

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

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

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corona Pandemic and Role of people to control it

Our Earth has witnessed some of the greatest pandemics which has left the mankind dumbstruck.

Throughout human history, there have been a number of pandemics of diseases such as smallpox and tuberculosis. One of the most ~~se~~ mortal pandemic was the 'Black death' ('Plague')

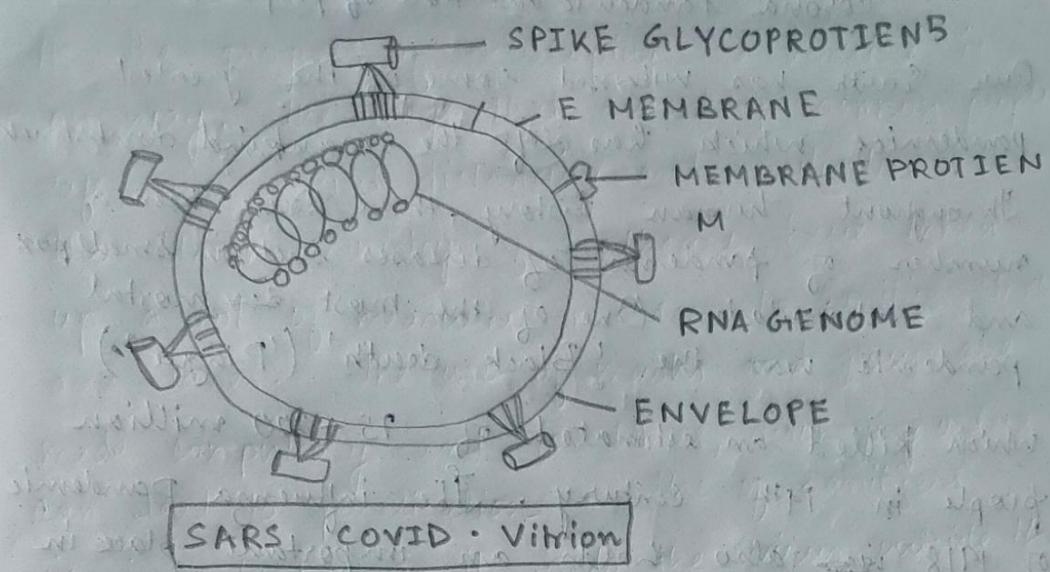
which killed an estimated of 75 - 200 million people in 14th century. The influenza pandemic of 1918 ~~was~~ also holds an important place in the history of Pandemics. The current Pandemic is the Covid-19.

Covid-19 or Corona Virus disease is a contagious respiratory and vascular disease, caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS COVID-2). First identified in Wuhan, China, and it is currently an ongoing pandemic.

Covid-19 spreads from person to person mainly by Respiratory Routes. When an infected person sneezes or coughs, the virus containing particles, get into the nose and mouth of other nearby persons.

Respiratory droplets may evaporate into droplet nuclei, which remain suspended in air for prolonged periods of time, causing infection. Particularly in crowded areas like market, chions, restaurants etc.

The contamination may also spread through touch and other forms of direct contact.



SARS covid-2 is closely related to original Sars Cov-1. It is thought to have an animal (zoonotic) origin. Genetic analysis has revealed that coronaviruses genetically clusters with the genus Betacoronavirus in subgenus Sarbecovirus, together with bat derived strains.

WHO published several protocols for testing the disease. The standard method for testing is Real-time Reverse Transcription Polymerase Chain Reaction (RT-PCR).

Other tests that are performed are swab tests in hospitals. The infection comes into play within 5-14 days. Nutrition like Vitamin C, Vitamin D plays a major role for treatment of covid.

- Most common symptoms of covid-19 are
 - i) fever
 - ii) cough
 - iii) tiredness
 - iv) headache
 - v) loss of taste & smell

India's total cases surge to 82,67,623 cases with 76,56,478 recoveries. India also suffered 123,650 deaths. Some of states where the infection has spread to a large extent are Maharashtra, Uttar Pradesh, Chennai, Bihar, Tamilnadu, Delhi, etc. Internationally, USA is one of the countries which has been leading the chart of contamination/infection for about 4 months now. India is at second position followed by Brazil and Russia.

Initially, regarding medication, a lot of doubt was encountered among physicians as study on the novel Coronavirus was not being in good progress. But with time, as the study of virologists progressed, different ways of fighting the virus was discovered. A lot of countries have taken the forward step in order to develop the vaccine. Many organisations like Moderna, AstraZeneca, Johnson and Johnson have taken the duty of developing the vaccine.

As the progress of developing the vaccine is on way, the things that can keep common people safe are social distancing and sanitization.

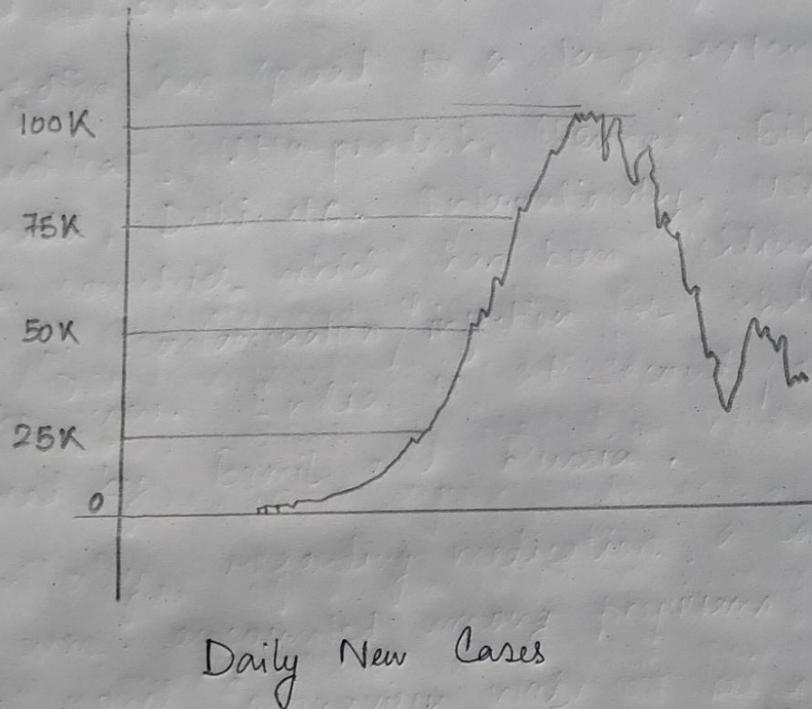
The Union ministry of healthcare have taken up a lot of measures in order to sanitize streets and lanes. The use of masks and gloves are made compulsory and for likers, disobeying orders can lead to penalisation. Use of sanitizers is important as it kills the virus outside the victim's body. We, the common people can and must follow these orders judiciously and also, we must avoid crowd and gatherings as it can exponentiate the growth of the virus.

If the common people follow these rules, then it is promised that the day is not far when covid-19 will be vanished from our vicinity.

Some of possible ways for common people is to boost their immunity, by regular exercises, yoga, pranayam etc. Regular exercises can immune a person and will help them to fight the disease.

With regards to minor and quick issues like sanitization, use of masks and gloves are very effective to prevent the spread of virus.

India seems to have bent the curve in all key covid parameters including active cases, death and positivity rate. However, the country's worst performance has come from one of the largest states. Maharashtra has shown a major rise in corona cases all over.



From the above data, we can observe that from 97,065 cases, we have dropped onto about 18,000 cases. This shows that, within the 8 months pandemic, immunity has been gained by our countrymen.

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE
(AUTONOMOUS)



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

CORONA PANDEMIC AND ROLE OF
COMMON PEOPLE TO CONTROL IT.

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: INTRODUCTION - PANDEMIC

A pandemic is an epidemic of an infectious disease that has spread across a large region, for instance multiple continents or worldwide, affecting a substantial no. of people. A widespread endemic disease with a stable no. of people is not pandemic. Widespread endemic disease like influenza is excluded. General Examples include Smallpox and tuberculosis. The most fatal pandemic is the Black Death (also known as Plague), which killed 75-200 million people in 14th century. Current pandemics are 1918 influenza pandemic and 2019 covid-19 (SARS-CoV-2) and HIV/AIDS.

: COVID PANDEMIC (2019-?)

The covid-19 Pandemic, also known as 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 WHO (World Health Organisation) declared the Pandemic Outbreak as a Public Health Emergency of International Concern in January 2020. As of 12 Nov. 2020 more than 52.2 million cases have been confirmed, with more than 1.28 million deaths attributed to covid-19.



WUHAN SEAFOOD MARKET

TIME OF OUTBREAK:

As per news the first infected person(s) of Covid-19 were from the City of Wuhan, People's Republic of China (PRC). As per the report of the government of China, the first outbreak might have been b/w October, 2019 - December 2019.

PLACE OF OUTBREAK:

Within debates b/w Government of China and Government of USA, it was finally acknowledged that the probable site of break out from China might be the city of Wuhan, Hubei Province, China. The city holds a famous Sea-food market, whose edible product is acclaimed to be a cause of pandemic or viral infection. (Meats of bats, pangolins or both).

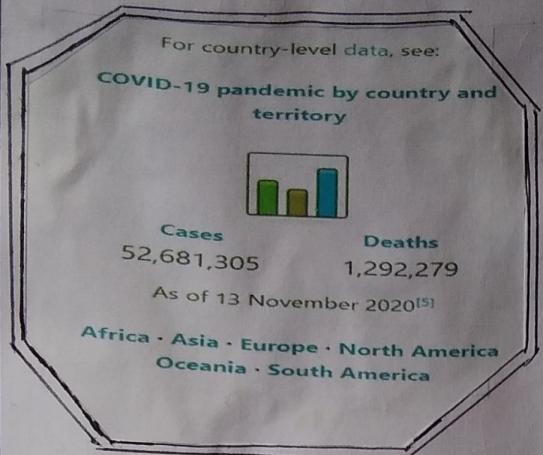
MODE OF TRANSMISSION:

Covid-19 spreads from Person to Person mainly through the respiratory route after an infected person coughs, sneezes, sings, talks or breaths. A new infection occurs when virus-containing particles exhaled by an infected person get in to mouth, nose or eyes of other people who are in close contact with the infected person. Also indirect contact to a contaminated surface before touching nose/mouth transmits the disease. Physical relations, kissing, cuddling, and other contacts also spread coronavirus.

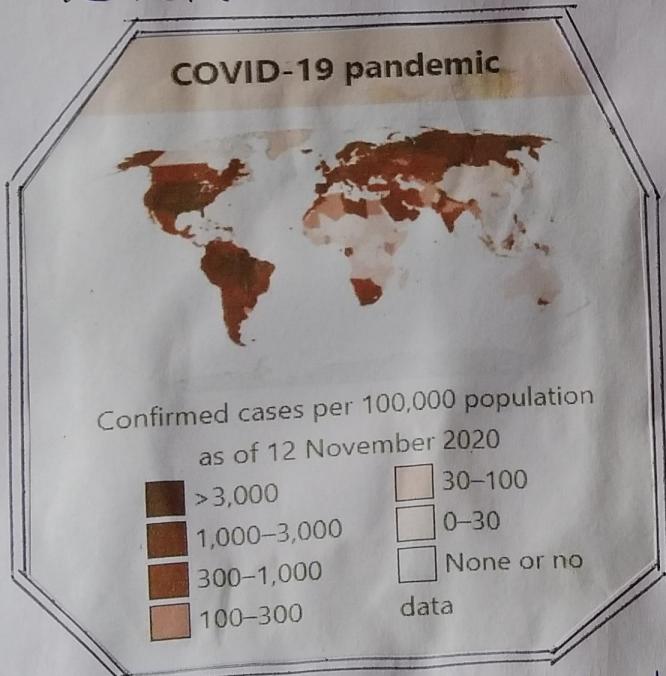


COVID population distribution/million population
19th Oct. 2020.

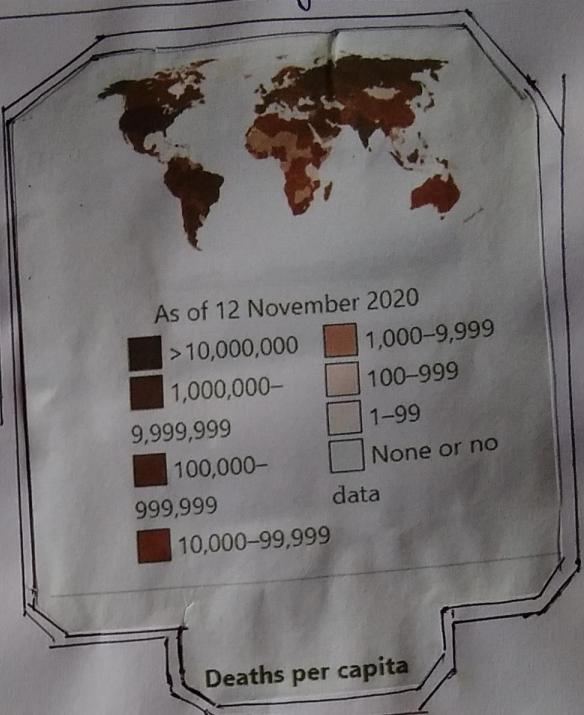
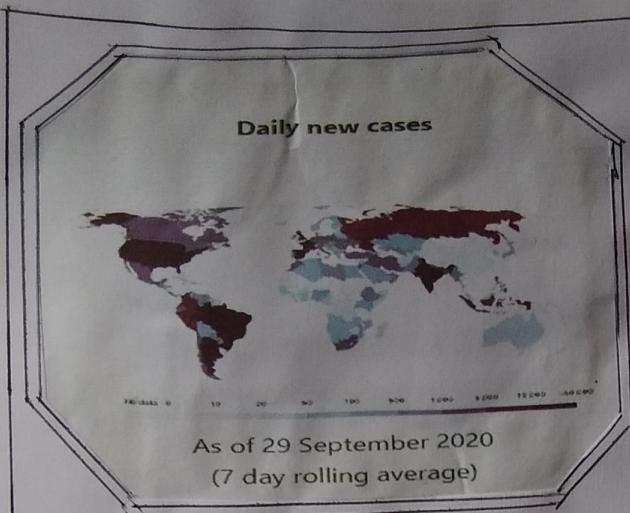
EPIDEMIOLOGY and STATISTICS:



The above data represents the total no. of cases of COVID and the total no. of deaths across the world as of 13th November 2020.

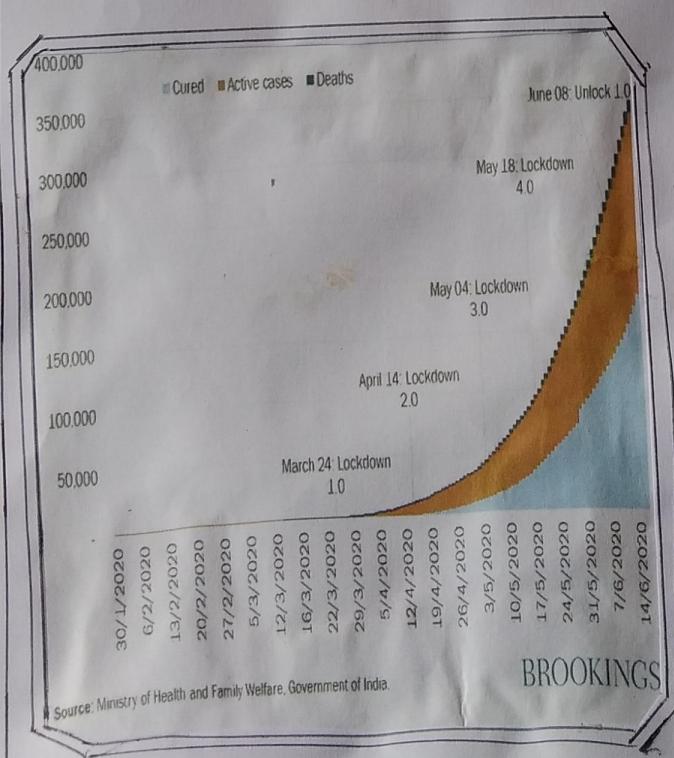


The above data represents the ~~no.~~ distribution of range of no. of confirmed cases per 1,00,000 population across the world as of 12th November 2020.



Distribution of daily new case across the globe
(The avg. of 7 days avg. is used),
as of 29th Sept. 2020.

The data represents deaths per capita range across the globe as of 12 Nov 2020

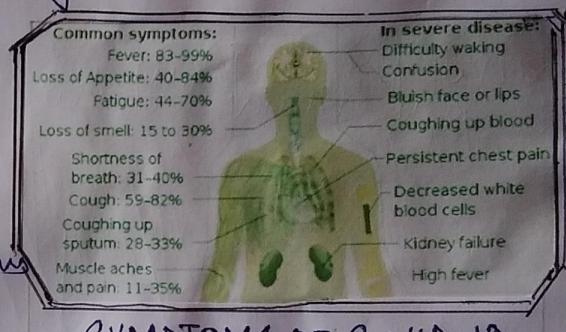


The statistics of no. of COVID-19 cases with progress of time in India. till
(14/6/20).

SIGNS AND SYMPTOMS:

Most symptoms of covid-19 are visible or felt after 3-14 days of infection. Symptoms are non-specific, the 2 most common are fever and dry cough. (88% and 68% respectively). Less common symptoms include muscular fatigue, respiratory sputum production, loss of smell, taste, shortness of breath, sore throat, headache, vomiting, diarrhea and rash.

Emergency symptoms include difficulty in breathing, persistent chest pain or pressure, sudden confusion, difficulty walking. May lead to complications like sepsis and kidney failure.



SYMPOTMS OF COVID-19

DIAGNOSIS:

VIRAL TESTING →

The standard test for presence of SARS-CoV-2 uses RNA testing of respiratory secretions collected using a nasopharyngeal swab, though it is possible to test other samples.

IMAGING →

Characteristic imaging features on chest radiographs and computed tomography (CT) of people who are symptomatic include asymmetric peripheral ground-glass opacities that include imagery such as the Italian Radiological Society which has confirmed cases.

ROLE OF COMMON MAN IN THIS COVID PANDEMIC:

SIMPLE MODES OF PREVENTION:

strategies for preventing transmission of the disease include social distancing, wearing of masks, washing hands, touching avoid, coughing/sneezing into a tissue and putting the tissue directly into a waste container.

SOCIAL DISTANCING:

Social distancing includes infection control. Actions intended to slow the spread of the disease by minimising close contact b/w individuals. Methods include quarantines, travel restrictions and closing of schools, workplaces, stadiums, theatres or shopping centres. Individual social distancing is mandated by the government.

FACE MASKS AND RESPIRATORY HYGIENE:

The CDC and WHO recommend individuals wear non-medical face coverings in public settings where there is an increased risk of transmission and where social distancing measures are difficult to maintain. This use is meant to reduce the spread of the disease by asymptomatic and pre-symptomatic individuals and is complementary to established preventing measures as social distancing.

Masks are also recommended for those who may have been infected and those taking care of someone who may have the disease. When not



WHO RECOMMENDS MASKS

Wearing a mask., the CDC recommends covering the mouth and nose with a tissue and recommends covering the mouth/nose with in the elbow if no tissue is available.

SELF ISOLATION:

Self isolation at home has been recommended for those diagnosed with COVID-19 and those who suspect they have been infected. Health agencies have been alerted and they have issued detailed instructions for proper self-isolation.

Many governments have mandated or recommended self-quarantine for entire populations. The strongest self-quarantine instructions have been issued to those in high-risk groups. Those who may have been exposed to someone with COVID-19 and who have already travelled to a country or region with the widespread transmission have been advised to self-quarantine for 14 days from last possible exposure.



THIS IS HOW VIRUS SPREADS. !!!



STOP THE FLOW!!!

Handwashing:

Hand hygiene is extremely important to prevent the spread of SARS-CoV-2. The CDC recommends that people wash hands often with soap and water for at least twenty seconds, especially after going to the toilet or when hands are visibly dirty; before eating and after blowing one's nose, coughing, or sneezing. ¹² Soap bursts the protective bubble of the virus. ¹² ¹³ Alcohol based hand sanitizers that are to be used when soap and water is not available (60% alcohol by volume).

SURFACE CLEANING:

Surfaces may be contaminated with no of solutions (within 1 minute of exposure to the disinfectant for a stainless steel surface), including 62-71% ethanol, (50-100)% isopropanol, 0.1% Na⁺ hypochlorite (NaClO₂), 0.5% H₂O₂ and 0.2-7.5% povidone-iodine. Offices, bathrooms, common areas, electronic devices should be regularly disinfected.

: ROLE OF DOCTORS AND HEALTH WORKERS IN COVID PANDEMIC:

TRIBUTE TO THE COVID WARRIORS:

The 2019-2020 COVID has hit the world badly. Within the continuous struggle ^{with} Covid, we have realised the importance of doctors more than ever. We have to thank the medical professionals who treat the health of the patients above theirs and offer round the clock services. Since the beginning of the outbreak, healthcare professionals have truly been selfless warriors, giving every trying to uphold their job responsibility. Even at the cost of cutting themselves off from their families and loved ones. We do grant them gratitude, respect and do ensure to cooperate with them at every stages of fight.



