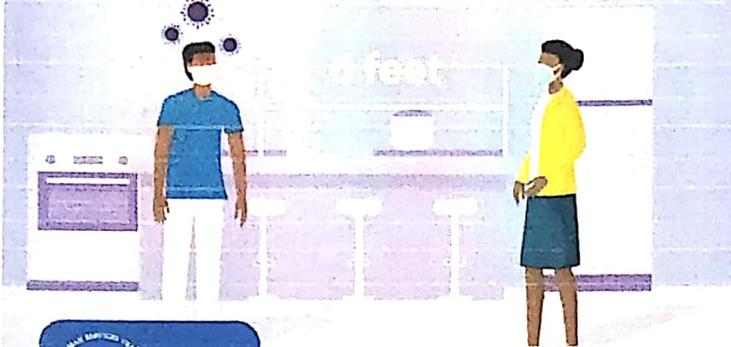
### ② Practice good hygiene :-

- 1) After coming home from outside or meeting other people

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# KEY TIMES to Practice Social Distancing

✓ **Inside your home** when someone has, or thinks they have, COVID-19  
If possible, stay at least 6 feet away.



✓ **Outside your home**  
Stay at least 6 feet away from people outside of your household in indoor / outdoor spaces.  
Stay out of crowded places if possible.



[cdc.gov/coronavirus](https://cdc.gov/coronavirus)

CS317639-A 07/05/2020

*Social Distancing*

2) After having touched your face, coughing or sneezing.

3) Before preparing food, eating or feeding children

4) Before and after using toilet, cleaning etc.

5) Before touching any child

- Wash your hand with soap and sanitize them with 70% alcohol sanitizers.

Also, while coughing or sneezing cover your nose and mouth with your elbow or a handkerchief.

Do not spit or shout in public to avoid the spread of droplets of your saliva.

Do not touch your eyes, nose and mouth with unclean hand.

Ensure that the surfaces of your house are cleaned and sanitized everyday.

# How can I help slow the spread of the virus?

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**Stay at home**  
no unnecessary journeys  
or social contact



Only leave home for  
essential shopping  
or medical needs



You can also go out to  
exercise once a day



Travel to and from work only if  
absolutely necessary



Public gatherings of  
more than two people are banned -  
excluding people you live with



Police could fine you  
if you don't follow the rules

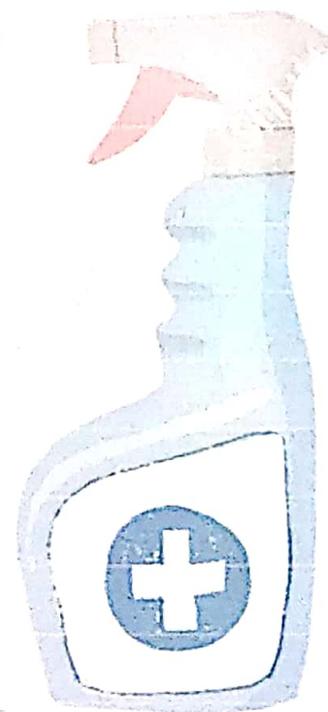
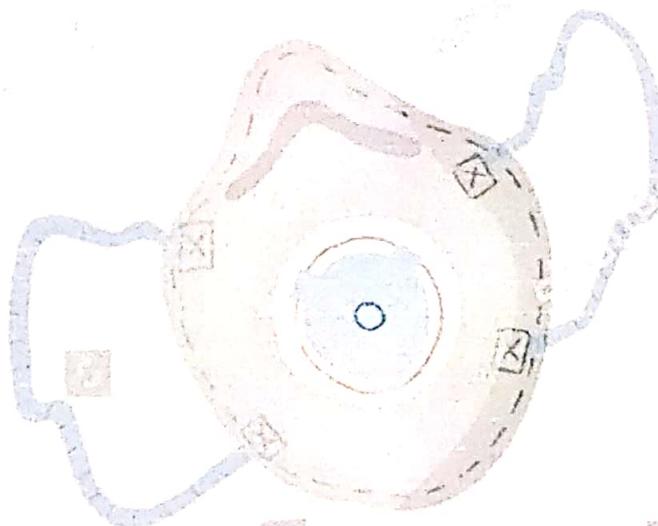
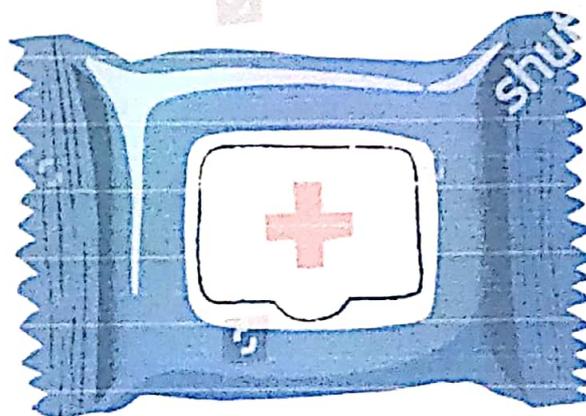
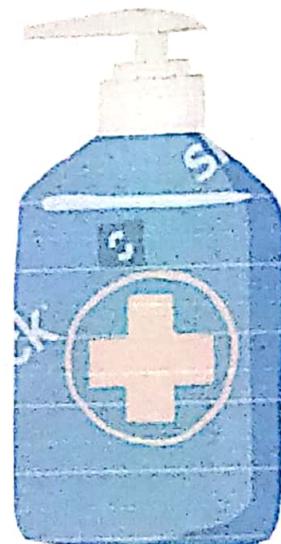
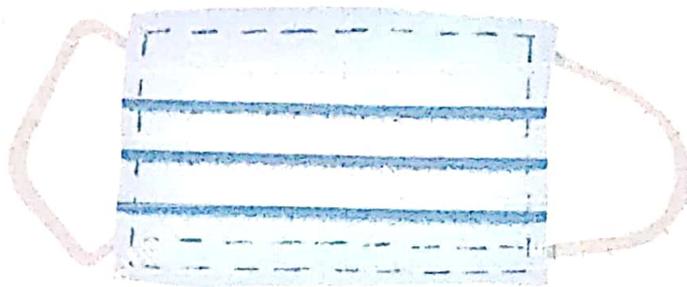
What to do if you are having symptoms or have travelled in public vehicles:—

- ① Symptoms of Covid-19 and seasonal respiratory illness are similar, All people with these symptoms may not have Covid-19.
- ② Who have the symptoms should be quarantined for 14 days [according to WHO] at their home or at quarantine center.
- ③ Those who have travelled to Covid-19 affected countries / areas in past 14 days or those who have come in close contact with a suspected Covid-19 patient or those who are affected should be quarantined.

Instructions for the person being Home Quarantined:—

- 1) Stay in a separate room at home, if possible with an attached toilet.
- 2) Wear masks if anyone is near you.
- 3) Use separate dishes, towels, bedding, room which should be cleaned separately.
- 4) The floor, door handles, chairs, should be cleaned and sanitized everyday.

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Health Kits to prevent coronavirus

# Instructions for the caretaker of the Home Quarantined Person:

Keep a distance of one meter when entering the room. Wear a mask or cover your face with double layered cotton cloth. Wash your hands before and after entering the room and coming out from the room.

## How to use masks:

Wash your hands before putting on the mask.

Make sure that it covers both mouth and nose and is not loose.

Make sure to wash your hands after changing the mask.

3-layered medicated masks are most effective against corona virus according to WHO.

Try to use them.

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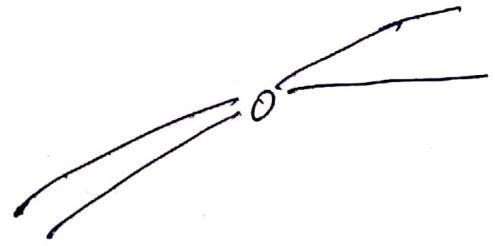
3-layered medicated mask and 70% alcohol  
sanitizer

# Acknowledgement

I would like to express my special thanks of gratitude to my teachers, Souvik Bhattacharya and Narayan Maity as well as our Principal Swami Shastrajanandaji Maharaj who gave me the golden opportunity to do this wonderful project on the topic "Corona Pandemic and Role of Common People to control it" which also helped me in doing a lot of reserch and I come to know about so many new things.

# Data Collection

Most of the data I have collected from internet and some of the data from WHO's instruction to prevent corona pandemic.



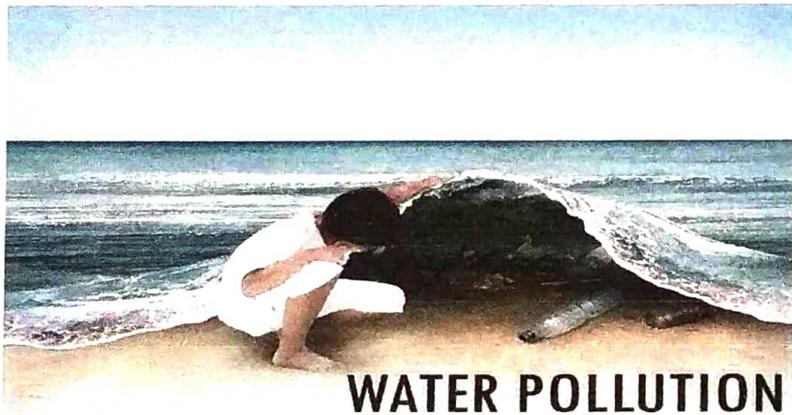
# RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE: water pollution & measures to control it



**WATER POLLUTION**

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-: Content :-

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● Introduction :-

British poet W.H. Auden once noted, "Thousands have lived without love, not one without water".

John Todd said, "Our liquid planet glows like a soft blue sapphire in the hard-edged darkness of space. There is nothing else like it in the solar system. It is because of water".

Water is the essential element that makes life on earth possible. Without water there would be no life.

Yet, while we all know water is crucial for life, we trash it anyway. We usually take water for granted. It flows from our taps when they are turned on and we remained complete careless about that. Like good health we ignore water when we have it.

The widespread problem of water pollution is jeopardizing our health. Unsafe water kills more people each year than war and all other forms of violence combined. Meanwhile, our drinkable water sources are finite i.e. less than 1% of the earth's freshwater is actually accessible to us. Without taking any positive action, the challenges will only increase by 2050, when global demand for freshwater is expected to be one-third greater than it is now.

Still, we are not hopeless against the threat to clean water. To better understand the problem, here we will discuss about an overview of what water pollution is, what causes it and how we can prevent it.

● What is water pollution?

↳ Water pollution occurs when harmful substances - often chemicals or microorganisms - contaminate a stream, river, lake, ocean, aquifers or any other waterbody, degrading water quality and rendering it toxic to humans and to the environment.

● Types of sources of water pollution :-

① Point source :- when contamination occurs from a single source and that source can be readily identified as it has a definite place where it enters water, then that source is called as point source. Though, this pollution originates from a specific place, it can affect miles of waterways and ocean.

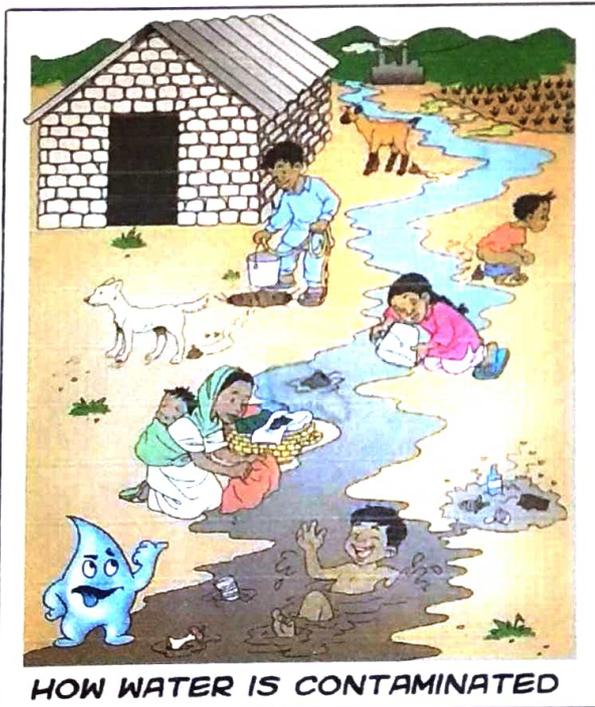
Examples :- Municipal and industrial discharge pipes, wastewater discharged from a manufacturing unit, oil refinery etc.

It can be from leaking septic systems and illegal dumping also. The EPA has set limits on what can be discharged by a facility directly into a body of water to regulate point source pollution.



② Non-point sources :- Non-point source of pollution is the opposite of point source pollution, with pollutants released in a wide area. Non-point source of pollution is harder to identify and harder to address. It is pollution that comes from many places all at once.

Example :- • Picture a city street during a thunderstorm. As rainwater flows over asphalt, it washes away droplets of oil that leaked from car engines, particles of tire rubber, dog waste and trash. The runoff goes into a storm sewer and ends up in a nearby river. So, runoff is a major cause of non-point source pollution.