BRAVE HEARTS, WHO FOUGHT
FOR OUR HEALTH....

QUOTE OF A DOCTOR TO SURVIVE IN COVID PANDEMIC:

1. "Let us follow what the UK Government did by closing a few big government hospitals and converting them into dedicated COVID-19 facilities. The Karnataka government should close two busy 1,000-bed govt. hospitals in Bangalore, convert 2,000 beds as critical care beds with piped oxygen, suction and compressed air supply to run 1000 ventilators."
 2. "Never take the O₂ Supply for granted. Even in Western Europe, COVID-19 patients died because O₂ Supply was exhausted."
 3. "Launch fever clinics with online consultation across the city with guidelines on viral screening and follow up".
- Dr. Devi Prasad Shetty.
(Indian Cardiac Surgeon),
MS, FRCS

PRECAUTIONS FOR 2nd WAVE?

WHY?

With Russia and the United Kingdom already experiencing a 2nd wave of COVID-19, aggravated by winter, there is no reason to dismiss the possibility of the same in India as the mercury dips. The risk of 2nd wave is increasing because with the decay of first wave younger, healthy population has started moving and travelling while ignoring basic precautions such as steam inhalation, social distancing, wearing masks and using a handwash.

Again winter chill makes people lock the doors and windows of their houses to stay cosy inside which increases the levels of stagnant air. This causes silent injuries inside the body and studies have shown that the incidence of COVID-19 goes up due to stagnant air indoors. Hence risk of 2nd wave increases. Precautions are needed.

MODES OF PRECAUTION:

- ② Since mercury dips down, immunity downfalls a little so, avoid catching cold.
- ② Use masks, sanitizers and soap with water.
- ② Improve food habits, increase Vitamin A, B, C, D intake and protein intake.
- ② Meditate, Helps in blood circulation and regulation of body temp. in winter.
- ② Steam inhalation also clears our respiratory tract.

- Continue to follow the precautions of 1st wave.
It reduces the risk of infection by 80% to 85%.

: CONCLUSION:

As already have discussed, We, the common men have nothing more to do other than to follow health security and safety guidelines as prescribed by WHO, government and health agencies. We would follow safety measures, and to maintain lockdown as imposed by Govt. of India, help them down as needed. Women, Old men and Children are to be taken care of. Proper supplies of medicine and necessary items are needed to be maintained. Awareness about COVID are needed to be spreaded among common men as much as possible through advertisements, posters in Television and social media. Home made Sanitiser production (Sanitisers are very easy to prepare) are needed to be increased. And lastly and most last, we need to help and express gratitude to the doctors, nurses and the other health workers who are fighting this tough time as COVID Warriors.

Hope all stays safe and hope for COVID vaccine as soon as possible.

: ACKNOWLEDGEMENT:

For this project I would like to thank my teacher of the corresponding Subject (Environmental Science) for goldy advice. I would also like to thank my family members and elders and all the ones who have helped me to complete this project within the hardships of lock down.

: BIBLIOGRAPHY:

Sources of Information:

- ① Google.
- ② Wikipedia.
- ③ Official website of ministry of Health.
- ④ Advices and informations from elders.

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

Pond ecosystem and foodchains

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YEAR : 2020
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A pond eco-system refers to freshwater ecosystem where there are communities of organisms dependent on each other with the prevailing water environment for their nutrients and survival. Ponds are shallow water bodies with depth of 12-15 feet in which the sun rays can penetrate to the bottom permitting the growth of plants there. This eco-system includes biotic plants, animals and micro-organisms, as well as abiotic (Non-living) physical and chemical interactions. Pond and lake ecosystems are a prime example of lentic ecosystems.

On the basis of the depth of water, penetration of light and types of plants and animals in the pond, we can divide pond into different zones. They are:

- Littoral:-

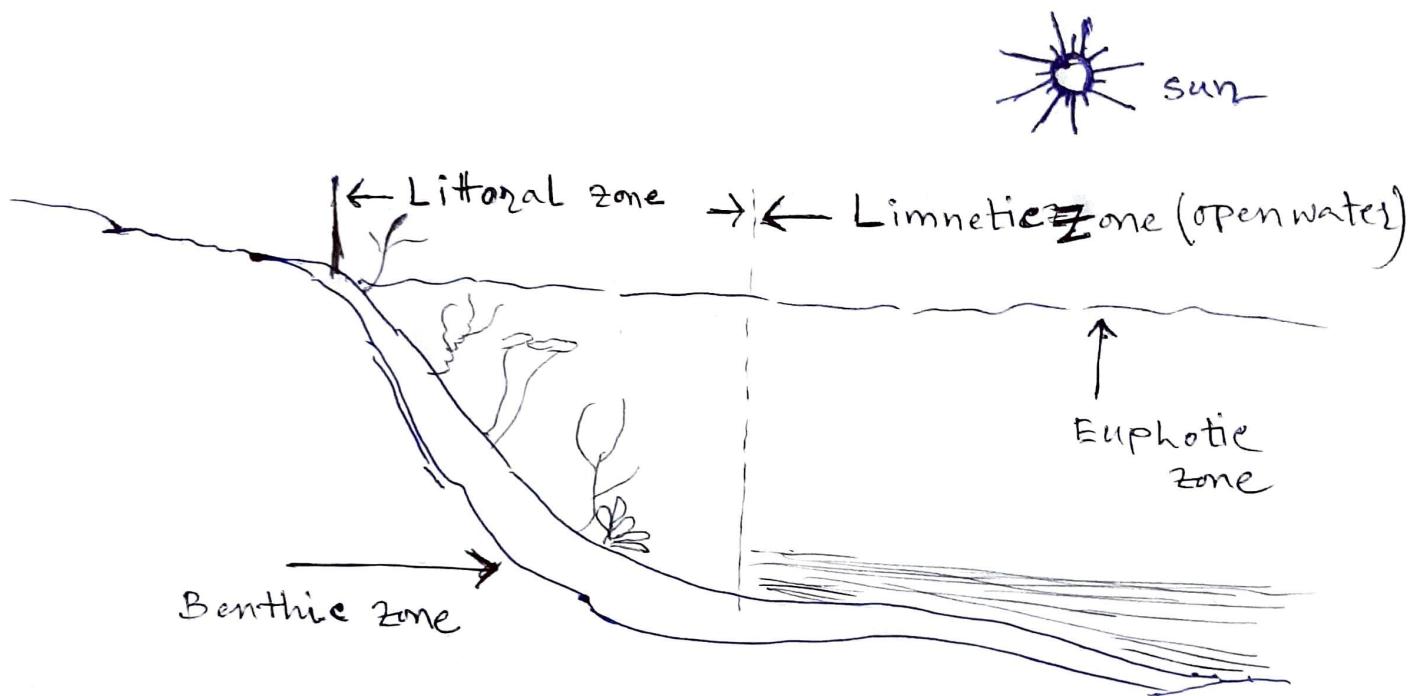
The Littoral zone is near shore area where sunlight penetrates all the way to the sediments and allows aquatic plants to grow. It contains warm and oxygen rich circulating water. So, this zone includes abundant rooted vegetations and different types of consumers.

- Limnetic:-

The Limnetic zone is central part of the pond and open water area where light does not generally penetrate all the way to the bottom. The associated organisms are small crustaceans, rotifers, insects and their larvae and algae. The water level, oxygen content, and temperature in this zone varies from time to time. Decomposers are almost absent here.

• Profundal:-

This is deep-water region where there is no effective light penetration. There the microscopic plants and decomposers are present. So, it is called Hypolimnion.



Zone of Pond

Structure of Pond ecosystem

Pond ecosystems contain mainly two components, abiotic and biotic.

Abiotic components:-

The abiotic substances of pond ecosystem are formed as a result of the mixture of some organic and inorganic materials. They have directly or indirectly effect in aquatic organisms of the pond. These includes:

Light

Temperature

Dissolved oxygen

Carbon dioxide

Other gases

Dissolved minerals

Biotic components:-

The biotic components of pond ecosystem are the living components which consists of:

1) Producers:-

Phytoplankton :-

These are microscopic algae that float in the open water and give it a green appearance. They carry out photosynthesis using carbon dioxide that is dissolved in the water and release oxygen that is used by the bacteria and animals in water.

Periphytic algae:-

These are microscopic algae that attach themselves to substrates and give the rocks and sticks a greenish brown slimy appearance. They also carry out photosynthesis and produce oxygen, often near the bottom of the pond where it can be used by decomposers.

Submerged plants:-

These plants grow completely under water.

Floating plants:-

These include plants that float on the surface and plants that are rooted on the bottom of the pond but have leaves stems that float.

Emergent plants:-

These are rooted in shallow water but stems and leaves are above water most of the time.

Shore plants:-

They grow in wet soil at the edge of the pond.

2) Consumers:-

Zooplankton:-

These are microscopic animals that eat phytoplankton or smaller zooplankton. Some are single-celled animals, tiny immature stages of larger animals. Zooplankton float about in the open water portions of the pond.

Invertebrates:-

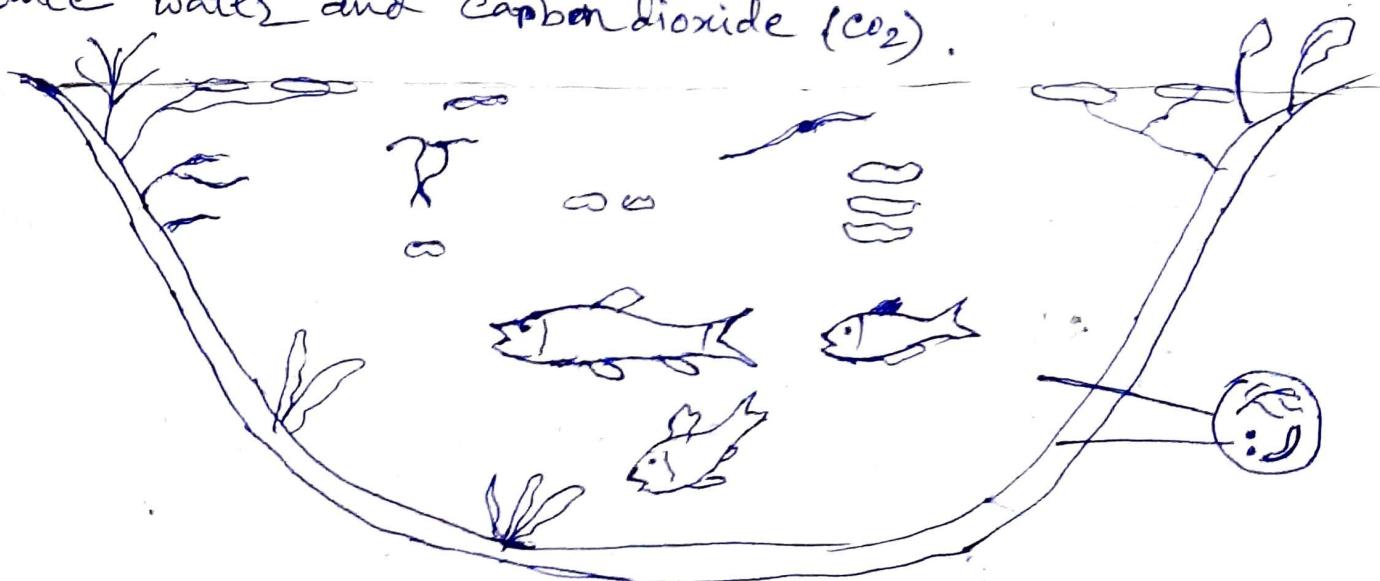
These include all animals without backbones.
Macroinvertebrates are big enough to be seen with naked eyes.

Vertebrates:-

These are animals with backbones. In a pond these might include fish, frogs, salamanders and turtles.

3) Decomposers:-

Animal waste and dead and decaying plants and animals form detritus on the bottom of the pond. Decomposers, also known as detritivores, are bacteria and other organisms that break down detritus into material that can be used by primary producers, thus returning the detritus to the ecosystem. As this material decomposes it can serve as a food resource for microbes and invertebrates. During decay microbes living on detritus can pull nutrients from the overlying water thus acting to improve water quality. In the process of breaking down detritus, decomposers produce water and carbon dioxide (CO_2).



Pond Ecosystem

Food chain and functional aspect of Pond ecosystem

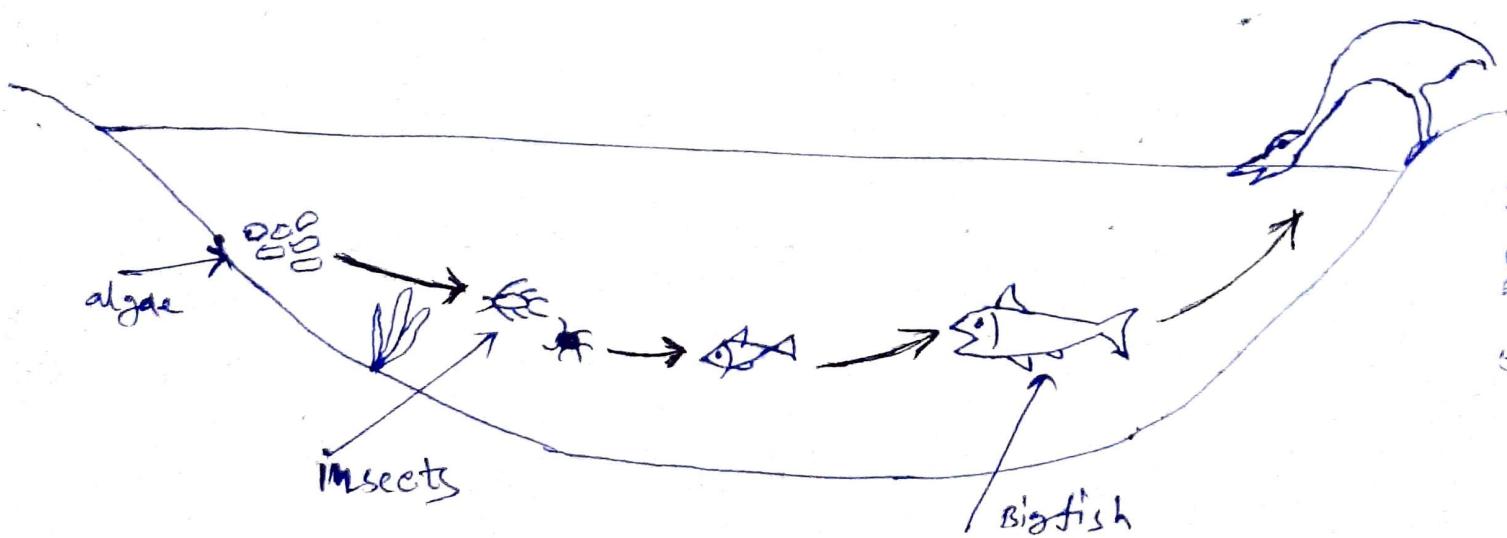
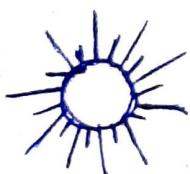
In pond there are two types of food chain which are given below:

i) Predatory food chain :-

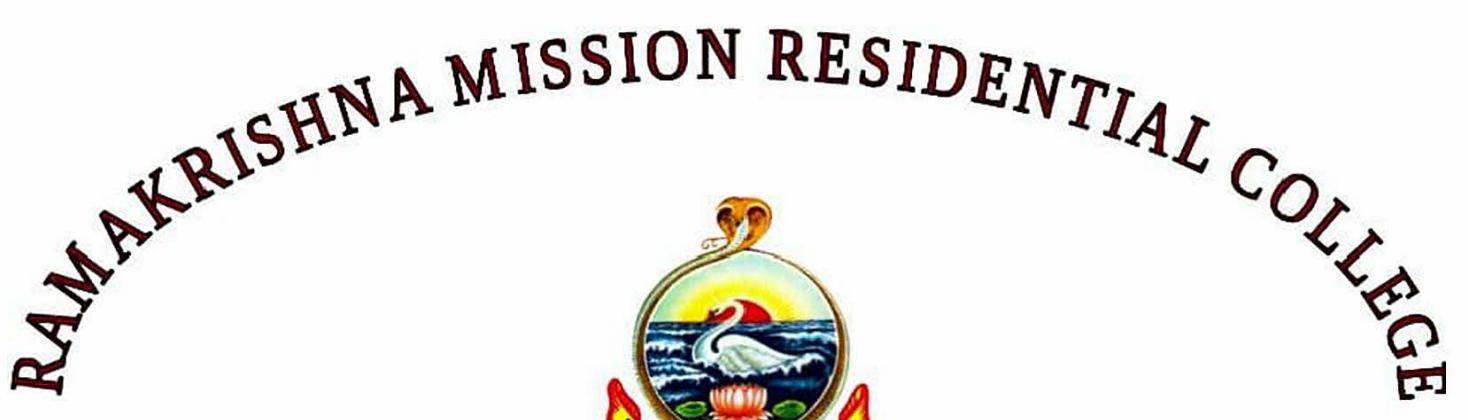
In a predatory food chain, food chain starts with aquatic green plants (autotrophs) whose source of energy is the sun and this autotroph becomes the source of energy for herbivorous which are the source of energy for primary carnivorous and then secondary carnivorous.

ii) Detritus food chain :-

Here organic matter (i.e. dead plants and animals) are first converted into detritus food by microorganisms like bacteria and fungi which is then consumed by consumers as a source of energy. There is no predatory and parasitic form.



A food chain of Pond ecosystem



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

CORONA PANDEMIC

AND

ROLE OF COMMON PEOPLE TO CONTROL IT

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ACKNOWLEDGEMENTS

(iii)

I would not even be motivated to work on a project such as this if it wasn't for our Environmental Science teachers, Sowik Bhattacharya and Narayan Majhi. I am and shall continue to be grateful for their support.

This project would be extremely difficult to do without the help of my father, Asok Kumar Nanda. His guidance shall continue to assist me on any and every project I embark on in future, as well. I am utterly indebted to him.

Last, but not the least, I want to thank everyone who has, directly or indirectly, helped me in the completion of this project.

A final show of gratitude towards all the corona-warriors out there. Thank you!

INTRODUCTION :-

1

On 31st December 2019, clusters of patients from Wuhan City, Hubei Province, China were reported to the World Health Organisation (WHO) with pneumonia of unknown cause.^(16,17) On 7th January, 2020, the causative agent was identified by Chinese Center for Disease Control and Prevention (CCDC) and named Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2)^(10,15) (previously termed "2019 novel coronavirus" or "2019-nCoV")^(15,17), an addition to the list of half-a-dozen already discovered human coronavirus species.^(11,16) The disease was subsequently named COVID-19 by WHO.⁽¹⁵⁾ In response to the rapid increase in the number of cases and the quick spread among countries, WHO declared COVID-19 as a pandemic.^(5,14)

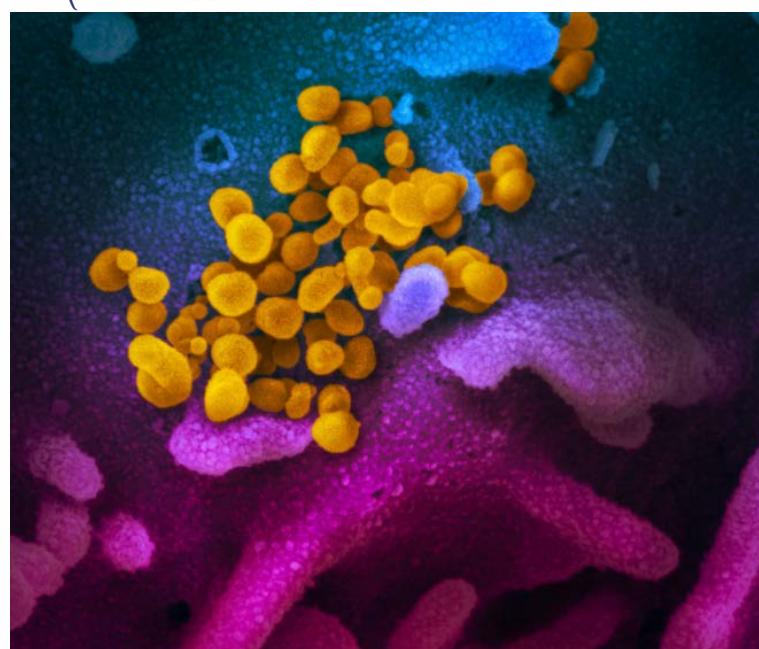


Fig: Scanning electron microscope image in false colour, showing the COVID-19 virus from a patient in the US; the viral particles are coloured yellow as it emerges from the surface of a cell (blue & pink.)