HOW WATER IS CONTAMINATED

• Also, in urban areas, people use water from a definite waterbody (pond, river etc.) in many purposes and also various chemicals mixed with that waterbody from agricultural field with the runoff of rain water. This is also a kind of non-point source water pollution.

\* The pollution from non-point source also very difficult to regulate, since there is no single, identifiable culprit.

## • Different categories of water pollution :-

↳ Groundwater pollution :- Groundwater is one of our least visible but most critical natural resources. With rainfall, it becomes groundwater as it seeps deep into the earth, filling up rocks, crevices and porous space of an aquifer, which is an underground storehouse of water.

Groundwater gets polluted when contaminants such as fertilizers, pesticides and waste leaching from landfills and septic systems, making their way into an aquifer. Making groundwater free of contaminants can be difficult to impossible, as well as costly.

↳ Surface water pollution :- Surface water covers about 70% of the earth, filling our oceans, lakes, rivers and including all blue bits in the world map. Surface water from fresh water surfaces other than sea accounts for more than 60% of the water delivered to our homes.

Nutrient pollution that includes nitrates and phosphates, which plants and animals need to grow, causes major pollution in the freshwater sources due to farm waste and fertilizer runoff. Municipal and industrial waste discharges and also individuals' dumping directly into waterways contribute their fair share of toxins.

As per the Environmental Protection Agency of U.S., nearly 50% of our rivers, streams, one third of our lakes and ponds are polluted and unfit for swimming, fishing and drinking.

③ Ocean water pollution :- 80% of ocean pollution or marine pollution originates on land along the coast or far inland. Streams and rivers carry contaminants such as chemicals, nutrients and heavy metals that are carried from farms, factories and cities into our bays and estuaries, and from there finally they reach the ocean.

Marine debris, particularly plastic is blown away by the wind or washed away in storm via drains and sewers. Our seas sometimes get polluted by big and small oil spills and leaks and are also soaking up carbon pollution from air. The ocean absorbs a quarter of human made carbon.

④ Transboundary :- A boundary line can't contain water pollution on a map. Transboundary pollution happened when contaminated water from one country spilled into other countries' waters. It can result from a disaster like an oil spill or the slow, downriver creep of industrial, agricultural or municipal discharge.



⇒ surface water pollution by industrial and household wastes which is also main cause of ground-water pollution.

• Causes and effects of water pollution :-

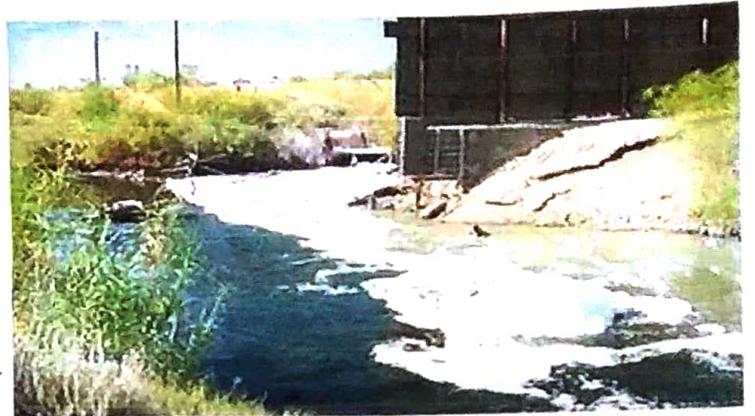
① Sewage and domestic waste :-

Nearly 75% of water pollution is due to sewage and domestic wastes. A mere 0.1% impurities make domestic sewage unfit for human use. Sewage generally includes biodegradable pollutants like human faecal matter, animal wastes and many dissolved organic compounds like - carbohydrates, proteins, fats, urea etc., inorganic salts such as nitrates and phosphates of detergents also. These pollutants undergo natural processes and are rapidly decomposed.



↳ Effect :- In water, organic wastes provide nutrition for many decomposers like bacteria. These break down the organic part by using bulk of oxygen and cause deficiency of oxygen in water that kills the fishes and other animals (aquatic). Anaerobic bacteria in oxygen deficient water disrupt food chains. Anaerobic bacteria produces foul smelling gases. These give rise to many other pollutants like  $H_2S$ ,  $NH_3$  etc. Organic sulphide and methane also produced by those bacteria that makes the water brownish and turbid.

② Industrial wastes and effluents :- The industrial wastes and their effluents include poisonous materials like acids, alkalies, chromium salts, phenols, cyanides, insecticides, agricultural chemicals, chlorine, ammonia, hydrogen sulphides, salts of heavy metals such as Cu, Pb, Zn and Hg.



↳ Effects :-

- The water becomes toxic and deoxygenated, so this can't support aquatic life.
- Mercury (Hg) enters the food chain, kills fish and poisons the remaining fauna.
- Mercury causes minamata disease. People feeding on this aquatic forms develop numbness of limbs and lips, impairment in speech hearing and vision, meningitis and genetic disorders.
- oils deplete oxygen of water, inhibit plankton growth and photosynthesis. Sea birds also harmed.
- organic phosphates and nitrates enhance growth of algal blooms.
- Black foot diseases is caused by chronic exposure to As. Also, exposure of - As may cause skin lesions, skin cancers, lungs cancers etc. chronic diseases.

③ Dumping :- dumping of solid wastes and litters in water bodies cause huge problems. Litters include glass, plastic, aluminium, styrofoam etc. Different things take different time to degrade in water.



↳ Effect :- They effect the aquatic plants and animals. Dumping of plastic and household wastes

④ Mining activities :- Mining is the process of crushing

the rock and extracting coal and other minerals from the underground.

These elements, when extracted in the raw form, contain harmful chemicals and can increase the numbers of toxic elements when



mixed up with water, mining activities emit a large amount of metal waste and sulphides from the rocks, which is harmful to water.

↳ Effect :- Release of toxic chemicals in water may cause health problems of aquatic animals as well as of human.

⑤ Accidental oil leakage :- A ship carrying a large quantity of oil may spill oil in sea if met an accident.



⇒ In 1967 large oil tanker Torrey canyon met an accident and release 100000 ton crude oil in sea of southern England.

↳ Effect :- such an oil spill can cause various damages to the species in the ocean, depending on the amount of spill, the toxicity of the pollutants and the size of ocean. When a large amount of oil spills into the sea and does not dissolve in water. It causes problems for local marine wildlife including fish, birds and sea otters. Oil inhibits the plankton growth and photosynthesis. Sea birds smeared with oil fall sick and die.



⑥ Insecticides and pesticides :- Insecticides are biologically active chemicals that are used for pest control. These include D.D.T, B.H.C,  $\text{CuSO}_4$  and aldrin etc. Aquatic microorganisms absorb them in fats and oils. Fish feeding on these zooplanktons and phytoplanktons rapidly spread it through other trophic levels.