Situations in China have shown that the pandemic can be contained by maintaining social distancing and isolation of infected people. Hong Kong, for instance, has managed the COVID-19 spread well by early governmental action and social distancing measures taken by the individuals.⁽²⁾

Coughing, fever, shortness of breath and other respiratory problems are the common symptoms of COVID-19.⁽¹²⁾ In certain severe cases, COVID-19 can also cause kidney injury.⁽¹⁰⁾ The virus shows significant similarity with the effects of SARS-CoV in terms of symptoms and spread.⁽⁹⁾

To address the associated unknowns, WHO launched a global initiative which aims to enable any country, in any resource setting, to gather rapidly robust data on key epidemiological parameters to understand, respond and control the COVID-19 pandemic. Several generic ~~recom~~ investigation protocols, branded the WHO Unity Studies, were also developed.⁽¹³⁾

CORONAVIRUS :-

3

With the recent detection of SARS-CoV-2, there are now seven human coronaviruses.^(11,16) The variants 229E, OC43, NL63 and HKU1 cause mild diseases, while the pathogenic species are SARS-CoV, MERS-CoV and SARS-CoV-2.⁽⁷⁾ Coronaviruses (order Nidovirales, family Coronaviridae, and subfamily Orthocoronavirinae) are spherical (125nm diameter), and enveloped with club-shaped spikes on the surface giving the appearance of a solar corona. Within the helically symmetrical nucleocapsid is the large positive sense, single stranded RNA.⁽⁸⁾

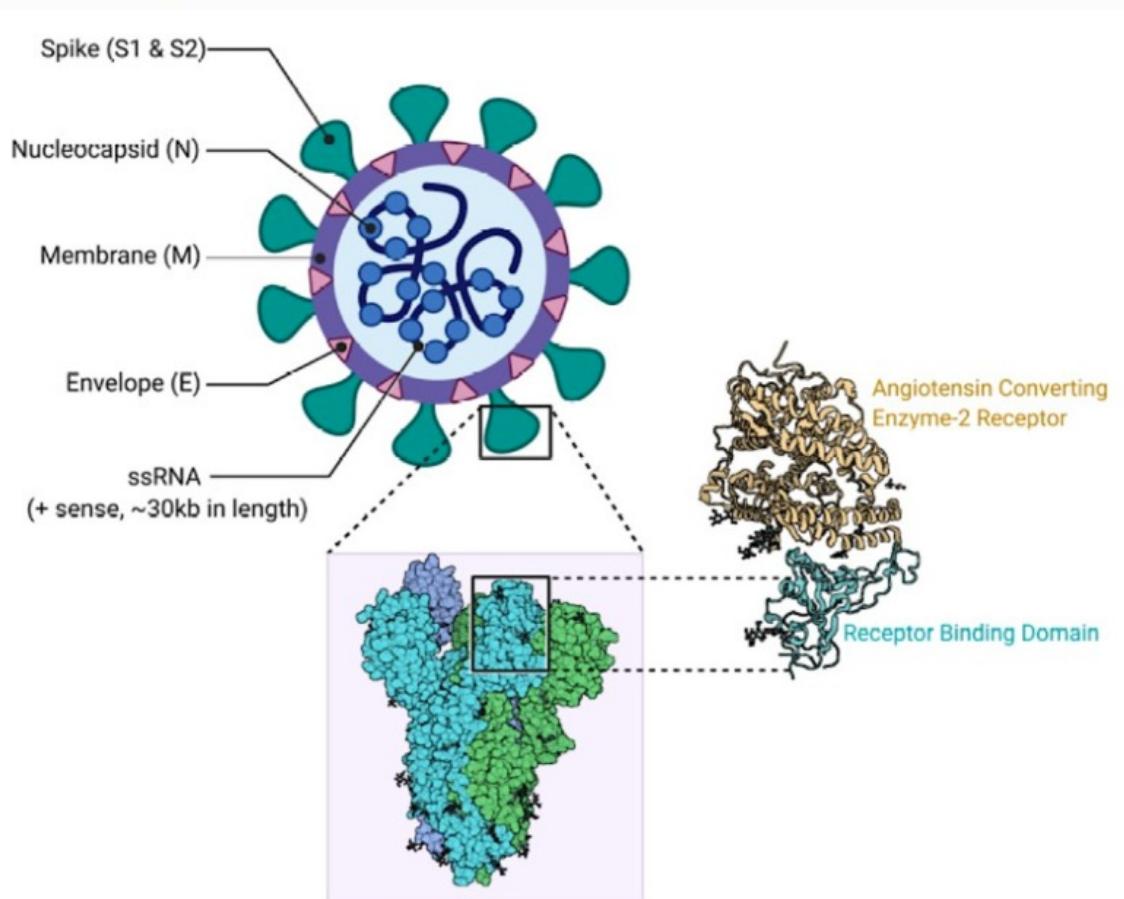


Fig: The structure of SARS-CoV-2 virus and ACE2 protein
(Contributed by Rohan Bir Singh; made with Biorender.com)

SPREAD :-

4

Globally, as of 10:13am CET, 13 November, 2020, there have been 52,177,708 confirmed cases of COVID-19, including 1,286,063 deaths, reported to WHO.

— WHO⁽⁴⁾

As of 13th November, 2020, India had 8,728,795 confirmed cases of COVID-19, which is second highest after United States of America. The death toll in the country stands 128,658 which is third highest after United States of America and Brazil.⁽⁴⁾

Even now, after more than ten months, daily death toll is being reported close to 550 in India and close to 10,000 worldwide.⁽⁴⁾

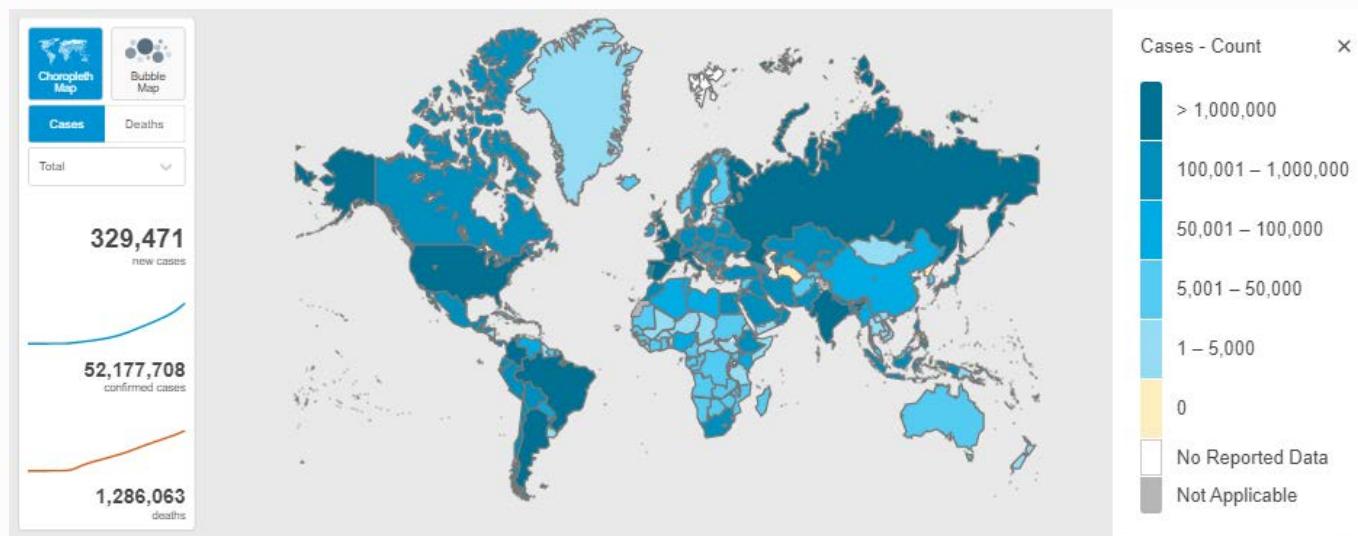


Fig: Choropleth Map of current spread of COVID-19 (courtesy: WHO)

Ten months into the pandemic, while initially it was thought of as a pneumonia-like illness as it displayed all tell-tale signs of a respiratory condition, it has been well-established by now that COVID-19 can impact the entire body from head-to-toe. As people of different ages, ethnicities and health conditions continue to contract the SARS-CoV-2 virus, it is clear that the virus manifests in completely bizarre ways.

While a typical coronavirus infection may begin with a scratchy throat, fever and unexplained fatigue, it isn't always the case. More and more people are reporting unique symptoms of the illness including a thunderclap headache and loss of smell and/or taste, before testing positive. These signs point to the fact that COVID-19 is far from the respiratory it was first understood to be and attacks the whole nervous system in some COVID-19 patients.

According to a recent study published in the Annals of Neurology, an increasing number of patients are reporting neurological symptoms including headaches, dizziness, strokes and a decrease in alertness, before other hallmarks of COVID-19 like a dry cough, itchy throat or even fever.

As per the researchers of the study, patients also noted other neurological signs of the disease including loss of smell and taste, difficulty in concentrating and seizures. To conduct the study, the researchers analyzed 19 coronavirus patients at Northwestern Medicine to understand the occurrence of neurological signs of the disease, before the appearance of more commonly known symptoms of COVID-19.

The lead author of the study Igor Koralnik, who is the professor of neurology at Northwestern University Feinberg School of Medicine, said, "It's important for the general public and physicians to be aware of this, because a SARS-CoV-2 infection may present with neurological symptoms initially before any fever, cough or respiratory problems occur."⁽³⁾

Recognition of neurological disease associated with SARS-CoV-2 in patients whose respiratory infection is mild or asymptomatic might prove challenging, especially if the primary COVID-19 illness occurred weeks earlier. The proportion of infections leading to neurological disease will probably remain small. However, these patients might be left with severe neurological sequelae. With so many people infected, the overall number of neurological patients, and their associated health burden and social and economic costs might be large.⁽⁶⁾

SAFETY MEASURES :-

7

In the wake of the COVID-19 pandemic, WHO chalked out certain simple precautions, such as physical distancing, wearing a mask, keeping rooms well ventilated, avoiding crowds, cleaning hands, and coughing into a bent elbow or tissue.

In the aspects of physical distancing, it was advised that at least a 1-metre distance be maintained among people to reduce the risk of infection when they cough, sneeze or speak. Even greater distance was advised indoors.

It was advised that wearing masks be made a normal part of being around people. Even the basics of wearing a mask were highlighted as

- “ • Clean your hands before you put your mask on, as well as before and after you take it off.
- Make sure it covers both your nose, mouth and chin.”⁽¹⁾

Specifics were also mentioned regarding the types of masks to be worn, depending on location, age and general health.

Medical or surgical masks were especially advised for people

- over sixty years of age.
- having underlying medical conditions
- who are unwell or taking care of ill family member.
- health workers engaging with patients with suspected, probable or confirmed COVID-19.



Fig.3: Medical/Surgical Mask.



Fig.4: N95 respirator mask

"Respirator masks (such as FFP2, FFP3, N95, N99) should be used in settings where procedures generating aerosols are performed and must be fitted to ensure the right size is worn."

— WHO (1)

WHO also advised the general public to avoid the 3Cs: spaces that are closed, crowded or involve close contact.

This is primarily because outbreaks have been reported in restaurants, choir practices, fitness classes, night clubs, offices and places of worship where people have gathered, often in crowded indoor settings where they talk loudly, shout, breathe heavily or sing. The risk of getting COVID-19 are higher in crowded and inadequately ventilated spaces where infected people spend long periods of time together in close proximity.

Hence, outdoor gatherings were deemed safer than indoor ones, particularly if indoor spaces are small and without outdoor air coming in.

In case, crowds or indoor settings cannot be avoided, it is advised to open a window to ~~increase~~ increase the amount of natural ventilation and/or to wear a mask.

Of course, it was also advised that hands be cleaned thoroughly and regularly with alcohol-based hand-rub or with soap and water. It is always advised to avoid touching eyes, nose and mouth, and to disinfect or clean frequently touched surfaces.

CONCLUSION:-

10

While the global authorities are working towards fighting the disease with cures and vaccines, which are being developed and are under trials already, the pandemic continues to affect us all. And being a global citizen, it is undoubtedly our responsibility to keep fighting the pandemic in the very little ways that we are capable of. Not only our own health, but that of the entire community can be maintained if we all collectively be a little more responsible.

Hence, we must all try to follow the guidelines and keep the fighting on until we beat the virus and the propagating pandemic.

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RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR
ENVIRONMENTAL STUDIES

PROJECT TITLE:

'Water Pollution and measures to control it'

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DEPARTMENT : ENGLISH
YEAR : 2020
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I am making this project not only for marks but also to increase my knowledge.

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Introduction :-

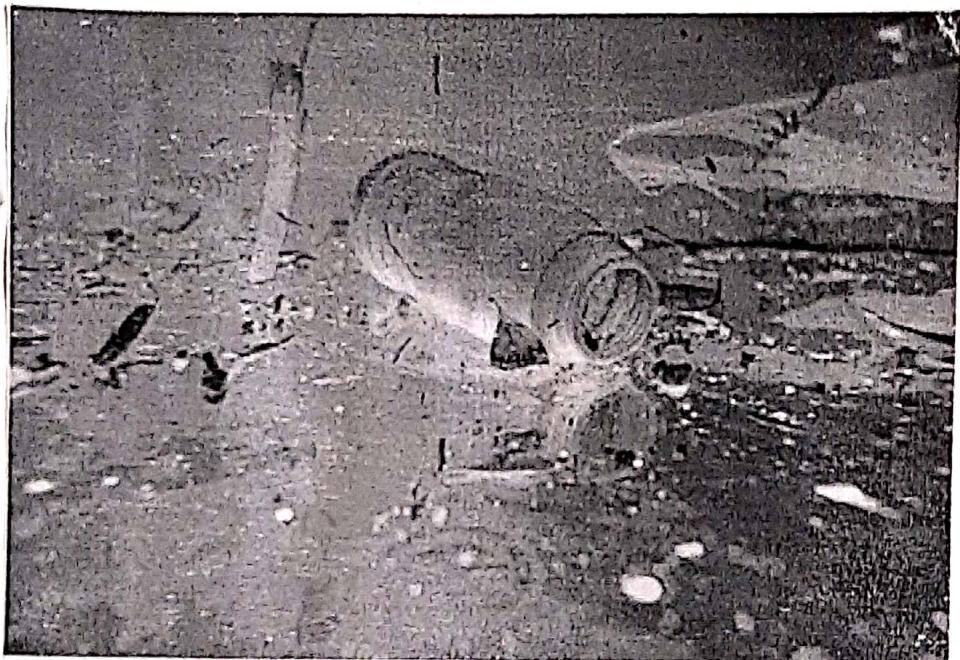
Water is typically referred to as polluted when it is impaired by anthropogenic contaminants. Due to these contaminants it does not support a human use, such as drinking water, or undergoes a marked shift in its ability to support its biotic communities such as fish. Natural phenomena such as volcanoes, algae blooms, storms and earthquakes also cause major changes in water quality and the ecological status of water.

Water pollution is a major global problem. It requires ongoing evaluation and revision of water resource policy at all levels (international down to individual aquifers and wells). It has been suggested that water pollution is the leading worldwide cause of death and diseases. Water pollution accounted for the deaths of 1.8 million people in 2015.

The organisation Global Oceanic Environmental Survey consider water pollution as one of the main environmental problems that can present a danger for the existence of life on earth in the next decades. One of the main concerns, is that water pollution, heat phytoplankton who produce 70% of oxygen and remove a large part of carbon-dioxide on the earth.

The organization proposes a number of measures for fixing the situation, but they should be taken in the next 10 years for being effective.

India and China are two countries with high levels of water pollution.



An estimated 580 people in India die of water pollution related illness (including water borne diseases) every day. About 90 percent of the water in cities of China is polluted. As in 2007, half a billion Chinese had no access to safe drinking water. In addition to the acute problems of water pollution in developing countries, developed countries also continue to struggle with pollution problems. For example, in a report on water quality in the United States

in 2009, 44 percent of assessed stream miles, 61 percent of assessed lake acres and 30 percent of assessed bay and estuarine square miles were classified as pollution.

Definition, Sources and Causes :-

Water pollution is the contamination of water bodies usually as a result of human activities water bodies include for example lakes, rivers, oceans and ground water.

Water Pollution results when contaminants are introduced into the natural environment. For example, releasing inadequately treated waste water into natural water bodies can lead to degradation of aquatic ecosystems in turn, this can lead to public health problems for people living downstream. They may use the same polluted river water for drinking or bathing or irrigation. Water Pollution is the leading world wide cause of death and disease, e.g. due to water borne disease.

Water pollution can be classified as surface water or groundwater pollution. Marine pollution and nutrient pollution are subsets of water pollution. Sources of water pollution are either point sources or non-point sources. Point sources have a identifiable cause of the pollution, such as storm drain or a waste water treatment plant. Non-point sources are more diffused, such as agricultural

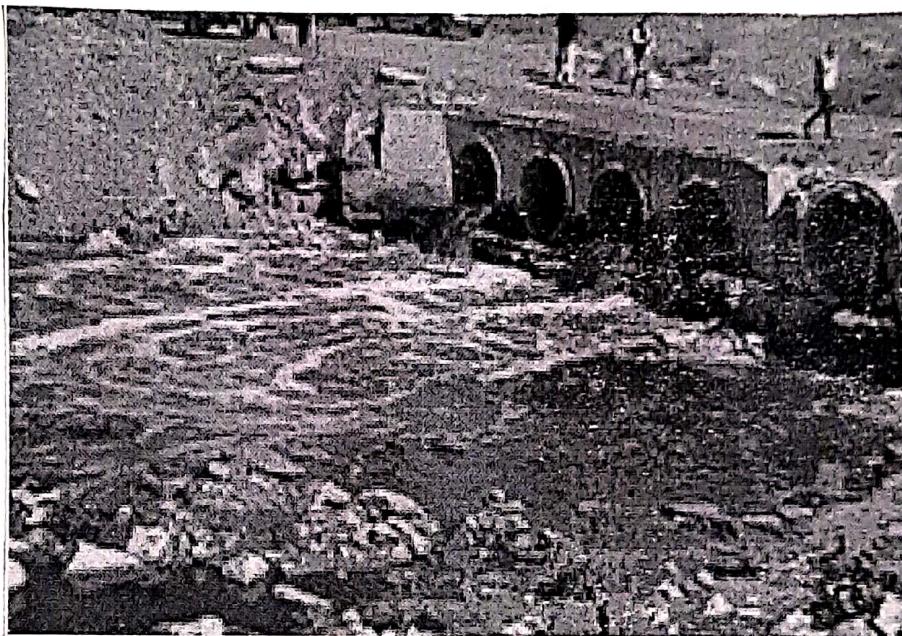
Pollution is the result of the cumulative effect over time. Plants and organisms living in or being exposed to polluted water bodies, can be impacted and effects can damage individual species and impact the natural biological communities they are part of.

The causes of water pollution include a wide range of chemicals and pathogens as well as physical parameters contaminants may include organic and inorganic substances. Elevated temperatures may also lead to polluted water.



A common cause of thermal pollution is the use of water as a coolant by power plants and industrial manufacture. Elevated water temperatures decrease oxygen levels, which can kill fish and alter food chain composition, reduce species biodiversity.

and poster invasion by new thermophilic species. Water pollution is measured by analysing water samples. Physical, Chemical and biological tests can be conducted. Control of water pollution requires appropriate infrastructure and management plans. The infrastructure may include waste water treatment plants. Sewage treatment plants and industrial wastewater treatment plants are usually required to protect water bodies from untreated wastewater.



Agricultural wastewater treatment for farms and erosion control at construction sites can also help prevent water pollution. Nature based solution are another approach to prevent water pollution. Effective control of urban runoff includes reducing speed and quantity of flow. In the United States, best management practices for water pollution include approaches to reduce the quality of water and improve water quality.

Sources of Water Pollution :-

There are two main sources of water pollution; point sources and non point sources. Point source include factories, wastewater treatment facilities, septic systems and other sources that are clearly discharging pollutants into water sources. Non-point sources are more difficult to identify because they cannot be traced back to a particular location. Non-point sources include runoff including sediment, fertilizer, chemicals and animal wastes from farms, field construction sites and mines. Landfills are also be a non-point source of pollution, if substances leach from the landfill into water supplies.

The United States Environmental Protection Agency (EPA) divides water pollution into the following six categories :-

- i) Biodegradable waste.
- ii) Plant nutrients, such as phosphates and nitrate.
- iii) Heat.
- iv) Sediment.
- v) Hazardous and toxic chemicals.
- vi) Radioactive pollutants.

Causes of Water Pollution :-

- i) Urbanization.
 - ii) Deforestation.
 - iii) Damming of rivers.
 - iv) Destruction of wetlands.
 - v) Industries.
 - vi) Mining.
 - vii) Agriculture.
 - viii) Energy use.
 - ix) Accidental Water Pollution.
- the physical disturbance of land due to construction of houses, industries, roads etc.
 - bottom dwelling plants cannot photosynthesize as the sun's rays cannot reach them.
 - Enhanced eutrophication may result due to the water spending a longer time in the dam.
 - pH of water, color of water, amount of nutrients.
 - destroys the habitat of many birds and fish.
 - can increase the murkiness of water.
 - increases soil erosion.

Measures :-

Water pollution, to a larger extent, can be controlled by a variety of methods. Rather than releasing sewage waste into water bodies, it is better to treat them before discharge. Practising this can reduce the initial toxicity and the remaining substances can be degraded and rendered harmless by the water body itself. If the secondary treatment of water has been carried by, then this can be reused in sanitary systems and agricultural fields.



A very special plant, the water Hyacinth can absorb dissolved toxic chemicals such as cadmium and other such elements. Establishing these in regions prone to such kinds of pollutants will reduce the adverse effect to a large extent.

Some chemical methods that help in the control of water pollution are precipitation, the ion exchange process, reverse osmosis and coagulation. As an individual, reusing, reducing and recycling wherever possible will advance a long way in overcoming the effects of water pollution.

Other than these there are few simple steps which can be followed to save and conserve water.

- Conserve water by turning off the tap when running water is not necessary. This helps prevent water shortages and reduces the contaminated water that needs treatment.
- Be careful about what you throw down your sink or toilet. Don't throw paints, oils or other forms of litter down the drain. Use environmentally household products, such as washing powder, household cleaning agents and toiletries.
- Take great care not to overuse pesticides and fertilizers. This will prevent runoffs of the material into nearby water sources.
- By having more plants into your garden you are preventing fertilizer, pesticides and contaminated water from running off into nearby water sources.
- Don't throw litter into rivers, lakes or oceans. Help clean up any litter you see on beaches or in rivers and lakes, make sure it is safe to collect the litter and put it in a nearby dustbin.

Conclusion

There is more than one billion people in the world who have no access to safe drinking water and more than two billion people worldwide who don't have proper sanitation systems. Water Purification is one of the solutions for water pollution. Millions of people worldwide could be saved if people used chlorination, filtration and solar disinfection to treat water at their homes. Therefore, water pollution is indeed a very serious concern because it not only has an impact on health and but also can have negative effects on various industries and agriculture. It is therefore highly important to devise methods to reduce the level of water pollution that we are currently facing.

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE: Air pollution In cities
and measures to control it.

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Contents of This Project

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Air Pollutions In Cities And Measures To Control It

Introduction

Most Cities world-wide suffers from serious air-quality problems, which have received increasing attention in the past decade. A major problem probable reason for the air-quality problems is urban-population growth, combined with change in land use due to increasing urban areas. The Urban population growth is the result of -
 ① drift to the cities and ② excess of births over deaths in the cities themselves - especially due to high birthrate in the developing countries.

Mainly responsible for the migration to the cities is a deep structural change, especially in the non-industrialised countries. This structural change is the consequence of - ① economic opening up, ② new trading partners, and ③ change of political conditions, e.g. democratisation.

Structural change takes a rapid course in some countries dubbed 'tigers'. It is not surprising that the expected urban population growth from 1992 until 2010 is much higher for Lagos, Bombay or Dhaka than for Tokyo or New York.

urban population growth has many consequences. One of them is higher emission of air pollutants. Even though for most air pollutants, the emission rate per inhabitants is at present higher in industrialized countries the tendency is obvious that this rate will in future be higher in the so-called developing countries.



What Is Air Pollution?

Air pollution is the presence of substances in the atmosphere that are harmful to the earth, health of humans and other living beings, or cause damage to the climate or to materials. There are different types of air pollutants, such that gases like ammonia, carbon monoxide, sulfur dioxide etc. Particulates (both organic and inorganic), and biological molecules.

It may cause diseases, allergies and even death to humans; It may also cause harm to other living beings such as animals and food crops, and may damage the natural or built environment. Both human activities and natural processes can generate air pollution.

General Quality Of Elements In Air

Elements	Quantity (%)
NO_2	78.11%
O_2	20.6%
CO_2	0.03% - 0.04%
Other materials like Vapours, Helium, Neon, O_3 , CH_4 , Hydrogen etc.	0.96% - 0.97%

This diagram represents the general quantity of elements in air. If there be any increase or decrease in the quantity of these elements in air, then the air becomes pollute air.

Pollutants For Air Pollution In Cities

An air pollutant is a material in the air that can have adverse effects on humans and the ecosystem. The substance can be solid particles, liquid droplets, or gases.

A pollutant can be of natural origin or man-made

Pollutants are classified as primary or secondary

① Primary Pollutants

Primary pollutants are usually produced by processes such as ash from a volcanic eruption

Other examples include carbon monoxide gas from motor vehicle exhausts or sulfur dioxide released from factories.

Secondary pollutants

Secondary pollutants are not emitted directly. Rather they form in the air when primary pollutants react or interact. Ground level O₃ is a prominent example of a secondary pollutant.

Some pollutants may both primary and secondary; they are both emitted directly and formed from other primary pollutants.

Pollutants Emitted into atmosphere By Human Activities

① **Carbon dioxide (CO₂)**: Because of its role as a green house gas, it has been described as 'the leading pollutant' and 'worst climate pollutant'.

CO₂ is a natural component of atmosphere, essential for plants, and given off by human. This question of terminology has practical effects, for example as

determining whether the U.S Clean air act is deemed

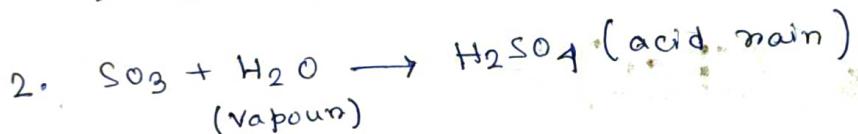
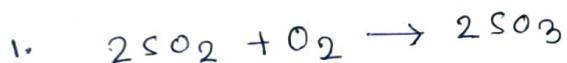
to regulate CO₂ emissions. CO₂ currently forms about

410 ppm of earth's atmosphere. Compared to about 280 ppm in preindustrial times, and billions of metric tons

of CO_2 are emitted annually by burning of Fossil fuels.

Sulfur Oxide (SO_x) : - particularly SO_2 , a chemical compound, produced by Volcanos and various industrial processes. Coal and petroleum often contains sulfur compounds and their combustion generates SO_2 .

Further oxidation of SO_2 , usually in the presence of a catalyst such as NO_2 , forms H_2SO_4 and thus acid rain is formed.



Nitrogen Oxides (NO_x) : Nitrogen oxides, particularly NO_2 , are expelled from high temp. combustion, and also produced during thunderstorms by electric discharge. They can be seen as a brown haze dome above or a plume downwind of cities. NO_2 is a chemical compound which is one of the most prominent air pollutants. This reddish-brown toxic gas has a characteristic sharp, biting odour.

Carbon Monoxide (CO) : - CO is a colourless, odourless toxic gas. It is a product of combustion of fuel such as natural gas, coal or wood. It creates a smog type formulation in the air that has been linked to many lung diseases and disruptions to environment and animals.

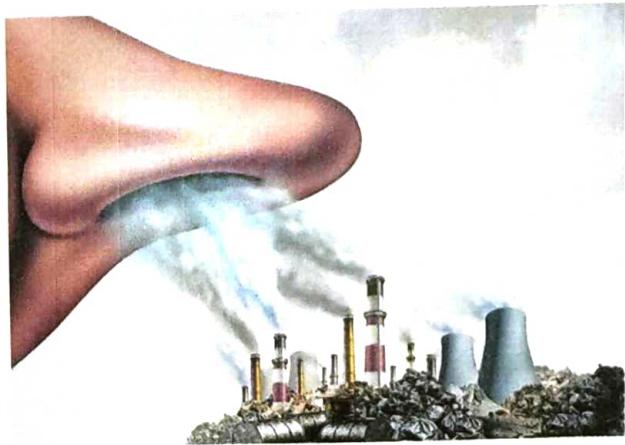
Volatile Organic Compound (VOC): VOCs are a well-known outdoor air-pollutant. They are categorized as —

Ethers, Methane (CH_4) or non-methane (NMVOCs).

CH_4 is an extremely efficient greenhouse gas because it enhances 'global warming'. Other hydrocarbons VOCs are also significant greenhouse gases because of their role in creating O_3 and prolonging the life of CH_4 in atmosphere.

Clorofluoro Carbons (CFCs) :- harmful to O_3 -layers;

emitted from products are currently banned from use. These are gases which are released from a.c., refrigerators, aerosol sprays etc. on release into the air, CFCs rise to the stratosphere. Here they come in contact with other gases and damage the O_3 layers. This allows harmful U.V rays to reach earth surface. This can cause skin cancer, eye-diseases etc.



Results Of Air pollution / Effects Of air pollutions

On atmosphere and living beings :

People experience a wide range of health effects from the being exposed to air pollution. Effects can be broken down into short-term effect and long-term effect.

i) Short-Term Effect: which are temporary includes illness such as pneumonia or bronchitis. They also includes discomfort such that irritation to the nose, throat, eyes, or skin. Air pollution always cause headache, dizziness, and nausea. Bad smell made by factories, garbage, or sewage system are considered air pollution too. These orders are less serious but still unpleasant.

ii. Long-Term Effect: This effect of air pollution can last for years or for an entire life time. They can even lead to a person's death. Long-term health effect from air pollution includes heart diseases, lung cancers, and respiratory diseases, such as emphysema. Air pollution can also cause long term damage to people's nerves, brains, kidney, liver, and other organs. Some scientists suspect air pollution cause birth defects. Nearly 2.5 M people

die worldwide each year from the effects of outdoor or indoor-air-pollution.

Effects On Environments :-

Like people, animals, and plants, entire ecosystem can suffer effects from air pollution. Haze, like smog, is a visible type of air pollution that obscures shapes and colours. Hazy air pollution can even muffle sounds.

Air pollution particles eventually fall back to Earth. Air pollution can directly contaminate the surface of bodies of water and soil. This can kill crops or reduce their yield. It can kill young trees and other plants..

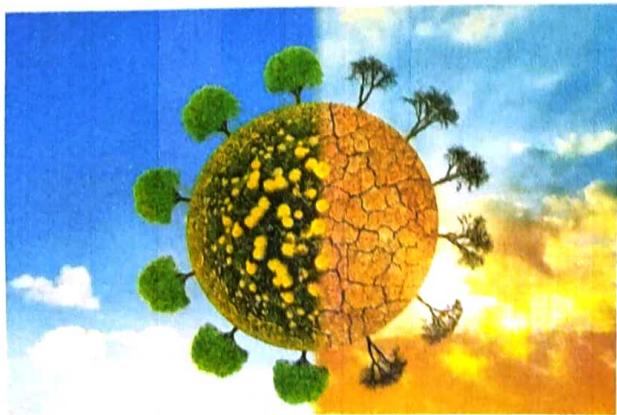
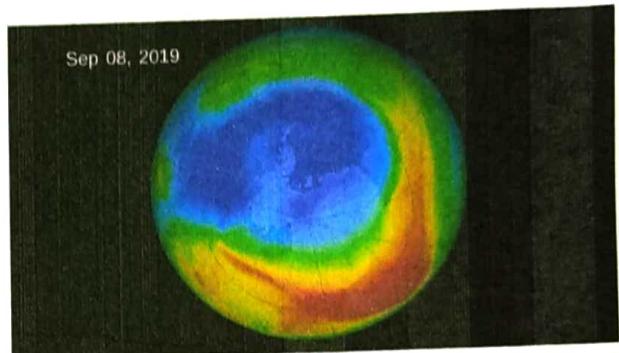
SO_2 and NO_x particles in the air, can create acid rain when they mix with water and O_2 in the atmosphere. These air pollutants come mostly from coal-fired power plants and motor vehicles. When acid rain falls to earth, it damages plants by changing soil composition; degrades water quality in rivers, lakes and streams; damages crops; and can cause buildings and mountains to decay.

Global Warming

Global warming is an environmental phenomenon caused by natural and anthropogenic air pollution. It refers to rising air and ocean temperatures around the world. This temp. rise is at least partially caused by an increase in the amount of greenhouse gases in the atmosphere.

Green house gas traps heat energy in the earth's atmosphere.

CO_2 is a greenhouse gas that has the biggest effect on global warming. CO_2 is emitted into the atmosphere by burning fossil fuels (coal, gasoline, and natural gases). Humans have come to rely on fossil fuels to power cars and planes, heat homes, and run factories. Doing these things pollutes air with

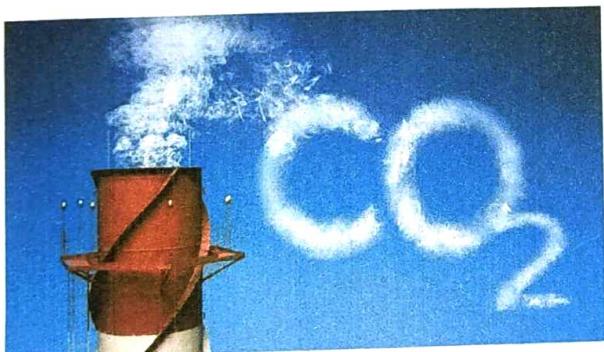


Other greenhouse gases emitted by natural and artificial sources also include methane, nitrous oxide, and fluorinated gases. Methane is a major emission

from coal plants and agricultural processes. Nitrous oxide is a common emission from industrial factories, agriculture

and the burning of fossile fuels in cars. Fluorinated gases, such as hydrofluorocarbons, are emitted by industry. Fluorinated gases are often used instead of gases such as (CFCs), which have been outlawed in many places because they deplete the O₃-layer.

which helps U.V rays to come to earth surface and increase the ground level temp and the atmospheric temp of earth.



Smog and Soot:

These are two most prevalent types of air pollution. Smog or 'ground-level-ozone', as it is more wokily called, occurs when emissions from combusting fossil fuels react with sunlight. Soot, or 'particulate matter' is made up of tiny particles of chemicals, soil, smoke, dust or allergens, in the form of gas or solids, that are carried in the air.



Sulfurous Smog:

- Sulfurous smog is also called "London Smog" as it first formed in London.
- Sulfurous smog results from a high concentration of sulfur oxides in the air and is caused by the use of sulfur bearing fossil fuels, particularly coal.
- This type of smog is aggravated by dampness and a high concentration of suspended particulate matter in air.

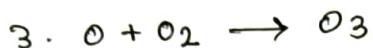


Photochemical Smog:

- Photochemical smog is also known as 'Los Angeles Smog'.
- Photochemical smog occurs most prominently in urban areas that have large no. of automobiles (nitrogen oxides are the primary emissions).
- Photochemical (summer smog) forms when pollutants such as NO_x and organic compounds react together in the presence of sunlight, O_3 is formed.



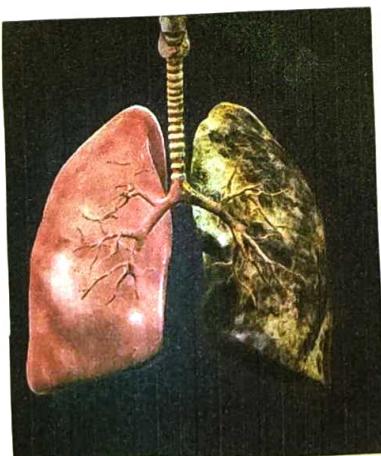
- The resulting smog causes a light brownish coloration of the atmosphere, reduced visibility, plant damage, irritation of the eyes and respiratory distress.



Smog is usually highly toxic to humans and can cause severe sickness, shortened life or death.

Effects on Humans by Air pollution:

- Lung Cancer :- While previously lung cancer was associated with those who smoke excessively, new evidence suggests that air pollution can also be carcinogenic. Adhesives and chemicals used in furniture and computer equipment can release formaldehyde fumes, which are a known cause for cancer.



CardioVascular problems:

Breathing in polluted air for long periods

can increase the risk of heart diseases.

Harmful air pollutants such as

CO, NO₂, O₃ can get mixed in the

bloodstream and cause cardiovascular disorders. Particulate Matter

is another pollutant that severely impacts the nervous system and

cardiovascular activities.

Affects pregnant women and New borns :

Air pollution can also have adverse effects on the

health of women during pregnancy. The new born

child can suffer from a weak immune system and

may have lung disorders upon birth.

Shortened life Span:

Not necessarily a disease but air pollution is also having

an impact on a person's general health and wellness.

Multiple studies point out the lifespan of a person living in a metro city like Delhi is about 3-years less than a person living in a cleaner rural or urban environment.

Measures to Control Air Pollution

Following are the measures one should adopt to control air pollution:

- Avoid using Vehicles:

People should avoid using vehicles for shorter distances. Rather, they should prefer public modes of transport to travel from one place to another. This not only prevents pollution, but also conserves energy.

- Energy Conservation

A large number of fossil fuels are burnt to generate electricity. Therefore, do not forget to switch off the electrical appliances when not in use. Thus we can save the environment at the individual level. Use of energy-efficient devices such as CFLs also controls pollution to a greater level.

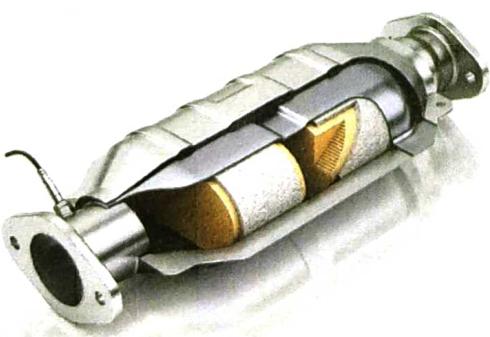
- Use of Clean Energy Resources:

The use of solar, wind and geothermal energies reduce air pollution at a large level. Various countries including India, have implemented the use of these resources as a step towards a clean environment.

Other air pollution measures includes -

- (i) By minimizing and reducing the use of fire and fire products
- (ii) Since industrial emissions are one of the major causes of air pollution, the pollutants can be controlled or treated at the source itself to reduce its effects.
For example, if the reactions of a certain raw material yield a pollutant, then the raw materials can be substituted with others less polluting materials.
- (iii) Fuel substitution is another way of controlling air pollution. In many parts of India, petrol and diesel are being replaced by CNG - (Compressed natural gas) fueled vehicles. These are mostly adopted by vehicles that are not fully operating with ideal emission engines.
- (iv) Although there are many practices in India, which focus on repairing the quality of air, most of them are either forgotten or not being enforced properly.

We have to use machines like Electrostatic-precipitators, scrubbers, Catalytic-converter etc. to control the quality of air and to purify it.



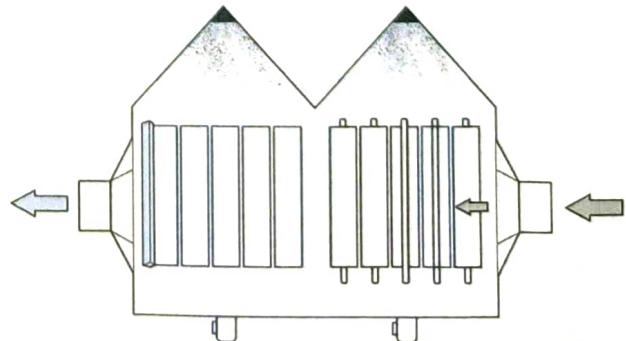
[Catalytic converter]

[Electrostatic precipitators] → (Next page)

- (v) Another way to control air pollution caused by industries is to modify and maintain existing pieces of equipments so that the emission of pollutants can be minimized.
- (vi) Sometimes controlling pollutants at the source is not possible.
e. In that case, we can have process control equipments to control the pollution.
- (vii) A very effective way to control air pollution is by diluting the air pollutants.
- (viii) The last and the best way to reducing the ill effects of air pollution is tree plantation. Plants and trees reduce a large numbers of pollutants in air.
Ideally, planting trees in areas of high pollution levels will be extremely effective. So we have to be careful about our nature and this environment to control such pollutions.



[Cyclone separator]



[Electrostatic precipitator]

Acknowledgements

I would like to acknowledge everyone who played a role to complete this project work, my mothers, my friends and my respected professors. Without them, I could never fulfill my project work.

Thank you all for your unwavering support.

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

Pond eco-system.

NAME : Anirban Mandal

COLLEGE ROLL NO : MTUG/100/19

DEPARTMENT : Mathematics

YEAR : 202020

SIGNATURE : Anirban Mandal.