Effect :-

• Biomagnification :- Aquatic microorganisms absorb the insecticides in fats and oils.

Fish feeding on these zooplanktons and phytoplanktons further concentrate these pesticides still more.

The increased accumulation of these toxic substances in the food chain at higher

trophic level is called biological magnification. Many species



of predatory birds like eagles, cormorants, hawks and large fishes shown serious adverse effects from this accumulation. Thinning of egg shells is the major effect.

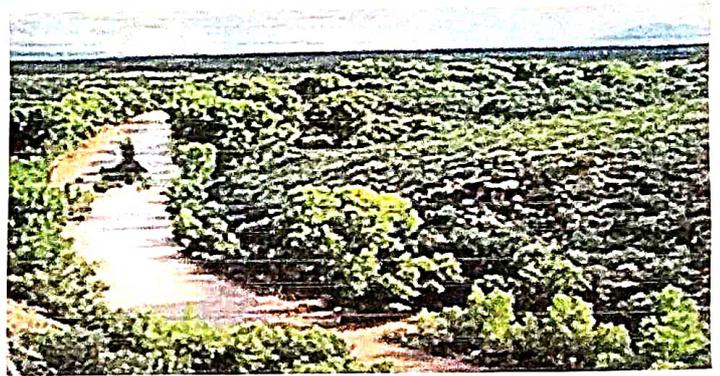
Water  $\Rightarrow$  Zooplankton  $\Rightarrow$  Small fish  
 (DDT = 0.003 ppm) (DDT = 0.04 ppm) (DDT = 0.5 ppm)

↓

Fish eating birds  $\Leftarrow$  Large fish  
 (DDT = 25 ppm) (DDT = 2 ppm)

⑦ Siltation :- Excessive agricultural and forestry practices cause soil erosion

(removal of top fertile soil) during heavy rain and through rain water soil particles mixed with rivers or any other waterbodies.

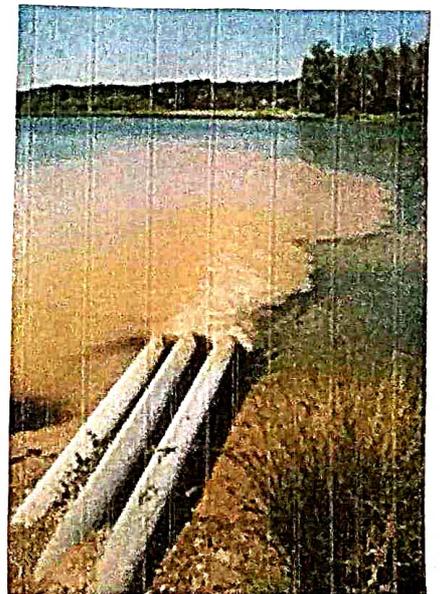


↳ Effects :- The water becomes muddy which fails to support much plant growth due to poor light.

Muddy rivers polluted by siltation

⑧ Thermal pollution :- Heated waste water from various powerplants and industries, which raises the temperature of water to a harmful level is called thermal pollution.

↳ Effects :- Thermal pollution speeds up the biodegradation of organic matter which results in ecological imbalance of the rivers and streams. Warm water holds less oxygen. Many fish and aquatic animals which are very sensitive to temp. change can't withstand.



⑨ Detergents and fertilizers :- Detergents are washing materials in water which cause soapiness. These form a film around organic waste.

Some of the fertilizers such as nitrates and phosphates are used in agriculture to increase the crops yield, reach into rivers and ponds through irrigation, rainfall and drainage, where they seriously disturb the aquatic ecosystem.

↳ Effects :-

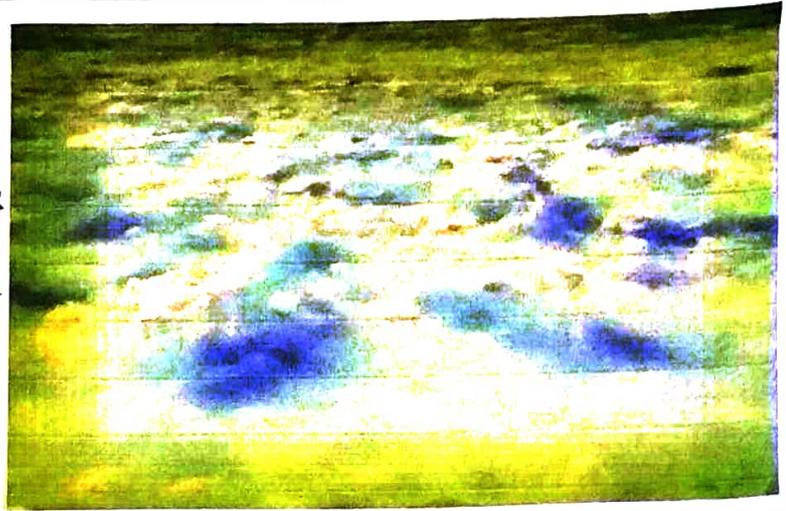
- When such waters are used by animals, the nitrates of polluted waters become reduced to toxic nitrites in their body by intestinal bacteria. The nitrites in the body combine with haemoglobin to cause a serious disease called methaemoglobinemia or Blue baby syndrome. It reduces the oxygen carrying capacity of the blood. It damages respiratory and vascular systems and sometimes cause suffocation.

- Eutrophication :- The natural aging of a lake by biological enrichment of its waters is known as eutrophication. In a young lake, the water remains cold and clear supporting little life. With time streams draining into the lake introduce nutrients such as nitrogen and phosphorus, which encourages the growth of aquatic organisms. Now, in this situation growth of phytoplanktons rapidly increase that covers the surface of water, which is called algal bloom.

Now, as the lake's fertility increases, plant and animal life burgeons, and organic remains begin to be deposited on the lake bottom. Over the centuries, as



slit and organic debris pile up, the lake grows shallower and warmer, with warm-water organisms supplanting those that thrive in a cold environment. Marsh plants take root in the shallows and begin to fill in the original lake basin. Eventually, the lake grows older



and gives way to large masses of floating plants (bog), finally converting into land. Pollutants from man's activities like effluents from the industries and homes can radically accelerate the aging process. This phenomenon has been called cultural or accelerated eutrophication. Eichhornia crassipes grow abundantly in eutrophic water body.

⑩ Radioactive waste :- Nuclear energy is produced using nuclear fission or fusion. The element that is used in production of nuclear energy  $U^{235}$  which is very toxic chemical, these wastes are generally disposed in nearby waterbody of the nuclear reactor.

↳ Effects :- Nuclear wastes can have serious environmental hazards if not disposed of properly. Release of nuclear wastes in fresh water will cause major water pollution and death of aquatic organisms. Few major accidents have already taken place in Russia and Japan.



• Prevention measures of water pollution :-

It is very important to prevent the polluting of water bodies and remove existing contaminants or reducing the concentration of these contaminants so as to make it fit for desired use. So, now we will follow some of the ways of treating polluted water.

① Industrial wastewater treatment :- The raw sewage

is needed to be treated correctly in a water treatment plant before it can be safely released into the environment. To reduce the toxicity of waste, it is passed through a number of chambers and chemical processes in water treatment plant.



dissolved air flotation system for treatment of industrial waste water



Deers - island wastewater treatment plant.

Industries that generate wastewater with high concentrations of organic matters (e.g. - oil and grease), toxic pollutants (e.g. - heavy metals), need specialized treatment systems. e.g. - air flotation system.

## ② Erosion and sediment :- Firstly to stop erosion and

sedimentation of loose soil particles we have to plant more and more trees specially aside waterbodies that can prevent erosion of soil very much.



Also, to stop sedimentation of various hard particles in waterbodies from construction site, we may apply slit fence, also we can use separate sediment basins from waterbody.

## ③ Retention basin for controlling urban runoff :-

Effective control of urban runoff involves reducing the velocity and flow of storm water, as well as reducing pollutant discharge. Nowadays, retention basins are mainly used, which are separated from general waterbodies, for discharge of urban runoff.



Retention basin for urban runoff

④ Denitrification :- When nitrates present in water get converted into gas, it is known as denitrification. It is an ecological approach that prevents leaching of nitrates in the soil. It stops groundwater from getting contaminated.

⑤ Ozone waste water treatment :- The ozone waste water treatment method has become very popular. In this method,

an ozone generator breaks down the pollutants in water. Ozone oxidises bacteria, organic material, molds and other contaminants in water.

⑥ Septic tanks :- Septic tanks treat sewage right at the place of the location where it originates instead of treating it in any far-away plant or sewage system. This system is usually put to use at the individual building level. The sewage gets separated into solid and liquid components and treated separately.

⑦ Removing heat from wastewaters :- To remove heat from wastewaters generated by powerplants or manufacturing plants the following technologies are used: cooling ponds, man-made bodies of water designed for cooling by evaporation, convection and radiation. Cooling towers can be used which transfer waste heat to the atmosphere through evaporation or heat transfer.

• Conclusion :- Water pollution is mainly cause of our undisciplined actions and irresponsibility. Mainly, we, humans are creating problems that consequently we will also carry the burden of these problems. So, let's just realize how important our mother nature is. It is our only source of living. Let's not destroy it nor pollute it. Let us act for a change. We need and we should help, save and conserve our mother nature, especially the different bodies of water, which are very crucial to maintain the balance of nature. Absolutely, there are many simple ways in how we can help and can stop polluting water.

# RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

## ENVIRONMENTAL STUDIES

PROJECT TITLE:

*Air pollution in cities and Measures to control it*

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## ■ Air pollution in cities and Measures to control it

### ■ History of air pollution :

The origin of air pollution on the earth can be traced from the times when men started using firewood as a means of cooking and heating. Hippocrates has mentioned air pollution in 400 BC. With the discovery and increasing use of coal, air pollution became more pronounced specially in urban areas. It was recognized as a problem 700 years ago in London in the form of smoke pollution, which prompted King Edward to make the first antipollution law to restrict people from using coal for domestic heating in the year 1273. In the year 1300 another act banning coal for the use was passed. Defying the law led to imposition of capital punishment. In spite of this air pollution became a serious problem in London during the industrial revolution due to the use of coal in industries. The earliest major disaster was the 'London smog' that occurred in 1952 that resulted in more than 4000 deaths due to the accumulation of air pollutants over the cities for five years days.



In Europe, around the middle of 19<sup>th</sup> century, a black form of the peppered moth was noticed in industrial areas. Usually, the normal peppered moth is well camouflaged on a clean lichen covered tree. However the peppered pattern were easily spotted and picked up by the birds on the smoke blackened bark of trees in the industrial areas while the black form remained well camouflaged. Thus while the peppered patterned moths were successful in surviving in clean non-industrial areas, the black coloured moths were in successful in industrial areas. This is a classic case of pollution leading to adaptation adaptation.

Air pollution began to increasing in the beginning of the twentieth century with the development of the transportation systems and large-scale use of petrol and diesel. The severe air quality problems due to formation photochemical smog from the combustion of the residues of petrol and diesels were felt for the first time in Los Angeles. Pollution due to auto-exhaust remains a serious environmental issue in many developed and developing countries involving India.



The Air Pollution control Act in India was passed in 1981 and the Motor Vehicle Act for controlling the air pollution, very recently. These laws intended to prevent the air from being polluted.

The greatest industrial disaster leading to serious air pollution took place in Bhopal where extremely poisonous MIC (methyl isocyanate) gas was accidentally released from Union carbide's pesticide manufacturing plant on the night of 3<sup>rd</sup> 1984. The effects of this disaster on human health and soil are felt today.

#### ▣ What is air pollution ?

Air pollution occurs due to the presence of undesirable solid and gaseous particles in the air in quantities that harmful to human health and the environment. Air may get polluted by natural causes such as - volcanoes which releases ash, dust, sulphur and other gases or by forest fires that are occasionally naturally caused by lightning. ~~tend to~~ However unlike pollutants from human activity, naturally occurring pollutants tend to remain in the atmosphere for a short time and do not lead to permanent atmospheric change.



Pollutants that are emitted directly from identifiable sources are produced both by natural events (for example, dust storms, volcanic eruptions) and human activities (emission from vehicles, industries etc.). These are called primary pollutants that together contribute about 90 percent of the global air pollution. These are carbon oxides ( $\text{CO}_2$  and  $\text{CO}$ ), nitrogen oxides, sulphur oxides, volatile organic compounds (mostly hydrocarbons) and suspended particulate matter.

Pollutants that are produced in the atmosphere when certain chemical reactions take place among the primary pollutants are called secondary pollutants eg. sulphuric acid, nitric acid, carbonic acid etc.

### Causes of air pollution in India:

currently in India has drastically increased and is said to have grown more than the birthrate in the country. This is because the increased number of vehicles in cities and burning of fuels. Also, outdated vehicles that are more than 10 years and do not possess fitness certificate of authority to be ridden on the road are actually freely left.



Here are some of the major causes of air pollution in India.

- Increase in the number of vehicles.
- Vehicles more 10 years have the tendency to emit more smoke.
- Unregulated industrialization
- Unregulated environmental issues.
- Lack of awareness of environmental issues.