Introduction

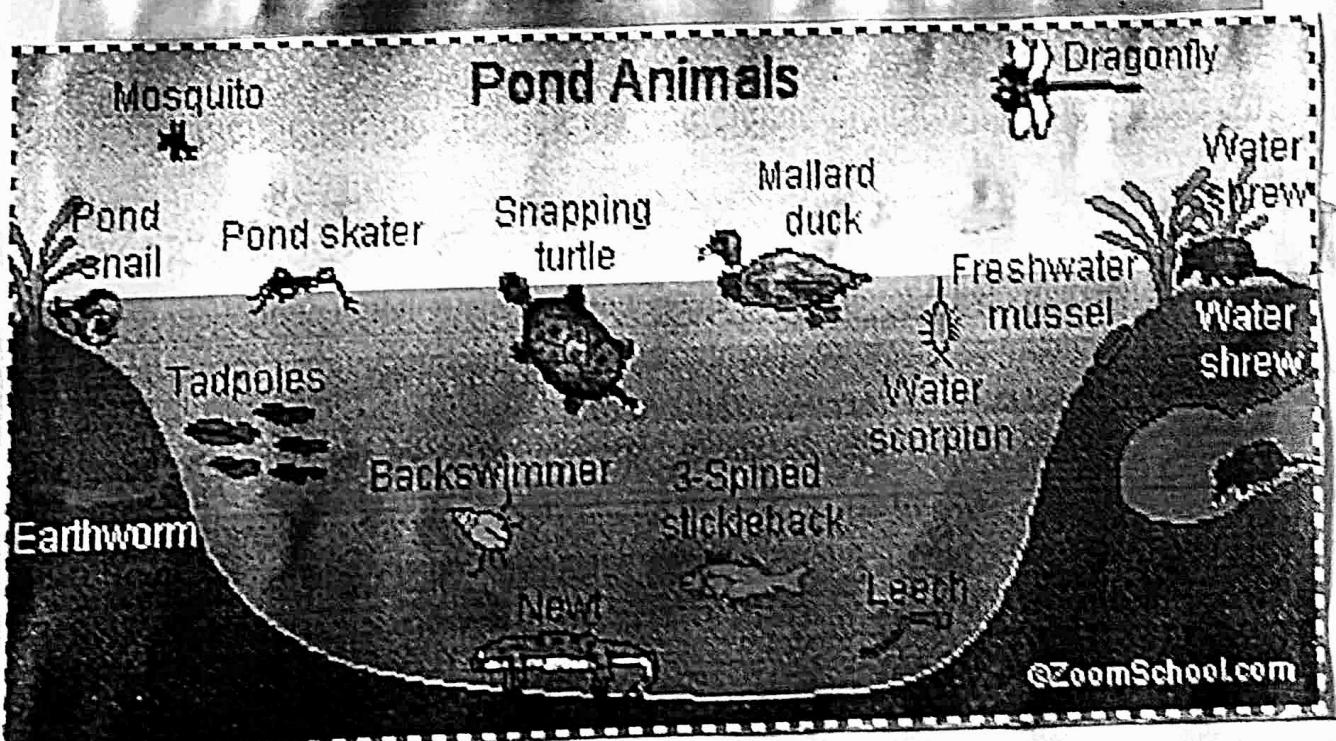
An ecosystem is a community of living beings, organisms (plants, animals and microbes) in conjunction with the non-living components, of their environment (things like air, water & mineral soil), interacting as a system.

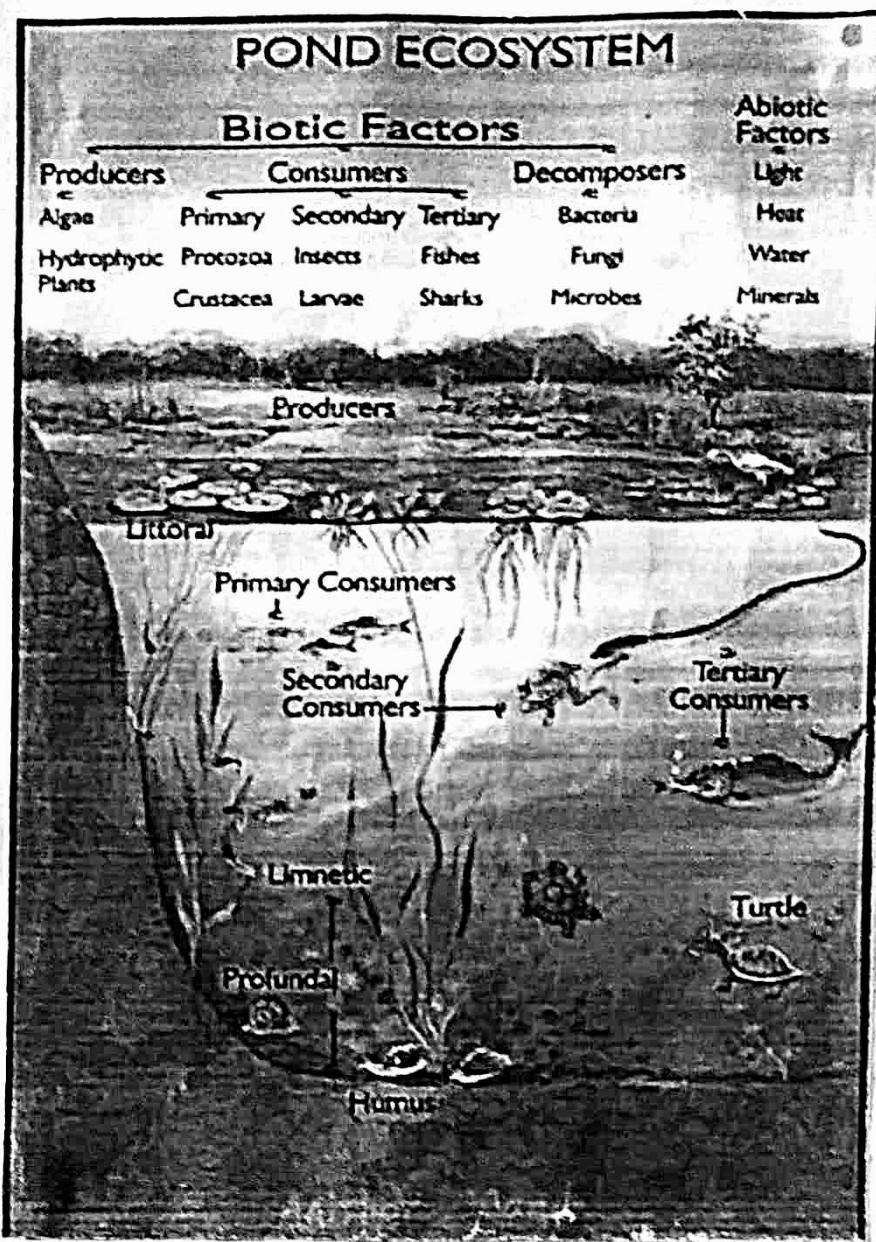
As ecosystems are defined by the network of interactions among organisms and between organisms & their environment, they can be of any size but usually encompass specific, limited spaces.

Pond eco-system

A Pond is different from a river. Rivers are generally fast flowing. Ponds are hollows with water in them. There is very little waterflow in a pond. In this still water, a whole community of plants & animals can grow.

Pond Ecosystem: List examples of the biotic and abiotic factors in this image.





Habitat & Biodiversity

At one time there were many more ponds than we have today. These ponds have disappeared. This has reduced the habitat available to wildlife. The word for the variety of life is biodiversity. Our native biodiversity is being reduced due to lack of pond habitat.

Pond - Plants

The picture above shows many plants that would be expected to find in a pond. Plants are different to animals. They can make their own food. They do this by using water, minerals & carbon-di-oxide to absorb the sun-rays. This is called photo-synthesis. They absorb carbon-di-oxide and produce oxygen which allows animals to breath. They also provide food for animals to eat. This is true for all ecosystems be it on land or water. A simple way to understand this is to do think of a food chain: sun, grass, rabbit & fox. Food chains also exist in ponds & all of them depend upon plants.

1. Plankton & Algae:

The smallest plants are planktons in ponds. These are so tiny that they can't be seen except with a microscope. They provide for many of the smaller creatures in pond. Another small plant is algae. This can be seen floating on ponds as what looks like a green scum.

2. Plant - succession

In a pond some plants live entirely outside the water & some live entirely in it. others are partially in the water. Each of those plants need special adaptations to survive where they grow.

:Pond creatures:

There are many strange looking creatures in the pond. Because they all live in water, they are different from land based animals. They are adapted for living in water. They have ~~hair~~ things on their bodies which allow them to live successfully in this environment.

1. snail:

They are molluscs and are closely related to their land cousins. They have a hard shell & they can vary from 25 mm to 50 mm in size. It has gills which allows it to breath under water.

2. Water spider:

They are arachnids. They can be about 16 mm. They can't breath under water. They spin a web & use it as an airbell. They are able to breath in this airbell.

3. Shrimp:

The shrimp is about 16 mm long.

They have 7 or 9 pair of legs. They swim on their sides. They eat floating dead matter in the pond. They don't live in polluted water. Their presence reduces pollution in the pond.

4. Caddis Fly Larva:

They are about 20 mm long. They are usually grown up from plants, stones or shells. Like other insects, it has a life-cycle of egg, larva, pupa and adult. The larva stage lives in the water, makes its own case from silk like material surrounding this inner case with different material. The pupa stage also remains in the case. Eventually the adult fly emerges & begins its short life as a fly.

5. Beetle larva:

It is the largest larva in the pond about 50 mm. when fully grown. It is fierce predator eating whatever it can catch.

6. Pond skater:

They are about 20 mm across. They have six legs. They are held out from the body so it can spread its weight as widely as possible. This allows it to move across the surface very quickly along it to catch prey, the small creatures, which live on the surface. Some species of pond skater can fly & some others can't.

Food chains & ecology of the pond.

All life in the pond depends upon the ability of the plants to photosynthesis. The animals are then able to feed from the plants. One simple food chain might be -

Sun-algae-tadpole-kingfisher.

All these food chains added together form an interconnected web that make up the pond eco-system. The idea of an ecosystem means that all the living things in the pond depend upon one-another. ponds are very susceptible to pollution. This can destroy the pond eco-system. ponds are very important for wildlife of all sorts, biodiversity.

Following are the consumers of the pond habitat food chain.

Primary consumers: These are the herbivores that depend on the Producers for food - examples are tadpoles, very tiny fish, snails.

Secondary consumers:

These are the organisms which depend on the primary consumers for food. Examples - medium sized fish, frogs.

Tertiary consumers:

These are the organisms which can feed on the primary and the secondary consumers. Examples are - duck, crane etc.

Top consumers: top consumers or predators, which include the osprey, fish hawk & humans.

Acknowledgement:

During this project, we got a lot of practical experience.

- I personally went to the spot & asked the nearby people about different kinds of plants, animals around the pond. Residential people really helped a lot. Except this, we got help from my teachers, family members & especially my friends. I am really thankful to all of them.

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NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

Coxona Pandemic and Role of common People
to control it.

NAME : Ankit Mondal
COLLEGE ROLL NO : CHUGI/018/19
DEPARTMENT : chemistry
YEAR : 2020
SIGNATURE : Ankit Mondal.

■ Corona pandemic and role of the common people to control it :-

~~#~~ Initiation of corona pandemic:-

From March 25, India initiated the most extreme step in the mitigation strategy of covid-19 control: the lockdown. This is a very courageous step by the Indian government, and as responsible citizens we need to abide by its instructions. If we are instructed to remain at home, we need to!

Most countries follow the containment, delay and mitigation stepwise strategies to control covid-19.

In the very early stage, people who had recently travelled to other countries tested positive. This is the 'stage of imported cases'. India followed the 'containment strategy' at this stage. We isolated these patients, tracked their contacts and quarantined them.

Then we had the second stage, of 'local transmission', wherein contacts of the patients developed the disease. At this stage, Indian public health officials continued contact-tracing and also instituted the 'delay measures' in the form of social-distancing, and closed offices, schools and colleges and advised against large gatherings like weddings.

Next, India expects the stage of 'community spread'. In this stage, people with no history of contact with visitors from foreign countries or with their contacts acquire the COVID-19 infection. In the community spread stage, we need to concentrate on delay and mitigation strategies by strictly implementing social distancing.

■ Rapid spreading of corona disease:-

(i) The last and most extreme stage is the epidemic phase, where we can have hundreds or thousands of patients with the disease within the country. In this stage of the epidemic, the most reliable control measure is an extreme mitigation step known as "suppression" or "lockdown". Most countries, including France, Italy and the US, initiated a lockdown at the epidemic stage. But by this time, several hundred patients were already dead in these countries.

India has followed the same strategy of containment, delay and mitigation. but the difference is we followed a quicker transition from one stage to the next relative to those in other countries. India hasn't yet confirmed the presence of community transmission of the new coronavirus but we can't

(1)

definitively rule out this stage either. The government has already taken the extraordinary step of implementing a lockdown, the extreme mitigation measure, at a very early stage of the outbreak. Unlike other countries that initiated a lockdown at the epidemic stage, our country initiated a lockdown at the local spread stage itself.

In effect, we rapidly changed our strategy from containment to delay to mitigation. We have learned from the failure of other countries. Initiating a lockdown at the threshold of the epidemic stage will be less fruitful. We are convinced that if we decide on a lockdown, we need to do it sooner rather than later.

(ii)

A lockdown has its downsides. A three-week lockdown in particular will have significant economic consequences for any country. That is the reason why many countries initiated a lockdown later. We have considered the economic consequences but considered the lockdown an unavoidable mitigation measure.

There are some strategies with lower economic consequences. For example, a few countries are following a strategy of building herd immunity. In this case there won't be any lockdown. Instead, vulnerable individuals such as the elderly will be quarantined and the younger and fit individuals will be exposed to the virus while they continue with their routines. The logic behind this idea is that by exposing younger people to the virus, most individuals in the community will develop immunity and this 'herd immunity' will subsequently protect the vulnerable population.

And the pitfall of this strategy is the possibility of a large number of vulnerable people succumbing to the disease, overwhelming healthcare system and potentially resulting in a catastrophic scenario. The United ~~Kingdom~~ Kingdom initially followed the herd immunity strategy but later realised its impracticality and quickly moved to delay and mitigate.

At this situation , the coronavirus , a pandemic has made us realize that we all are connected and this entire world is a family . Although connected medical experts have suggested social distancing as one of the ~~best~~ solution to ~~fight~~ fight against the new evil . Now we focus on the picture of spreading of covid-19 and how common people fight against corona ?

In india , our honourable prime minister - Narendra Modi Ji indicated how COVID-19 chain can be splintered with the 21 days country lock-down . But to flatten the curve of covid-19 , the lock-down must be respected and accepted by 130 crore Indians altogether .

This framework is useful in the context of the coronavirus crisis because it involves both a range of rights and responsibilities of many actors . our right to health , but also rights to liberty , freedom of movement , to education , to information , to food , to shelter are all at stake . As countries ramp up exclusionary travel and border policies , some of these right be imperiled .

Role of youth to fight against COVID-19 :- (7)

→ Now, youth in India constitutes about more than one fourth of the total population. We as a responsible youth of this country should participate in this battle against Zoonotic disease. Now, let's understand the role of youth in this battle. To name some of them from the canvas of history - Lenin, the ~~the~~ Russian youth had a major contribution to the Russian Revolution. Likewise Mazzini and Bhagat Singh also contributed their role for the country. This battle can be won by helping the government in this time exigency. We can spread the right awareness in our Posti, Family, xyz etc. WhatsApp group with right information about the virus. Social media groups always have as much as traffic on ~~on~~ our roads. Let's spread the right message among our acquaintances during this situation.

→ Every religious activity has been on halt in lieu of corona-virus outbreak, still if we see any of the gathering around. It's our responsibility to guide and report if required. The constitution of India, is the holy book for every Indian citizen and every order must be accepted as a commandment. We live in a democracy and we have every right to put our thoughts

on the table but this is the time to unite and stand with our government.

→ Admittedly, there is much blot about being tested positive for covid-19 and facing quarantine for a couple of week(s). But "whatever gets measured gets managed". If the positive cases are effectively measured, we shall be able to contain the outbreak effectively. so it's our responsibility to spread the right kind of awareness within the family, society or acquaintances rather than wasting time on optional stuff.

The outbreak of corona-virus has also affected the mental health of humans as everyone reacts differently to stressful situations. so in this hour of stress/anxiety let's spread the right knowledge, right humours, right videos and ensure them that we are going to win this battle. To understand better "It is not the corona-virus which is dangerous but it is the quick spread which is a threat". Let's us do our part and participate in this battle by staying at home.

5 things people can do to join the Global

COVID19 Response :-

We are all impacted by COVID19 - the coronavirus - one way or another. No matter where we are in the world and where in the age spectrum we sit. However, some of us are at higher risk - for instances, older people and people with severe underlying health conditions. Some of us are more impacted than others due to individual, community or geographical circumstances.

The one thing that surely must cut across all these levels is being overwhelmed with the constant influx of information and misinformation both on and offline. You see, hear, read one thing and before you have a second to grasp it, you are flooded by a completely different set of information. I bet we are all also experiencing multiple stages of panic, paranoia, fear, uncertainty and disbelief or even denial! "How could this happen", or "this could never happen to me"! It is happening to us, all of us, and all of us together. But mostly it's compounding the already uncertain future that young people face today!

COVID19 - now classified as a pandemic by the World Health organization, a new disease for which people don't have immunity to - is spreading around the world beyond expectations. However, this crisis shouldn't be a call to panic regardless of how tough that might be under the circumstances! This is a reason to organize ourselves better. young people always ask me how can we change the world? How can we be a part of what is going on in the world?

What is the young people's role in global challenges? Well there is no time like now for young people to do what they do best. self organise, self mobilize and come together no bars held just like you have in the biggest crisis of all climate change. come together in global solidarity!

We all know disasters happen, whether it be natural disasters or global pandemics, but usually they don't hit so close to home for most of us and hence we successfully "otherwise" them to another part of world or to another part of community somewhere faraway from us. But, not with the covid 19's "forest fire" nature,

it's better to take preventive measures and be geared to respond immediately! Here are some things you can do in this time of global solidarity.

As a precursor to the 5 pointers on what to do as a young person in times of the COVID19 pandemic, the most important and urgent step is to be rational, to exercise calm ~~and~~ and reason in all situations. Now this can be particularly tough in countries with a lockdown situation. This is when it is key to take heart in resilience as a community and an opportunity to use social media as a tool for community therapy and communication with each other on a positive note of solidarity — as opposed to one of panic. To learn from social media solidarity over the climate crisis, where movements sparked worldwide to support the cause and show young people's resilience.

Now before a deep dive into specifically what you can do, start by applying practicality in sense and follow these five sample pointers to manage the COVID19 and also come together as a resilient global community.

1) Follow simple and routine World Health organization WHO guidelines:-

properly wash your hands more often, avoid crowded spaces, avoid handshaking, if you are sick wear a mask and seek medical attention immediately.

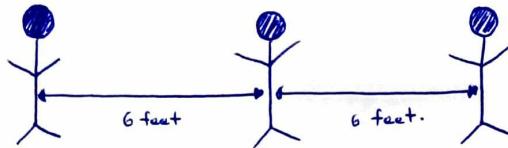
2) Educate your families, friends and community :-

spread community awareness online and offline. For example look at how the scouts are raising community awareness around the world and how the Ndlovu youth choir in south africa used to music and dance to dismantle myths about coronavirus. Unfortunately, fake news spread so fast in times of uncertainty. so be responsible. Verify every news and information before sharing. Be a source of calm during this storm.

③ Donate:-

Find a reliable charity to donate. the UN Foundation and the swiss philanthropy foundation for an example, just launched a coronavirus response fund. you can also support other campaigns such as "stand together to beat coronavirus" by global citizen that the G20 countries contribute financially.

■ Maintain social distancing:-



- Limit close contact with others as much as possible.
- Maintain at least 6 feet between you and people outside of your family unit.
- Do not congregate in groups of more than 10 people.
- Avoid sports and exercise equipment shared by others.
- Use a video conferencing platform to stay connected with loved ones, co-workers and your union family.

④ Hold your government accountable:-

Advocate for free testing, reliable information, paid sick leave, investments in science and universal health coverage.

(5)

Volunteer:-

Find opportunities to volunteer in your community. If there are older people or immuno compromised people help them out. Help out vulnerable people in your community to pick up their groceries and medicine. Healthcare workers around the world are called to work in high demand and they might need your help looking after their children or looking after their parents while they attend to life-saving work in clinics and hospitals around the world. This example shows how young people are helping out the elderly.

Therefore, we need young people's leadership now more than ever. Most of all, in doing all of this, stay healthy and stay safe. Listen to ~~the~~ health Authorities. stay alert ~~and~~ and keep a calm open mind.

NAME-ANKUSH BHATTACHARYA

ROLL - SNUG/073/19

PROJECT OF ENVS

SUB- WATER POLLUTION

1ST YEAR

2ND SEMESTER EXAM

YEAR - 2020

college name-

RAMKRISHNA MISSION
RESIDENTIAL COLLEGE

Department-
sanskrit

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE

NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE :-

NAME — Ankush Bhattacharya

COLLEGE ROLL NO — SNUGI/073/19

DEPARTMENT — Sanskrit

YEAR — 2020

SIGNATURE — Ankush Bhattacharya

Introduction:-

water is one of the renewable resources essential for sustaining all forms of life, food production, economic development, and for general well being. It is impossible to substitute for most of its uses, difficult to be pollute, expensive to transport and it is truly a unique gift to mankind from nature. The surface water and groundwater resources of the country play a major role in agriculture, hydropower generation, livestock production, industrial activities, forestry, fisheries, recreational activities etc.