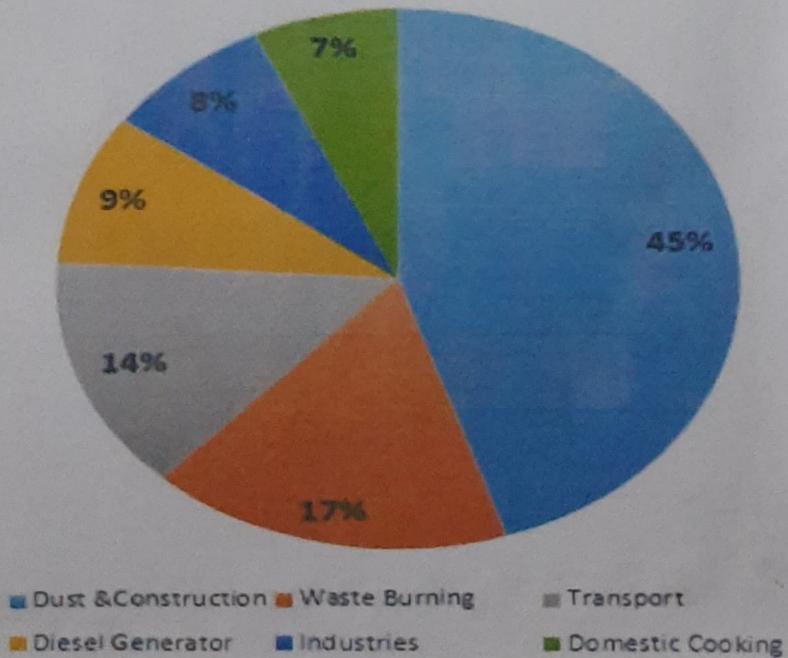
Other than the above listed causes of air pollution, here some other factors that are said to have dangerous impact on the environment we habit.

→ Pollution due to wild fires:

Currently in India, land construction has boomed, this has made many people adapt to it than worry about the environment they habit. The concept of cutting down on trees and extreme concentration has made them reliant over building houses by chopping away trees. The total covered of forest area in the country is 19.27%



Sources of Air Pollution



Sometimes these forests are prone to wildfire that can occur due to massive amount of heat. once the fire catches, it causes something known as wildfire. These wild fires pollute the air by releasing harmful particles into it and this can get into your respiratory system causing tissue damage.

→ Harmful emission from vehicles :

The harmful emission released from vehicles, Aeroplanes that can pollute the air around us. This is a cause of improper regulatory vehicles system in the country. vehicles that are 10 years and more than are said to smoke more but none of these vehicles is banned.

The government of India provides a fitness certificate to all vehicles that are 10 years or more. This is to check if these vehicles stick to emission laws. But the ugly truth is that all of that vehicles are still on the run without having any fitness certificate. Thus vehicles quickly emits harmful toxins in air and this can hurt our health and environment badly.  $SO_2$  is emitted from the vehicles and this is major cause of air pollution in the country.

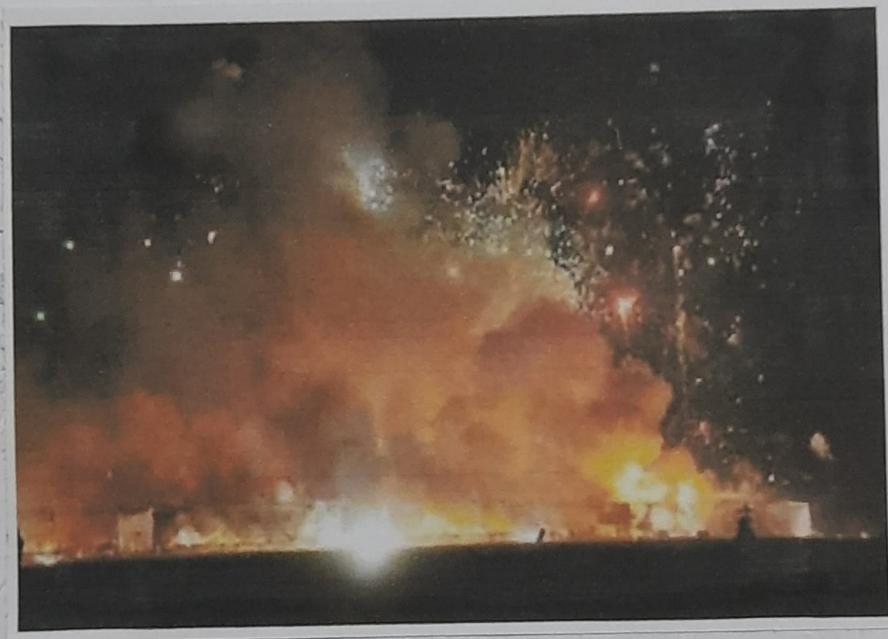


## → Industrial Emission :-

Industrial activities emit several pollutants in the air that degrades the ~~lower~~ air quality more than we can imagine. Particulate matter 2.5, 10, Nitrogen dioxide, sulphur dioxide and carbon monoxide are the key pollutants that are emitted from the industries that use coal and wood as their primary energy source. For production of their goods. Industrial pollution effects associated with your health can range from irritation in your eyes and throat to breathing issues at times can even lead to chronic illness.

## → open burning of garbage waste :-

Open burning of garbage is much more harmful to your health and the environment than one may think. As per Engage EPW, Delhi air pollution is choking public health. Delhi generates a whopping 9500 tons of waste every day which makes it India's second waste dumping city. Exposure to open burning of garbage waste can pose serious health risk including cancer, liver issues, impairment of immune system.



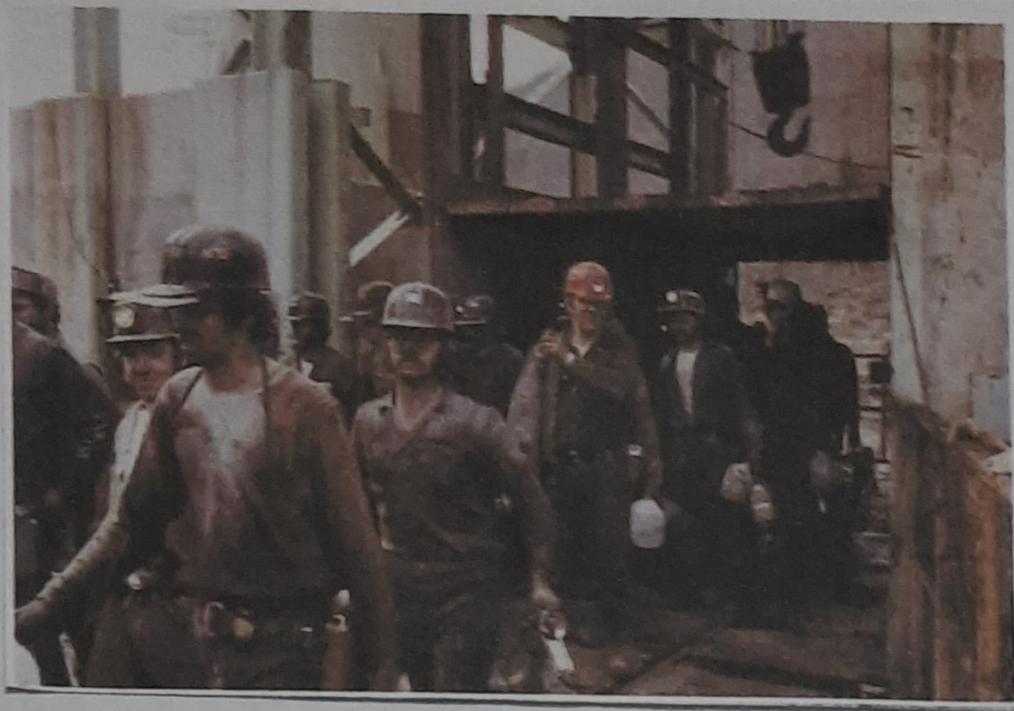
reproductive functions ; can also effect the devoloping nervous system.

→ Use of chemical and synthetic products :-

Talking about air pollution, we often talk or consider outdoor air pollution dangerous for our lives but never talk about indoor air pollution. Household products cause indoor air pollution which is 10 times more dangerous than outdoor air pollution. Volatile organic compounds (VOCs) found in paint, cleaners and personal care products such as perfume and deodorants are a reason for common health issues. Risks like - asthma or other respiratory diseases and lung issues are other sides cause by inhaling poor house air quality.

☑ Effects of air pollutants :-

Pollutants	Source	Effects
1. Aerosols [vapour chemicals in th form of fluoro carbon, (FC, SO <sub>2</sub> , NO <sub>2</sub> , NO etc.)	→ Emissions of jet and super sonic Aeroplanes → Refrigerators and air conditioners use aerosols (CF <sub>2</sub> (Cl <sub>2</sub> ) as refrizerant.	cause Ozone depletion that results in entry of UV-rays in our atmosphere and Global warming



Pollutants	Source	Effect
2. Smoke [Visible suspension of Carbon]	→ The power stations throw out amount of fly ashes	causes respiratory problems like asthma and bronchitis in Humans.
3. Dust and mist	→ Both are released from industries	causes Byssinosis, Asbestosis and silicosis etc.

### ▣ Air pollution in cities :

→ Delhi leads the country India in its levels of air pollution

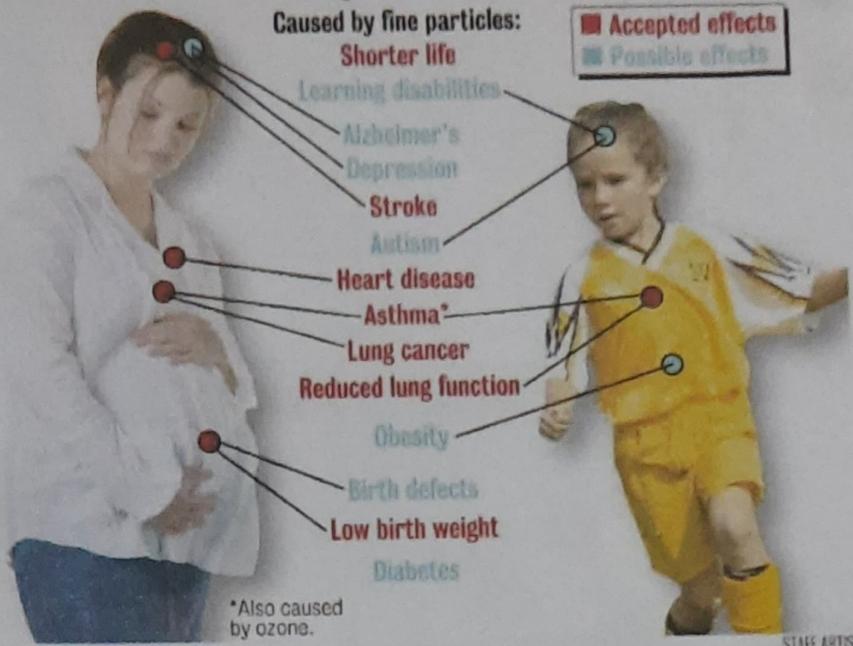
It has more cars than states ~~of~~ West Bengal and Gujrat put together.

→ In 1990's Delhi ranked 4<sup>th</sup> among the 41 most polluted cities of the world.

→ Kanpur known for its shoe industries and leather has the worst air quality in India confirmed by WHO. The annual average level of PM 2.5 in Kanpur is 173 which is 17 times higher than recommended level of WHO

# POLLUTION MATTERS

Thousands of studies have shown how air pollution can harm people, causing heart attacks, lung problems and other ailments, and shortening lives. Now research is finding possible links between certain pollutants and autism, birth defects and childhood obesity, among other conditions.



## PROTECTING CHILDREN FROM THE ENVIRONMENT

### Air Pollution: An unseen threat to children's health.

Each year, air pollution causes **570,000 deaths** in children under 5. This includes indoor, outdoor and second-hand smoke.

In children, air pollution can:

Stunt brain development



Reduce lung function & trigger asthma

Cancers

Chronic respiratory illnesses

It can also set the stage for problems later in life from:

Stroke

Cardiovascular disease

Nearly a million children die from pneumonia each year. Half of those are linked to air pollution.



World Health Organization

→ Agra, renowned for Taj Mahal is popular tourist destination. Due to cooking fuels, factories, vehicular emission have increased the average PM 2.5 level to 131. The excessive level of air pollution has turned the Marbels of Taj Mahal yellow and green.

▣ Measures to control Air pollution in cities :-

Air pollution in India's many cities (specially Delhi) became so serious that a Public Interest Litigation (PIL) was filled in Supreme Court of India, under its directive the Government was asked to take, within a specified time period, approximate measures including switching over the entire fleet of public transport i.e. buses, from diesel to CNG. All the buses of Delhi were converted to run on CNG by the end of 2002.

▣ Some Actions are taken by Govt. of India in this Regard :-

The government of India through a new auto fuel policy has laid out a road map to cut down the vehicular pollution in Indian cities.



More stringent norms for fuels means steadily reducing the sulphur and aromatic content in petrol and diesel fuels.