In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. In addition, deficient water resources have increasingly restrained water pollution control and water quality improvement. Water pollution has been a research focus for government and scientists. Therefore protecting river water quality is extremely urgent because of serious water pollution and global security of water resources.

Source of water pollution:-

water pollution can occur from two sources.

1. Point source.
2. Non-point source.

a) organic water pollution:- They comprise of insecticides and herbicides, organohalides and other forms of chemicals; bacteria from sewage and livestock farming, food processing wastes, pathogens, volatile organic compounds etc.

b) Inorganic water pollution:- They may arise from heavy metals from acid mining drainage; silt from surface run-off, logging, slash and burning practice and land filling; fertilizers from agricultural run-off which include nitrates and phosphates etc. and chemical waste from industrial effluents.

Point Sources

- wastewater effluent
- Runoff and leachate from waste disposal sites
- Run off and infiltration from animal feedlots
- Run off mines, oil fields

Nonpoint Sources

- Run off from agriculture
- Run off pasture and range
- urban Runoff unanswered and swered areas with a population < 100,000

Point source

- Storm sewer outfalls from cities with a population $> 100,000$
- Run off from construction sites $> 2 \text{ ha}$
- Run off from construction sites $> 2 \text{ ha}$
- Run off from construction sites $> 2 \text{ ha}$
- Run off from construction sites $> 2 \text{ ha}$

Nonpoint source

- Run off from construction site.
- Run off from abandoned mines.

Some important source of water pollution

a) **Urbanization**:- urbanization generally leads to higher phosphorus in urban catchments. Increasing imperviousness, increased runoff from urbanized surfaces, and increased municipal and discharges all result in increased loadings of nutrients to urban streams. This makes urbanization second only to agriculture as the major cause of stream impairment.

b) **Sewage and other oxygen demanding wastes**:- Management

of solid waste is not successful due to huge volumes of organic and non-biodegradable wastes generated daily. As a consequence, garbage in most parts of India is unscientifically disposed and ultimately leads to increase in the pollutant load of surface and



Scanned by TapScanner

groundwater courses. Seawage can be a fertilizer as it releases important nutrients to the environment such as nitrogen and phosphorus which plants and animals need for growth. Chemical fertilizers used by farmers also add nutrients to the soil, which drain into rivers and seas and add to the fertilizing effect of the sewage. Together, sewage and fertilizers can cause a massive increase in the growth of algae or plankton that facilitate huge areas of oceans, lakes or rivers creating a condition known as a ~~algae~~ bloom thereby reducing the dissolved oxygen content of water and killing other forms of life like fish.

Industrial wastes:- Many of the industries are situated along the banks of river such as steel and paper industries for their requirement of huge amounts of water in manufacturing processes and finally their wastes containing acids, alkalies, dyes and other chemicals are dumped and poured down into rivers as effluents. Chemical industries concerning with manufacture of Aluminium release

large amount of fluoride through their emissions to air and effluents to water bodies. Fertilizer industries generate huge amount of ammonia whereas steel plants generate cyanide. chromium salts are used in industrial process for the production of sodium dichromate and other compounds containing chromium. All such discharges finally arrive at water bodies in the form of effluents affecting human health and the organism living there.

[Agro-chemical wastes]:— In the agricultural sector, water and electricity for irrigation are subsidized for political reasons. This leads to wasteful flood irrigation rather than adoption of more optimal practices also do not necessarily encourage the judicious use of water. Agro-chemical wastes include fertilizers, Pesticides which may be herbicides and insecticides widely used in crop fields to enhance productivity. Some of pesticides are: DDT, Aldrin, Dieldrin, malathion, Hexachloro Benzene etc. Pesticides reach water bodies through surface run off from agricultural fields, drifting from spraying, washing down

Cause of water pollution



of precipitation and direct dusting and spraying of pesticides in low flying areas polluting the water quality. Most of them are non-biodegradable and persistent in the environment for long period of time.

These chemicals may reach humans through food chain leading to biomagnification.

Thermal pollution:- changes in water temperature adversely affect water quality and aquatic biota. Majority of the thermal pollution in water is caused due to human activities. Some of the important source of thermal pollution are nuclear power and electric power plant, boiler from industries which release large amount of heat to the water bodies leading to change in the physical, chemical and biological characteristics of the receiving water bodies. High temperature declines the oxygen content of water.

Ans

Oil Spillage:- oil discharges into the surface of sea by way of accident or leakage from cargo tankers carrying petrol, diesel and their derivatives pollute sea water to a great extent. Exploration of oil from offshore also lead to oil pollution in water. The residual oil spreads over the water surface forming a thin layer of water-in-oil emulsion.

Acid rain pollution:- water pollution that alerts a plant's surrounding pH level, such as due to acid rain, can harm or kill the plant. Atmospheric sulfur dioxide emitted from natural and human-made source like volcanic activity and burning fossil fuels interact with atmospheric chemicals, including hydrogen and oxygen, to form sulfuric and nitric acids in the air. These acids fall down to earth through precipitation in the form of rain or snow. Once acid rain reaches the ground, it flows into waterways that carry its acidic compounds onto water bodies. Acid rain that collects in aquatic environments lowers water pH levels and affects the aquatic biota.

Radioactive waste:-

Radioactive pollution is caused by the presence of radioactive materials in water. They are classified as small does which temporary simulate the metabolism and large does which gradually damage the organism causing genetic mutation.

Source may be from radioactive sediment, waters used in nuclear atomic plants, radioactive minerals exploitation, nuclear power plants and use of radioisotopes in medical and research purpose.

climate change:-

Global warming has also an impact on water resources through enhanced evaporation, geographical changes in precipitation intensity, duration and frequency, and severity of droughts and floods. Relatively small climate changes can have huge impact on water resources, particularly in arid and semi-arid regions such as North-west India. This will have impacts on agriculture, drinking water and on generation of hydroelectric power, resulting in limited

water supply and land degradation. Apart from monsoon rains, India uses perennial rivers which originate in the Hindu Kush and Himalayan ranges and depend on glacial melt waters. Since the melting season coincides with the summer monsoon season, any intensification of the monsoon is likely to contribute to flood disaster in the Himalayan catchment. Rising temperature will also contribute to a rise in the snowline, reducing the capacity of these natural reservoirs, and increasing the risk of flash floods during the wet season. Increase in temperatures can lead to increased eutrophication in wetlands and fresh water supplies.

The disruption of sediments:- construction of dams for hydroelectric power or water can reduce the sediment flow affecting adversely the formation of beaches ~~and~~ increase coastal erosion and reduces the flow of nutrients from rivers into seas. During construction

work, soil, rock and other fine powders sometimes enter nearby rivers in large quantities, causing water to become turbid. The extra sediment can block the gills of fish, causing them suffocation.

Effect of water pollution:- Polluted water has effects on both human and aquatic life.

1. Effect of water pollution on human health
 chemicals in water that affect human health:-
 some of the chemicals affecting human health are the presence of heavy metals such as Fluoride, arsenic, lead, cadmium mercury, pesticides and nitrates. Fluoride in water is essential for protection against dental carries and weakening of the bones. Arsenic is highly dangerous for human health causing respiratory cancer, arsenic skin lesion from contaminated drinking water in some districts of west Bengal. long exposure leads to



Effects of water pollution

bladders and lungs cancer. Lead is contaminated in the drinking water source from pipes, fitting, solder, household Plumbing systems. child and pregnant women are mostly prone to lead exposure. Mercury is used in industries such as smelters, manufactures of batteries, thermometers, pesticides, fungicides etc. The best known example of mercury pollution in the oceans took place in 1958 when a Japanese factory discharged a significant amount of mercury into Minamata Bay by contaminating the fish stocks there. It took several years to show its effects. By that time, many local people had eaten the fish and around 2000 were poisoned, hundreds of people were left dead and disabled and the cause for death was named as "Minamata disease" due to consumption of fish containing methyl mercury. It causes chromosomal aberrations and neurological damages to human. Mercury shows biological magnification in aquatic ecosystem. Cadmium reaches human body through food crop from soil irrigated by affected effluents. Friberg et. al (1974) noted that long term

consumption of rice from affected fields by the people living in areas contaminated by cadmium in regions of Japan, resulted into many renal diseases like "itai-itai disease", nephritis and nephrosis.

water borne disease:- Microorganisms play a major role in water quality and the microorganisms that are concerned with water borne disease are salmonella sp., shigella sp., Escherichia coli and vibrio cholera. All these cause typhoid fever, diarrhoea, dysentery, gastroenteritis and cholera. The most dangerous form of water pollution occurs when faeces enter the water supply. Many diseases are perpetuated by the faecal-oral route of transmission in which the pathogens are shed only human faeces. Children are generally more vulnerable to intestinal pathogens and it has been reported that about 1.1 million children die every year due to diarrhoeal diseases.

2. Effect of water pollution on plants

The following are the effects of water pollution on plants:-

1. Effects of acid deposition: Many of the gases from acid, aerosols and other acidic substances released into the atmosphere from industrial or domestic sources of combustion from fossil fuels finally fall down to ground and reach the water bodies along with run-off rainwater from polluted soil surfaces thereby causing acidification of water bodies by lowering its pH.

In many countries chemical substances like sulphates, nitrates and chloride have been reported to make water bodies such as lakes, river and ponds acidic.

2. Effects of oil spillage:- oil pollution due to spillage of oil tankers and storage containers prevents oxygenation of water and depletes the oxygen content of the water body by reducing light transmission inhibiting the growth of planktons and

photosynthesis in macrophytes.

3. Effects of Industrial wastes:- Effluents

from industries contain various organic and inorganic waste products. Fly ash form thick floating over the water thereby reducing the penetration of light into deeper layers of water bodies. Fly ash increase the alkalinity of water and cause reduced uptake of essential bases leading to death of aquatic plants. Liquid organic effluents change the pH of water and the specific toxicity effects on the aquatic plants vary depending on their chemical composition. There may be synergistic, additive or antagonistic interactions between metals with respect to their effects on plants however these effects are reduced in hard and buffered freshwater bodies.

Phytotoxicity effects on plants:- when chemical pollutants build up in aquatic or terrestrial environments, plants can absorb these chemicals through their roots. phytotoxicity occurs when toxic chemicals poison plants. The symptoms of phytotoxicity on plants include poor growth, dying seedlings and dead spot on leaves. For example, mercury poisoning which many people associate with fish can also affect aquatic plants, as mercury compounds build up in plant roots and bodies result in bioaccumulation. As animal feeds on polluted food the increasing levels of mercury is built up through food chain.



Effect of water pollution

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The key challenge to better management of the water quality in India comprise of temporal and spatial variation of rainfall, uneven geographic distribution of surface water resource, persistent droughts, overuse of ground water and contamination drainage and salinisation and water quality problems due to treated, partially treated and untreated wastewater from urban settlements, industrial establishments and runoff from irrigation sector besides poor management of municipal solid waste and animal dung in rural areas. Some of the control measures are —

1. The Ganga Action Plan and the National River Action Plan are being implemented for addressing the task of trapping, diversion and treatment of municipal wastewater.
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treated, due to inadequate Sanitation facilities. This waste water, containing highly organic pollutant load, finds its way into surface and groundwater course near the vicinity of human habitation from where further water is drawn for use. considerable investments should be done to install the treatment systems.

3. There should be ban on washing of clothes and laundry alongside the river bank.
4. Industries should install Effluent treatment plant to control the pollution at source.
5. Rain water harvesting should be practiced to prevent the depletion of water table.
6. Making people aware of the problem is the first step to prevent water pollution. Hence importance of water and pollution prevention measures should be a part of awareness and education programme.

Wetlands for Water Pollution Control

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Water Pollution

7. Improper use of fertilizers, herbicides and pesticides in farming should be stopped and organic methods of farming should be adopted. Cropping practices in riparian zone should be banned to protect the riparian vegetation growing there.

References:-

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Ankush Bhattacharya -

How poll

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Teacher's signature

Ankush Bhattacharya

student's signature

THE END

NAME-ANKUSH BHATTACHARYA

ROLL - SNUG/073/19

PROJECT OF ENVS

SUB- WATER POLLUTION

1ST YEAR

2ND SEMESTER EXAM

YEAR - 2020

college name-

RAMKRISHNA MISSION
RESIDENTIAL COLLEGE

Department-
sanskrit

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE

NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE :-

NAME — Ankush Bhattacharya

COLLEGE ROLL NO — SNUGI/073/19

DEPARTMENT — Sanskrit

YEAR — 2020

SIGNATURE — Ankush Bhattacharya

Introduction:-

water is one of the renewable resources essential for sustaining all forms of life, food production, economic development, and for general well being. It is impossible to substitute for most of its uses, difficult to be pollute, expensive to transport and it is truly a unique gift to mankind from nature. The surface water and groundwater resources of the country play a major role in agriculture, hydropower generation, livestock production, industrial activities, forestry, fisheries, recreational activities etc.

In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. In addition, deficient water resources have increasingly restrained water pollution control and water quality improvement. Water pollution has been a research focus for government and scientists. Therefore protecting river water quality is extremely urgent because of serious water pollution and global security of water resources.

Source of water pollution:-

water pollution can occur from two sources.

1. Point source.
2. Non-point source.

a) organic water pollution:- They comprise of insecticides and herbicides, organohalides and other forms of chemicals; bacteria from sewage and livestock farming, food processing wastes, pathogens, volatile organic compounds etc.

b) Inorganic water pollution:- They may arise from heavy metals from acid mining drainage; silt from surface run-off, logging, slash and burning practice and land filling; fertilizers from agricultural run-off which include nitrates and phosphates etc. and chemical waste from industrial effluents.

Point Sources

- wastewater effluent
- Runoff and leachate from waste disposal sites
- Run off and infiltration from animal feedlots
- Run off mines, oil fields

Nonpoint Sources

- Run off from agriculture
- Run off pasture and range
- urban Runoff unanswered and swered areas with a population < 100,000

Point source

- Storm sewer outfalls from cities with a population $> 100,000$
- Run off from construction sites $> 2 \text{ ha}$
- Run off from construction sites $> 2 \text{ ha}$
- Run off from construction sites $> 2 \text{ ha}$
- Run off from construction sites $> 2 \text{ ha}$

Nonpoint source

- Run off from construction site.
- Run off from abandoned mines.

Some important source of water pollution

a) **Urbanization**:- urbanization generally leads to higher phosphorus in urban catchments. Increasing imperviousness, increased runoff from urbanized surfaces, and increased municipal and discharges all result in increased loadings of nutrients to urban streams. This makes urbanization second only to agriculture as the major cause of stream impairment.

b) **Sewage and other oxygen demanding wastes**:- Management

of solid waste is not successful due to huge volumes of organic and non-biodegradable wastes generated daily. As a consequence, garbage in most parts of India is unscientifically disposed and ultimately leads to increase in the pollutant load of surface and



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groundwater courses. Seawage can be a fertilizer as it releases important nutrients to the environment such as nitrogen and phosphorus which plants and animals need for growth. Chemical fertilizers used by farmers also add nutrients to the soil, which drain into rivers and seas and add to the fertilizing effect of the sewage. Together, sewage and fertilizers can cause a massive increase in the growth of algae or plankton that facilitate huge areas of oceans, lakes or rivers creating a condition known as a ~~algae~~ bloom thereby reducing the dissolved oxygen content of water and killing other forms of life like fish.

Industrial wastes:- Many of the industries are situated along the banks of river such as steel and paper industries for their requirement of huge amounts of water in manufacturing processes and finally their wastes containing acids, alkalies, dyes and other chemicals are dumped and poured down into rivers as effluents. chemical industries concerning with manufacture of Aluminium release

large amount of fluoride through their emissions to air and effluents to water bodies. Fertilizer industries generate huge amount of ammonia whereas steel plants generate cyanide. chromium salts are used in industrial process for the production of sodium dichromate and other compounds containing chromium. All such discharges finally arrive at water bodies in the form of effluents affecting human health and the organism living there.

Agro-chemical wastes:- In the agricultural sector, water and electricity for irrigation are subsidized for political reasons. This leads to wasteful flood irrigation rather than adoption of more optimal practices also do not necessarily encourage the judicious use of water. Agro-chemical wastes include fertilizers, Pesticides which may be herbicides and insecticides widely used in crop fields to enhance productivity. Some of pesticides are: DDT, Aldrin, Dieldrin, malathion, Hexachloro Benzene etc. Pesticides reach water bodies through surface run off from agricultural fields, drifting from spraying, washing down

Cause of water pollution



of precipitation and direct dusting and spraying of pesticides in low flying areas polluting the water quality. Most of them are non-biodegradable and persistent in the environment for long period of time. These chemicals may reach humans through food chain leading to biomagnification.

Thermal pollution:- changes in water temperature adversely affect water quality and aquatic biota. Majority of the thermal pollution in water is caused due to human activities. Some of the important source of thermal pollution are nuclear power and electric power plant, boiler from industries which release large amount of heat to the water bodies leading to change in the physical, chemical and biological characteristics of the receiving water bodies. High temperature declines the oxygen content of water.

Ans

Oil Spillage:- oil discharges into the surface of sea by way of accident or leakage from cargo tankers carrying petrol, diesel and their derivatives pollute sea water to a great extent. Exploration of oil from offshore also lead to oil pollution in water. The residual oil spreads over the water surface forming a thin layer of water-in-oil emulsion.

Acid rain pollution:- water pollution that alerts a plant's surrounding pH level, such as due to acid rain, can harm or kill the plant. Atmospheric sulfur dioxide emitted from natural and human-made source like volcanic activity and burning fossil fuels interact with atmospheric chemicals, including hydrogen and oxygen, to form sulfuric and nitric acids in the air. These acids fall down to earth through precipitation in the form of rain or snow. Once acid rain reaches the ground, it flows into waterways that carry its acidic compounds onto water bodies. Acid rain that collects in aquatic environments lowers water pH levels and affects the aquatic biota.

Radioactive waste:-

Radioactive pollution is caused by the presence of radioactive materials in water. They are classified as small does which temporary simulate the metabolism and large does which gradually damage the organism causing genetic mutation.

Source may be from radioactive sediment, waters used in nuclear atomic plants, radioactive minerals exploitation, nuclear power plants and use of radioisotopes in medical and research purpose.

climate change:-

Global warming has also an impact on water resources through enhanced evaporation, geographical changes in precipitation intensity, duration and frequency, and severity of droughts and floods. Relatively small climate changes can have huge impact on water resources, particularly in arid and semi-arid regions such as North-west India. This will have impacts on agriculture, drinking water and on generation of hydroelectric power, resulting in limited

water supply and land degradation. Apart from monsoon rains, India uses perennial rivers which originate in the Hindu Kush and Himalayan ranges and depend on glacial melt waters. Since the melting season coincides with the summer monsoon season, any intensification of the monsoon is likely to contribute to flood disaster in the Himalayan catchment. Rising temperature will also contribute to a rise in the snowline, reducing the capacity of these natural reservoirs, and increasing the risk of flash floods during the wet season. Increase in temperatures can lead to increased eutrophication in wetlands and fresh water supplies.

The disruption of sediments:- construction of dams for hydroelectric power or water can reduce the sediment flow affecting adversely the formation of beaches ~~and~~ increase coastal erosion and reduces the flow of nutrients from rivers into seas. During construction

work, soil, rock and other fine powders sometimes enter nearby rivers in large quantities, causing water to become turbid. The extra sediment can block the gills of fish, causing them suffocation.

Effect of water pollution:- Polluted water has effects on both human and aquatic life.

1. Effect of water pollution on human health
chemicals in water that affect human health:-
some of the chemicals affecting human health are the presence of heavy metals such as Fluoride, arsenic, lead, cadmium mercury, pesticides and nitrates. Fluoride in water is essential for protection against dental carries and weakening of the bones. Arsenic is highly dangerous for human health causing respiratory cancer, arsenic skin lesion from contaminated drinking water in some districts of west Bengal. long exposure leads to



Effects of water pollution

bladders and lungs cancer. Lead is contaminated in the drinking water source from pipes, fitting, solder, household Plumbing systems. child and pregnant women are mostly prone to lead exposure. Mercury is used in industries such as smelters, manufactures of batteries, thermometers, pesticides, fungicides etc. The best known example of mercury pollution in the oceans took place in 1958 when a Japanese factory discharged a significant amount of mercury into Minamata Bay by contaminating the fish stocks there. It took several years to show its effects. By that time, many local people had eaten the fish and around 2000 were poisoned, hundreds of people were left dead and disabled and the cause for death was named as "Minamata disease" due to consumption of fish containing methyl mercury. It causes chromosomal aberrations and neurological damages to human. Mercury shows biological magnification in aquatic ecosystem. Cadmium reaches human body through food crop from soil irrigated by affected effluents. Friberg et. al (1974) noted that long term

consumption of rice from affected fields by the people living in areas contaminated by cadmium in regions of Japan, resulted into many renal diseases like "itai-itai disease", nephritis and nephrosis.

water borne disease:- Microorganisms play a major role in water quality and the microorganisms that are concerned with water borne disease are salmonella sp., shigella sp., Escherichia coli and vibrio cholera. All these cause typhoid fever, diarrhoea, dysentery, gastroenteritis and cholera. The most dangerous form of water pollution occurs when faeces enter the water supply. Many diseases are perpetuated by the faecal-oral route of transmission in which the pathogens are shed only human faeces. Children are generally more vulnerable to intestinal pathogens and it has been reported that about 1.1 million children die every year due to diarrhoeal diseases.

2. Effect of water pollution on plants

The following are the effects of water pollution on plants:-

1. Effects of acid deposition: Many of the gases from acid, aerosols and other acidic substances released into the atmosphere from industrial or domestic sources of combustion from fossil fuels finally fall down to ground and reach the water bodies along with run-off rainwater from polluted soil surfaces thereby causing acidification of water bodies by lowering its pH.

In many countries chemical substances like sulphates, nitrates and chloride have been reported to make water bodies such as lakes, river and ponds acidic.

2. Effects of oil spillage:- oil pollution due to spillage of oil tankers and storage containers prevents oxygenation of water and depletes the oxygen content of the water body by reducing light transmission inhibiting the growth of planktons and

photosynthesis in macrophytes.

3. Effects of Industrial wastes:- Effluents

from industries contain various organic and inorganic waste products. Fly ash form thick floating over the water thereby reducing the penetration of light into deeper layers of water bodies. Fly ash increase the alkalinity of water and cause reduced uptake of essential bases leading to death of aquatic plants. Liquid organic effluents change the pH of water and the specific toxicity effects on the aquatic plants vary depending on their chemical composition.

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Teacher's signature

Ankush Bhattacharya

student's signature

THE END

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE: Pond Ecosystem &
Food Chain

NAME : Ankita Banerjee
COLLEGE ROLL NO : ENVG/088/19
DEPARTMENT : Eng Lit.
YEAR : 2020
SIGNATURE : Ankita Banerjee

Ecosystem:-

An ecosystem can be visualized as a functional unit of nature, where living organisms interact among themselves and also with the surrounding physical environment. Ecosystem varies greatly in size from a small pond to a large forest or a global ecosystem, and a combination of all local ecosystems on Earth. There are two types of ecosystems - terrestrial and aquatic. We need to further look at the structure of the ecosystem.

Structure :-

The components involved in the various components - abiotic, biotic. Interaction of biotic and abiotic components is called structure of a ecosystem. A characteristic for each type of ecosystem. Identification and classification of plant and animal species of an ecosystem gives the different levels is called differentiation.

The components of the ecosystem are vital to function as a unit. When you consider the following aspects:-

- ① Productivity
- ② Decomposition
- ③ Energy flow
- ④ Nutrient cycling

A properties of many physical and chemical factors influence directly and indirectly the productivity of forest. The effect of physical forces like light and heat is of great significance. Chemical properties of water not only affect physical properties of the medium but also have a significant

Pond Ecosystem:-

A pond ecosystem refers to the freshwater ecosystem where the living organisms depend on each other and the prevailing water environment for their nutrients and survival. Ponds are shallow water bodies with a depth of 12 - 15 feet in which the sun rays can penetrate the bottom permitting the growth of plants.

Pond and lake are fresh water ecosystems of the water, there are two main components -

④ Abiotic Components:-

Abiotic components of pond consists of water, dissolved minerals, oxygen and carbon dioxide. Solar radiation are the main source of energy.

⑤ Biotic Components:-

Biotic components are most important of all. It refers to - ① Producers, ② Consumers, ③ Decomposers and Transformers.

On the basis of water depth and types of vegetation and animals there are three zones in a lake or pond littoral,

limnetic and benthic. The littoral zone is the shallow water region which is usually occupied by rooted plants. The limnetic-zone ranges from the shallow to the depth of effect light penetration and associated organisms are small crustaceans, molluscs, insects, and their larvae and algae.

• Producers :-

The main producers in pond or lake ecosystem are algae and other aquatic plants such as Azolla, Hydrilla, Potamogeton, Pista, Wolffia, Lemna, Eichornia, Nymphaea etc.

These are either floating on surface or rooted at the bottom. The green plants convert the form of food is utilized by all the organisms. O₂ evolved by producers in photosynthesis is utilized by all the living organisms in respiration.

• Consumers :-

In a pond, the primary consumers are hoofed vertebrates of frogs, fishes and other aquatic animals which consume green plants and algae as food. These birds herbivorous are secondary consumers. In pond, besides the secondary consumers, there are consumers of higher order.

• Decomposers & Transformers :-

When aquatic plants and animals die, a large number of bacteria and fungi attack their dead bodies and convert the complex organic substances into simpler inorganic compounds and elements. These micro-organisms are called decomposers. Chemical elements liberated by decomposers are again utilized by green plants in their nutrients.

• Food Chain :-

The transfer of food energy from producers to a series of consumers through different trophic level in an ecosystem, is known as food-chain.

• Characteristics of Food Chain :-

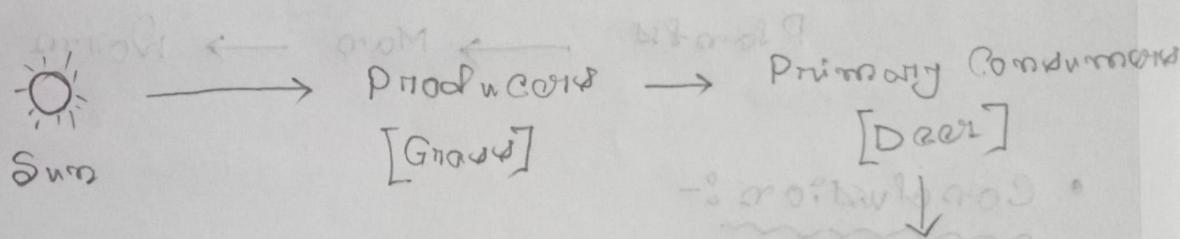
- ① Green plants are the producer of food chain
- ② Producer lies at the base of each food chain
- ③ Nature of food chain is very much complicated
- ④ In a food chain, from base after the number decreases, but the size increases.
- ⑤ The number of steps in a food chain is always restricted
- ⑥ The shorter the chain, the more effective it is. Longer number of steps results in loss of energy and makes the chain unstable.

• Types of Food Chain :-

Types of three types of Food Chain - ① Grazing food chain, ② Detritus food chain, ③ Parasitic food chain.

Grazing Food Chain :-

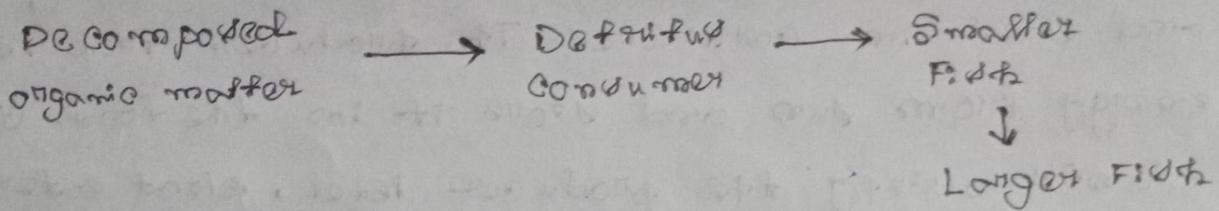
The Grazing food chain starts from the green plants, passes through plant eating animal and ends in carnivores. The producers trap the solar energy from sun and store it in the food. Green plants occupy the producer level, plant eaters from the level of primary consumers, the carnivores that feed on herbivores, occupy the secondary consumers level. Thus a typical food chain is formed.



Detritus Food Chain :-

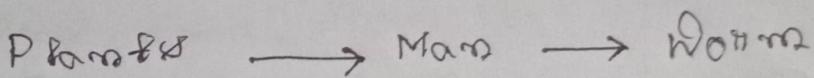
Detritus means the organic debris from decomposing plants and animals. In this type of chain the dead organic matters are acted. Such decomposed organic matters are again eaten by some aquatic animals e.g. snail etc. Such aquatic animals which directly feed on organic matter are called detritus consumers. Detritus are consumed

by smaller consumers which in turn are preyed upon by larger consumers.



Parasitic Food Chain :-

It goes from larger to smaller animals.



Conclusion :-

A food chain is a linear feeding relationship, an organism at one trophic level eats an organism at the level below it. A food web is more natural representation than a food chain due to interconnecting food chains.

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

Nitrogen cycle and its importance for living beings

NAME : ARGHADEEP FADIKAR

COLLEGE ROLL NO : STUGI/237/19

DEPARTMENT : STATISTICS

YEAR : 2020

SIGNATURE : Anghadeep Fadikar.

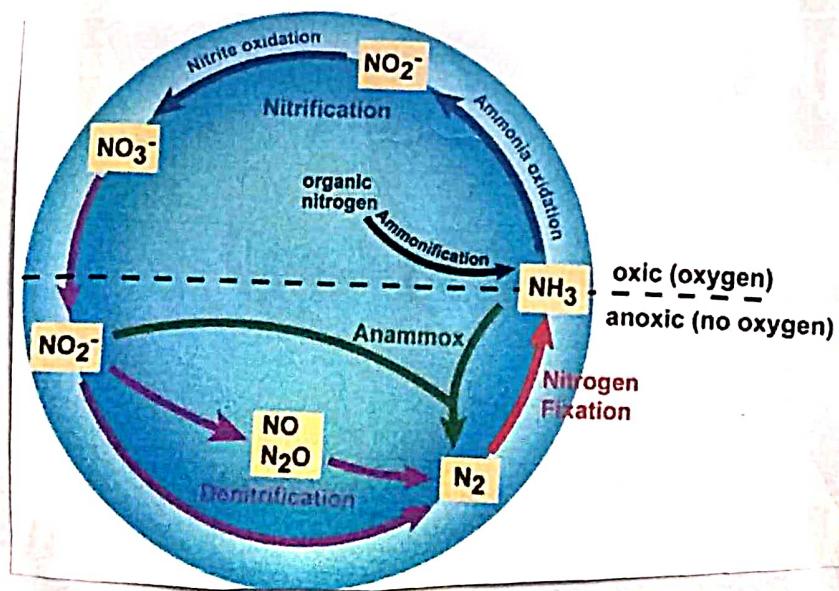
Acknowledgement

In the completion of this project successfully many people supported me. I would like to thank our environmental science teacher Sourik Bhattacharya for helping me in enrichment of knowledge about nitrogen cycle. I would also like to thank my friends, classmates and relatives for supporting me while doing this project.

[Introduction]

Nitrogen is one of the primary nutrients crucial 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 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 inorganic (ammonia, nitrate) and organic (ammonium, and nucleic acids) forms. Thus, nitrogen undergoes many different transformations in the ecosystem, changing from one form to another as organisms use it for growth and in some cases, energy. The major transformations of nitrogen are nitrogen fixation, nitrification, denitrification, anammox and ammonification.

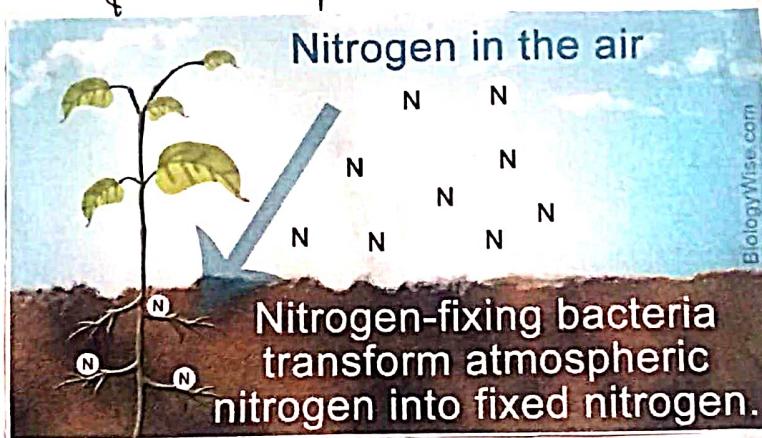


ammonification. The transformation of nitrogen into its many oxidation

nitrogen 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.

Stages of Nitrogen Cycle:

[Nitrogen Fixation] Nitrogen gas (N_2) makes up nearly 80% of the earth's atmosphere, yet nitrogen is often the nutrient that limits primary production in many ecosystems. Why is this so? Because plants and animals are not able to use nitrogen gas in that form. For nitrogen to be available to make proteins, DNA, and other biologically important compounds, 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 gas is a very stable compound due to the strength



the triple bond between the nitrogen atoms and it requires a large amount of energy to break the bond. This whole process requires a large amount energy and 8 electrons and at least 16 ATP molecules. As a result, only a select group of prokaryotes are able to carry out this energetically demanding process. Although most nitrogen fixation is carried out by lighting on certain

industrial processes, including the combustion of fossil fuels.



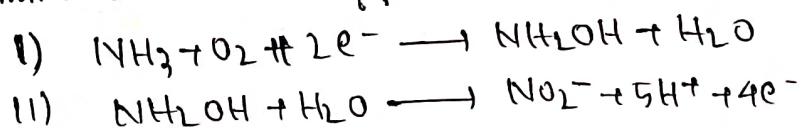
Some nitrogen fixing organisms are free-living while others are symbiotic nitrogen fixers, which require a close association with a host to carry out the association are very specific and have complex mechanisms that help to maintain the symbiosis. For example, root exudates from legume plants (e.g. pea, clover, soybean) serve as a signal to certain species of Rhizobium, which are nitrogen fixing bacteria. This signal attracts the bacteria to the roots and a very complex series of events then occur to induce uptake of the bacteria into the root and trigger the process of nitrogen fixation in nodules that form on the roots.



Some of these bacteria are aerobic, others are anaerobic, some are phototrophic, others are chemotrophic. 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 N_2 to NH_3 , which can be used as a genetic marker to identify the potential for nitrogen fixation. One of the characteristics of nitrogenase is that the enzyme complex is very sensitive to oxygen and is deactivated in its presence. This presents an interesting dilemma for aerobic nitrogen-fixers have evolved different ways to protect their

hydrogenase from oxygen. For example, some cyanobacteria have structures called heterocysts that provide a low oxygen environment for the enzyme and serve as the site where all nitrogen fixation occurs in these organisms. Other photosynthetic are dormant and are not producing oxygen.

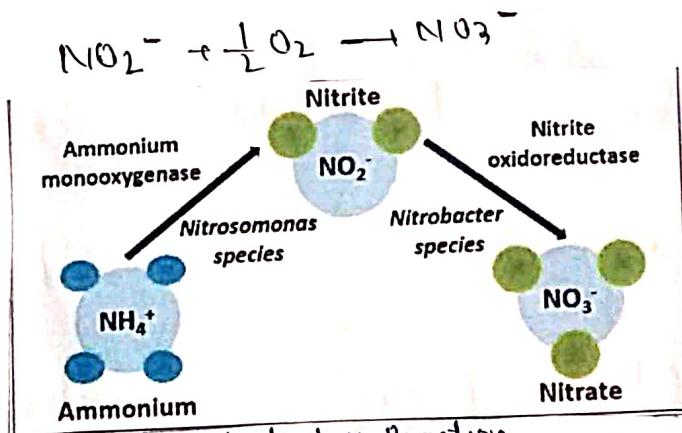
Nitrification Nitrification is the process that converts ammonia to nitrite and then to nitrate and is another important step in the global nitrogen cycle. Most nitrification occurs aerobically and is carried out exclusively by prokaryotes. There are two distinct steps of nitrification that are carried out by distinct types of microorganisms. The first step is the oxidation of ammonia to nitrite, which is carried out by microbes known as ammonia-oxidizers. Aerobic ammonia oxidizers convert ammonia to nitrite via the intermediate hydroxylamine, a process that requires two different enzymes, ammonia monooxygenase and hydroxylamine oxidoreductase. The process generates a very small amount of energy relative to many other types of metabolism; as a result, nitrifiers are notoriously very slow growers. Additionally, aerobic ammonia oxidizers are also autotrophs, fixing CO₂ to produce organic carbon, much like photosynthetic organisms, but using ammonia as the energy source instead of light.



Unlike nitrogen fixation that 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 was carried out by only a

few types of bacteria in the genera *Nitrosomonas*, *Nitropumtua*, *Nitrosooccus*. However in 2005 an archaeon was discovered that could also oxidize ammonia. Since their discovery, ammonia oxidizing Archaea have often been found to outnumber the ammonia oxidizing bacteria in many habitats.

The second step in nitrification is the oxidation of nitrite (NO_2^-) to nitrate (NO_3^-). This step is carried out by a completely separate group of prokaryotes, known as nitrite oxidizing bacteria. Some of the genera involved in nitrite oxidation include *Nitropumtua*, *Nitrobacter*, *Nitrococcus*, and *Nitronaphtha*. Similar to ammonia oxidizers, the energy generated from the oxidation of nitrite to nitrate is very small and thus growth yields are very low. In fact ammonia and other nitrite-oxidizers must oxidize many molecules of ammonia or nitrite in order to fix a single molecule of CO_2 . For complete nitrification, both ammonia oxidation and nitrite oxidation must occur.

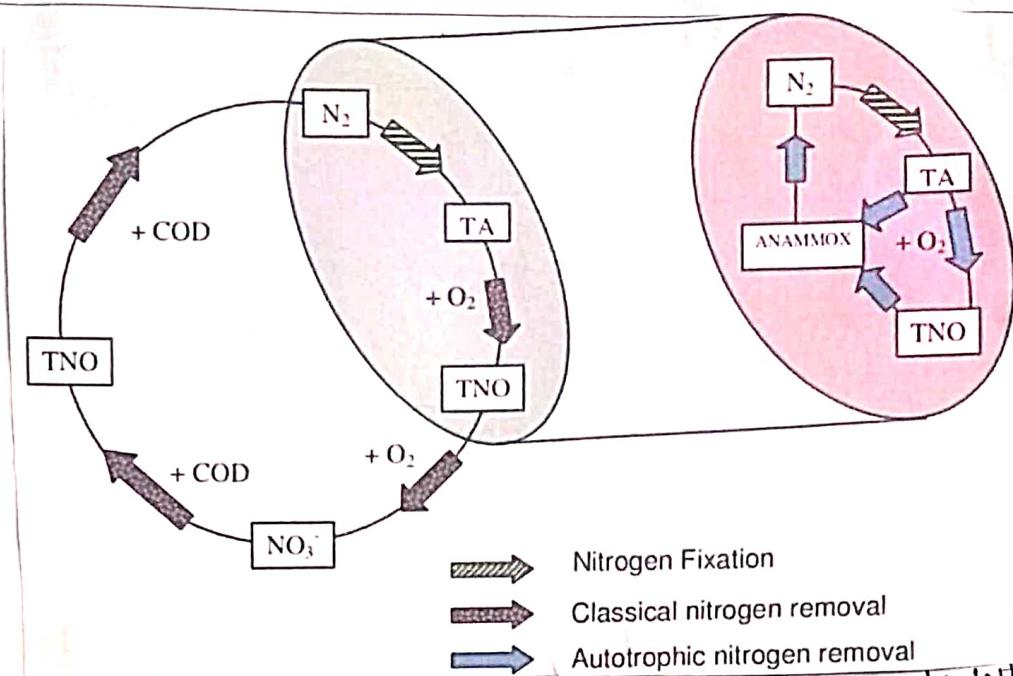


Ammonia-oxidizers and nitrite-oxidizers are ubiquitous in aerobic environments. They have been extensively studied in natural environments. However, ammonia and nitrite oxidizers also play a very important role in wastewater treatment facilities by

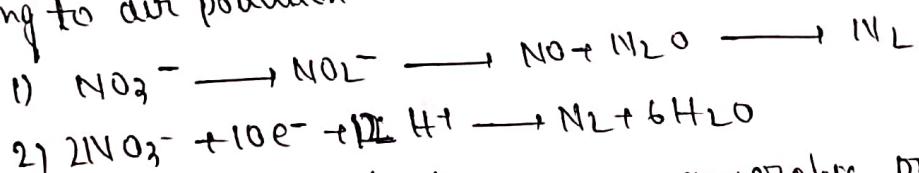
removing potentially harmful levels of ammonium that could lead to the pollution of receiving waters. Much research has focused on how to maintain stable population of these important microorganisms in wastewater treatment plants. Additionally, ammonia and nitrate oxidizers help to maintain healthy aquaria facilitating the potentially toxic ammonium excreted in fish urine.