→ On April 29, 1999, the Supreme Court of India had ruled that all vehicles in India have to meet Euro-I.

→ India 2000 norms by June-1.

→ Euro-II in the NCR by April, 2000.

→ Euro-III norms stipulate that sulphur should be controlled at 350 parts per million in diesel and 150 parts per million in petrol. Aromatic hydrocarbons should be contained at 42% in the concerned fuels.

→ Bharat stage IV fuels contain 50 ppm sulphur.

The BSIV norms had been enforced across the country since April 2017.

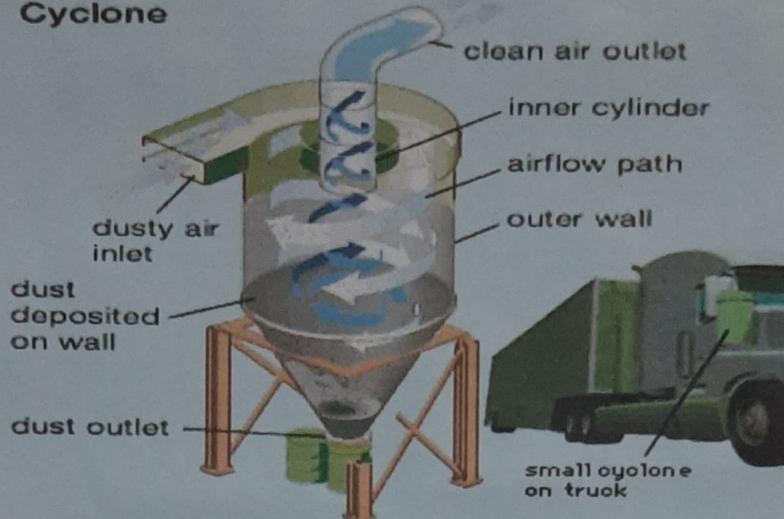
→ use of unleaded petrol.

→ use of low sulphur, petrol and diesel.

→ use of catalytic converters in vehicles.

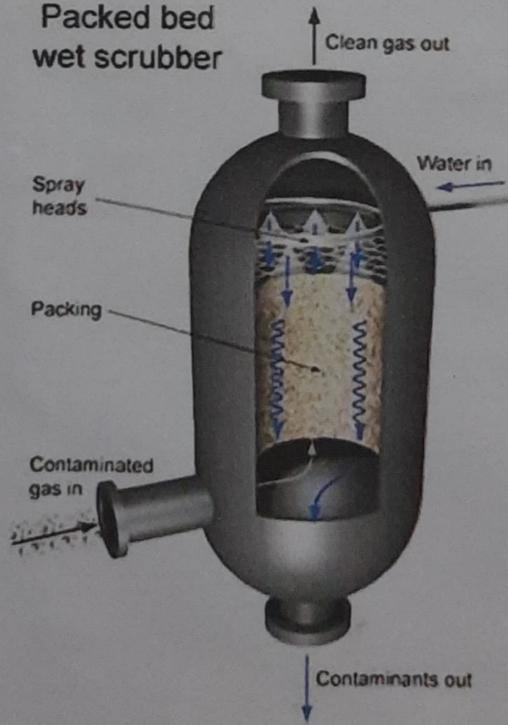
→ Application of stringent pollution level norms for vehicles.

### Cyclone



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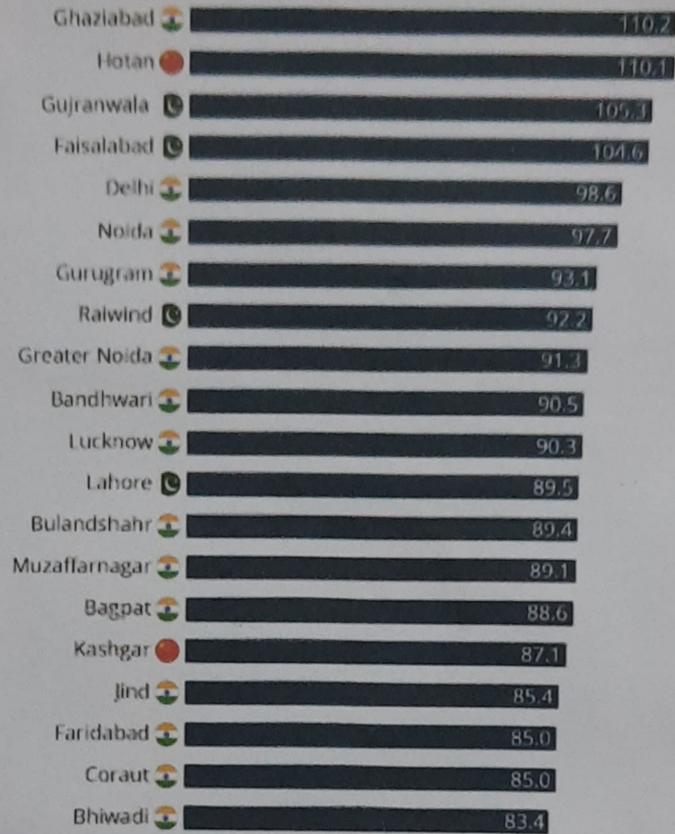
### Packed bed wet scrubber



- Use of scrubbers in Industries
- Use of Electronic precipitator which is most efficient device to remove over 99% of particulate matter present in the exhaust from a thermal power plant
- In 2016, the central had announced that the country would skip BSIV norms altogether and adopt BSVI norms by 2020.
- The BSVI fuel is estimated to bring around an 80% reduction of sulphur from 50 ppm to 10 ppm
- Delhi has become the first city of India to apply Bharat stage BSVI fuels (both petrol and diesel). State owned oil firms had started supplying the BSVI fuels in all their 391 petrol pumps in NCT.
- other cities in NCR like Noida, Gurgaon, Ghaziabad and Faridabad as well as other 13 major cities in India like Mumbai, Chennai, Bangalore, Hyderabad and Pune will roll out cleaner BSVI fuel from January 2019.

# India Has The Most Polluted Cities On Earth

Average level of particulate matter (PM 2.5) pollution in 2019



Sources: IQAir AirVisual 2019 World Air Quality Report



statista

However BSVI fuel will be rolled out in rest of the country by April, 2020.

At the last, thanks to the efforts made, the air quality of cities have significantly improved. According to an estimate, a substantial fall in  $\text{CO}_2$  and  $\text{SO}_2$  level has been found in various cities between 1997 and 2005.

• Acknowledgement:

I would like to express my special thanks of gratitude to all teachers of our college who have helped us to execute this project. I would also like to extend my gratitude to college authority in order to give sufficient time for the completion of a project on a very important topic of recent times.