Anammox Traditionally, all nitrification was thought to be carried out under aerobic conditions but recently a new type of ammonia oxidation occurring under anoxic conditions was discovered. Anammox (anaerobic ammonia oxidation) is carried out by prokaryotes belonging to the Planctomycetes phylum of Bacteria. The first described anammox bacterium was Brocadia anammoxidans. Anammox bacteria were first discovered in anoxic bio reactors of wastewater treatment plants but have since been found in a variety of aquatic systems, including low oxygen zones of the ocean, coastal and estuarine sediments, mangroves and freshwater lakes. In some areas of oceans the Anammox process is considered to be responsible for a significant loss of nitrogen. Whether anammox or denitrification is responsible for most nitrogen loss in the ocean, it is clear that anammox represents an important process, the global nitrogen cycle.





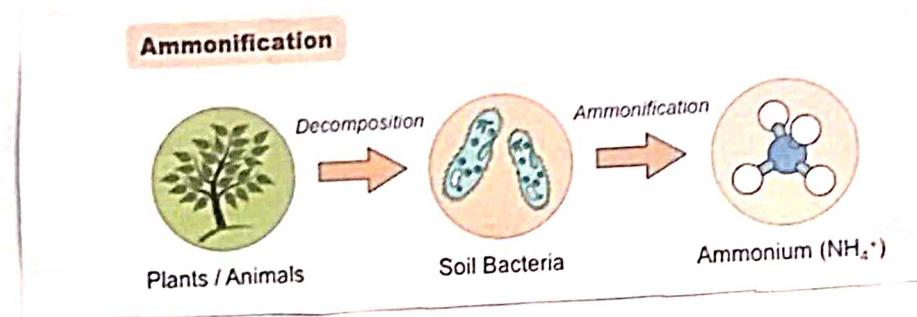
[Denzification]: Denitrification is the process that converts nitrate to nitrogen gas, thus removing bioavailable nitrogen and returning it to the atmosphere. Dinitrogen gas (N₂) is the ultimate end product of denitrification, but other intermediate gaseous forms of nitrogen exist. Some of these gases, such as N₂O, are considered greenhouse gases, reacting with ozone and contributing to air pollution.



Unlike nitrification, denitrification is an anaerobic process, occurring mostly in soils and sediments and anoxic zones in lakes and oceans. Similar to nitrogen fixation, denitrification is carried out by a diverse group of prokaryotes, and there is recent evidence that some eukaryotes are also capable of denitrification. Some denitrifying bacteria include species in the genera *Bacillus*, *Paracoccus*, and *Pseudomonas*. Denitrifiers are chemoorganotrophs and must also be supplied with some form of organic carbon.

Ammonification :-

When an organism excretes waste or dies, the nitrogen in the form is in the form of organic nitrogen. Various fungi and prokaryotes then decompose the tissue and release inorganic nitrogen back into the ecosystem as ammonia in the process known as ammonification. The ammonia then becomes available for uptake by plants and other microorganisms for growth.

Importance of Nitrogen cycle For living beings :

Importance of nitrogen cycle are as follows:

- ① Helps plants to synthesize chlorophyll from nitrogen compounds
- ② Helps in converting inert nitrogen gas into a usable form for the plants through the biochemical process.
- ③ In the process of ammonification, the bacteria help in decomposing the animal and plant matter which indirectly helps to clean up the environment.
- ④ Nitrates and nitrites are released into the soil which helps in decomposing the animal and plant matter and also help in enriching the soil with necessary nutrients required for cultivation
- ⑤ Nitrogen is an integral component of the cell and it forms

many crucial compounds and important biomolecules.

⑥ Nitrogen is abundant in the atmosphere but it is unusable to plants or animals unless it converted into nitrogen compounds.

⑦ The plants absorb the usable nitrogen compounds from the soil through their roots. Then these nitrogen compounds are used for the production of proteins and other compounds in the cell.

⑧ This cycle maintains the percentage of nitrogen in the atmosphere.

Bibliography I have taken help from the following websites for my knowledge about nitrogen cycle. and now I am excited to write:

- ① <https://www.nature.com/scitable/knowledge/library/the-nitrogen-cycle-processes-players-and-human-15644632>
- ② https://en.wikipedia.org/wiki/Nitrogen_cycle.

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

Nitrogen Cycle &

its importance for living beings

NAME : ARIJIT DEY
COLLEGE ROLL NO : STUG/217/19
DEPARTMENT : STATISTICS
YEAR : 2020
SIGNATURE : Arijit Dey

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I would also like to extend my gratitude to the Principal Maharaj Swami Shastrajnanandaji and our Vice Principal Maharaj Swami Krishnanathanandaji.

Nitrogen Cycle & its importance for living beings

→ What is Nitrogen Cycle?

① Definition:

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

② Overview:

Nitrogen cycle is a process through which nitrogen is converted into many forms, consecutively passing from the atmosphere to the soil to organism and back to the atmosphere.

It involves several processes such as nitrogen fixation, nitrification, de-nitrification, decay and putrefaction.

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

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

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

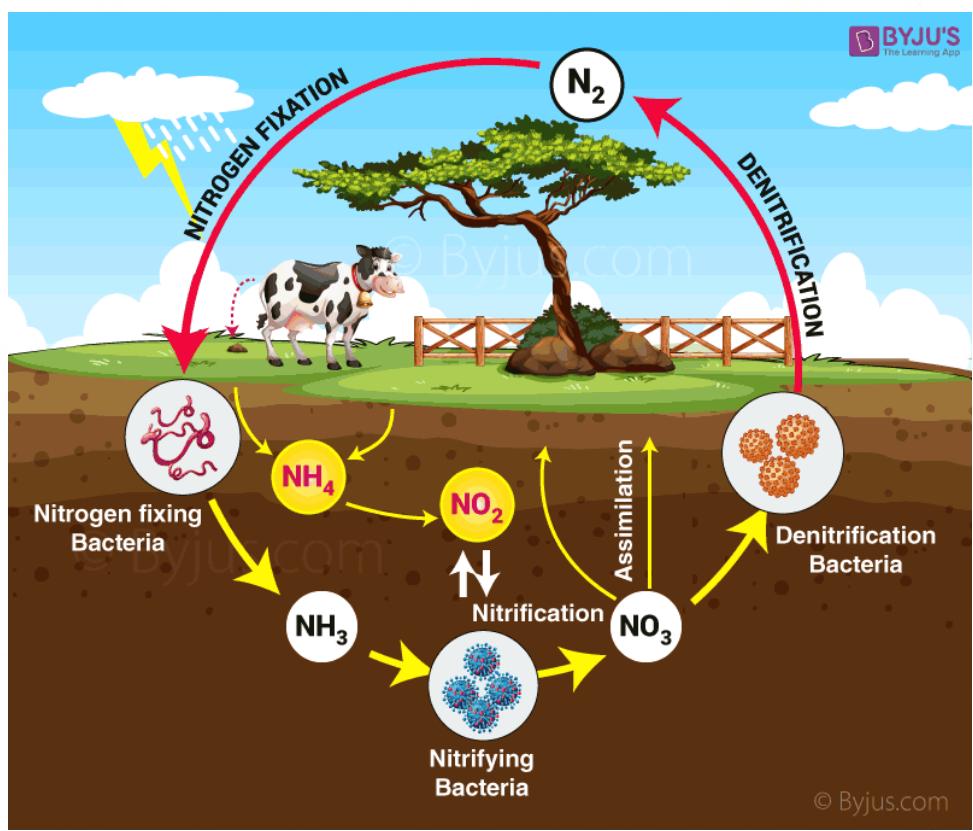


Fig. 1 : Diagrammatic representation of Nitrogen cycle.



Stages of Nitrogen Cycle :

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

➤ NITROGEN FIXATION :

It is the initial step of nitrogen cycle. Here atmospheric nitrogen (N_2) which is primarily available in an inert form is converted into usable form Ammonia (NH_3).

During the process of nitrogen fixation, the inert form of nitrogen gas is deposited into soils from the atmosphere.

Later, the nitrogen undergoes a set of changes, in which two Nitrogen atoms get separated and combine with hydrogen to form Ammonia (NH_4^+)

Nitrogen fixation ($N_2 \rightarrow 2NH_3$)

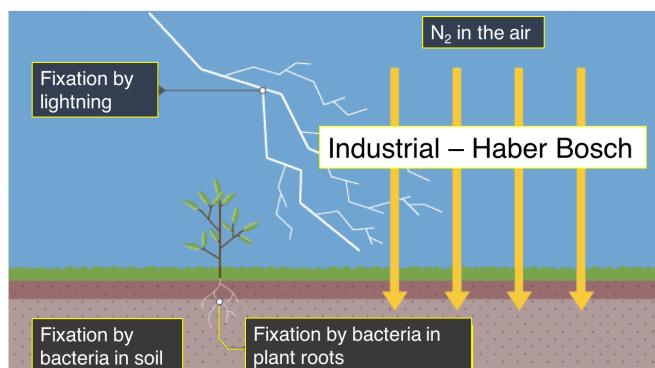


Fig:2 : Nitrogen fixation

The entire process of nitrogen fixation is completed by symbiotic

bacteria which are known as diazotrophs. Azetobacter and Rhizobium also have a major role in this process. These bacteria consists of a nitrogenase enzyme which has the capability to combine gaseous Hydrogen to Nitrogen to form Ammonia.

Nitrogen fixation can occur either by Atmospheric fixation - which involves lightning or by industrial fixation by manufacturing ammonia under high temperature and pressure condition. This can also be fixed through man-made process, primarily through industrial processes that creates ammonia and nitrogen-rich fertilizers.

Types of Nitrogen fixation:-

a) Atmospheric fixation: A natural phenomenon where the energy of lightning breaks intro nitrogen di-oxide and them used by plants.

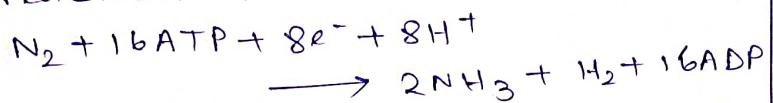
b) Industrial nitrogen fixation:

It is a man-made alternative that aids in nitrogen fixation by the use of ammonia. It is produced by direct combination of Nitrogen and Hydrogen and later, it is converted into various fertilisers such as Urea.

c) Biological Nitrogen fixing :-

We already know that nitrogen is not directly usable from that air for plants and animals.

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. The overall reaction for BNF is:



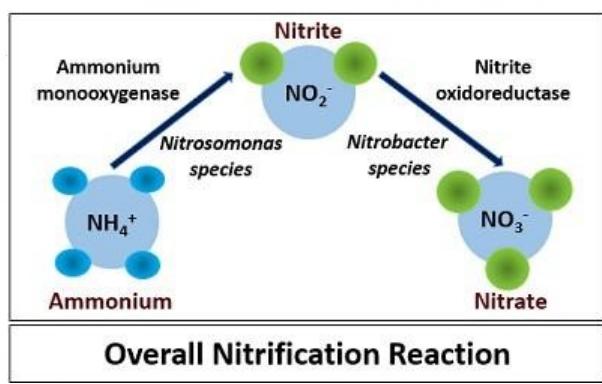
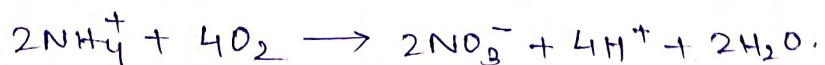
➤ NITRIFICATION :

In this process, the ammonia is converted into nitrate by the presence of bacteria in soil. Nitrite are formed by oxidation of Ammonia with the help of Nitrosomonas bacterium species. Later the produced nitrites are converted into

Nitrates by Nitrobacteria.

This conversion is very important as Ammonia gas is toxic for plants.

The reaction involved in this process is as follows —



Overall Nitrification Reaction

Fig:3 : Nitrification.

➤ 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 or ammonium ions and used in the formation of the plant and animal proteins. This way it enters the food web when primary consumers eat that plant.

➤ AMMONIFICATION :

When plants or animals die, the nitrogen present in the organic matter released back into the soil. The decomposers, namely bacteria or fungi, present in the soil, convert the organic matter back into ammonium. This process of decomposition produces Ammonia, which is further used for other bio-logical processes.

➤ DE-NITRIFICATION :

De-nitrification is the process in which the nitrogen compounds makes its way back into the atmosphere by converting nitrate (NO_3^-) into gaseous nitrogen (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 — Clostridium

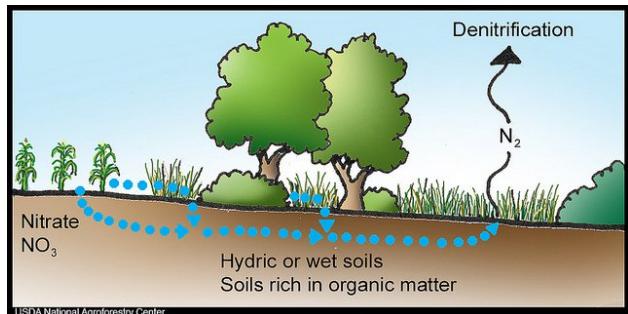
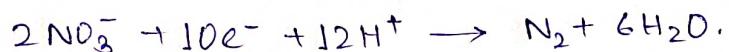


Fig:4 : De-nitrification

and Pseudomonas, which will process nitrate to gain oxygen and gives out free nitrogen gas as a by-product. The complete de-nitrification process can be expressed as a redox reaction:



→ Importance of Nitrogen Cycle :

Importance of Nitrogen cycle is as follows :

- ① Helps plants to synthesise chlorophyll from the nitrogen compounds.
- ② Helps in converting inert Nitrogen gas into a usable form for the plants through bio-chemical process.
- ③ In the process of ammonification, the bacteria help in decomposing the

animal and plant matter which indirectly helps to clean up the environment.

(4.) Nitrates and Nitrites are released into soil which helps in enriching the soil with necessary nutrients required for cultivation.

(5.) Nitrogen is a integral component of a cell and it forms many crucial compounds and many important bio-molecules.

(6.) Helps bring in the inert Nitrogen from the air into the biochemical process in plants and then to animals.

(7.) During the process of ammonification, the environment is cleared of garbage.

(8.) As plants use Nitrogen for their biochemical process, animals obtain the nitrogen and nitrogen compounds from plants. Nitrogen is needed as is an integral part of cell composition. It is due to the nitrogen cycle that animals are able to utilize the nitrogen that are present in our atmosphere in such a huge amount.

⇒ Conclusion :

- a) Nitrogen is abundant in the atmosphere but it is unusable to plants or animals unless it is converted into nitrogen compounds.
- b) Nitrogen-fixing bacteria play a crucial role in fixing the atmospheric nitrogen into nitrogen compounds that can be used by plants.
- c) The plants absorb the usable nitrogen compounds from the soil through their roots. Then these nitrogen compounds are used for production of proteins and other compounds in cell.
- d) Some bacteria then convert the nitrogenous compounds in the soil into nitrogen gas. It goes back to the atmosphere.
- e) These sets of processes repeat continuously and thus maintain the percentage of nitrogen in the atmosphere.

Bibliography

I have taken help from the following websites for my knowledge about Nitrogen Cycle and some associated pictures.

- www.google.com
- www.wikipedia.com
- www.byjus.com

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE: NITROGEN CYCLE AND ITS
IMPORTANCE

NAME : ARIJIT LAHIRI

COLLEGE ROLL NO : ENUG/186/19

DEPARTMENT : ENGLISH

YEAR : 2020

SIGNATURE : *Arijit Lahiri*

Nitrogen Cycle is a biochemical process through which nitrogen is converted into many forms, ~~consequently~~ ^{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 pass 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 symbiotic bacteria which can convert the inert nitrogen into usable form such as nitrates and nitrites and nitrates. Nitrogen undergoes various types of transformation to maintain a balance in the ecosystem. Further, this process extends to various biomes, with the marine nitrogen cycle being one of the most complicated biochemical cycles.

There are various stages of nitrogen cycle consisting of the following steps:- i) Nitrogen fixation, ii) Nitrification, iii) Assimilation iv) Ammonification, v) Denitrification. The process takes place in several stages as 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 B-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 consists of a nitrogenase enzyme which has the capability to combine gaseous nitrogen with hydrogen to form ammonia. Nitrogen fixation can occur either by the atmospheric fixation which involved lightning or industrial fixation by manufacturing ammonia under high temperature and pressure condition. This can also be fixed through man-made processes primarily industrial processes that create ammonia and nitrogen rich fertilizers.

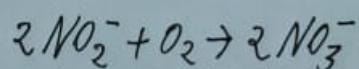
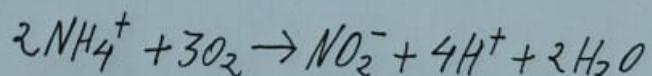
Types of Nitrogen Fixation:-

- 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: It 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 fertilizers such as urea.
- 3) Biological nitrogen fixation: We already know that nitrogen can not be directly used from air by plants and animals. Bacteria like Rhizobium and blue-green algae transform the usable form of nitrogen into other compounds that are more readily usable. These nitrogen compounds get fixed in the soil by these microbes.

Nitrification:-

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

The reaction involved in the process is as follows:



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.

Ammonification:-

When plants or animals die, the nitrogen present in the organic matter is released back into the soil. The decomposers, namely bacteria or fungi present in the soil, convert the organic matter back into ammonium. This process of decomposition produces ammonia, which is further used for other biological processes.

Denitrification:-

Denitrification is the process in which nitrogen compounds makes its way back into the atmosphere by converting nitrate (NO_3^-) into gaseous Nitrogen (N). 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 - Clostridium and Pseudomonas, which process nitrate to gain oxygen and gives out free nitrogen gas as a by product.

Nitrogen Cycle in Marine Ecosystem:-

The process of nitrogen cycle occurs in the same manner in the marine ecosystem as in the terrestrial ecosystem. The only difference is that it is carried out by marine bacteria. The nitrogen containing compounds that fall into the ocean as sediments gets compressed over long periods and form sedimentary rocks. Due to the geological uplift, these sedimentary rocks move to land. Initially it was not known that these nitrogen-containing sedimentary rocks are an essential source of nitrogen. But recent researchers have proved that the nitrogen from these rocks is released into the plants due to the weathering of rocks.

Importance of Nitrogen Cycle :-

- i) Helps plants to synthesize chlorophyll from the nitrogen compounds.
- ii) Helps in converting inert nitrogen gas into a usable form for the plants through a biochemical process.
- iii) In the process of ammonification, the bacteria helps in enriching the soil with necessary nutrients required for cultivation or decomposing the animal and plant matter and indirectly help to clean 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.

Conclusion:-

- i) Nitrogen is abundant in the atmosphere but is unusable to plants or animals unless its converted into nitrogen compounds.
- ii) Nitrogen-fixing bacteria play an important role in fixing the atmospheric nitrogen into compounds that can be used by the plants.
- iii) During the final stages of nitrogen cycle, bacteria and fungi help decompose organic matter, where the nitrogenous compounds get dissolved into the soil which is again used by plants.
- iv) These sets of processes repeat continuously and thus maintain the percentage of nitrogen in the atmosphere.

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

AIR POLLUTION IN CITIES
AND MEASURES TO CONTROL IT

NAME : ARINDAM JANA

COLLEGE ROLL NO : ENUG/004/19

DEPARTMENT : ENGLISH

YEAR : 2020

SIGNATURE : *Arindam Jana.*

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Secondly, I would also like to thank my parents and friends who helped me a lot in finishing this project within this limited time.

I am making this project not only for marks but also to increase my knowledge.

Date: 05/11/2020

Arindam Jana
ENUG/004/19

INTRODUCTION

Human population size has grown enormously over the last hundred years. This means increase in demand for food, water, home, electricity, roads and automobiles and numerous other communities. These demands are exerting tremendous pressure on our natural resources, and are also contributing to pollution.

Pollution is any undesirable change in physical, chemical or biological characteristics of air, land, water or soil. Agents that bring about such an undesirable change are called pollutants. In order to control environmental pollution, the government of India has passed the Environment (Protection) Act, 1986 to protect and improve the quality of our environment.

In this section, we are going to discuss about air pollution, its causes and how we can control it.

AIR POLLUTION

It is the occurrence or presence of any material or gas in the air in such a concentration which is harmful to man, vegetation, animals and their environment. Substances and factors which cause air pollution are called air pollutants.

Air quality in cities is the result of a complex interaction between natural and anthropogenic environmental conditions. Air pollution in cities is a serious environmental problem - especially in the developing countries. The air pollution path of the urban atmosphere consists of emission and transmission of air pollutants resulting in ambient air pollution. Each part of the path is influenced by different factors. Emissions from motor traffic are a very important source group throughout the world. During transmission, air pollutants are dispersed, diluted and subjected to photochemical reactions. Ambient air pollution shows temporal and spatial variability. As an example of the temporal variability of urban air pollutants caused by motor traffic, typical average annual, weekly and diurnal cycles of selected NO, NO₂, O₃ and O_x are presented for an urban air quality station in Stuttgart, Southern Germany.

CAUSES

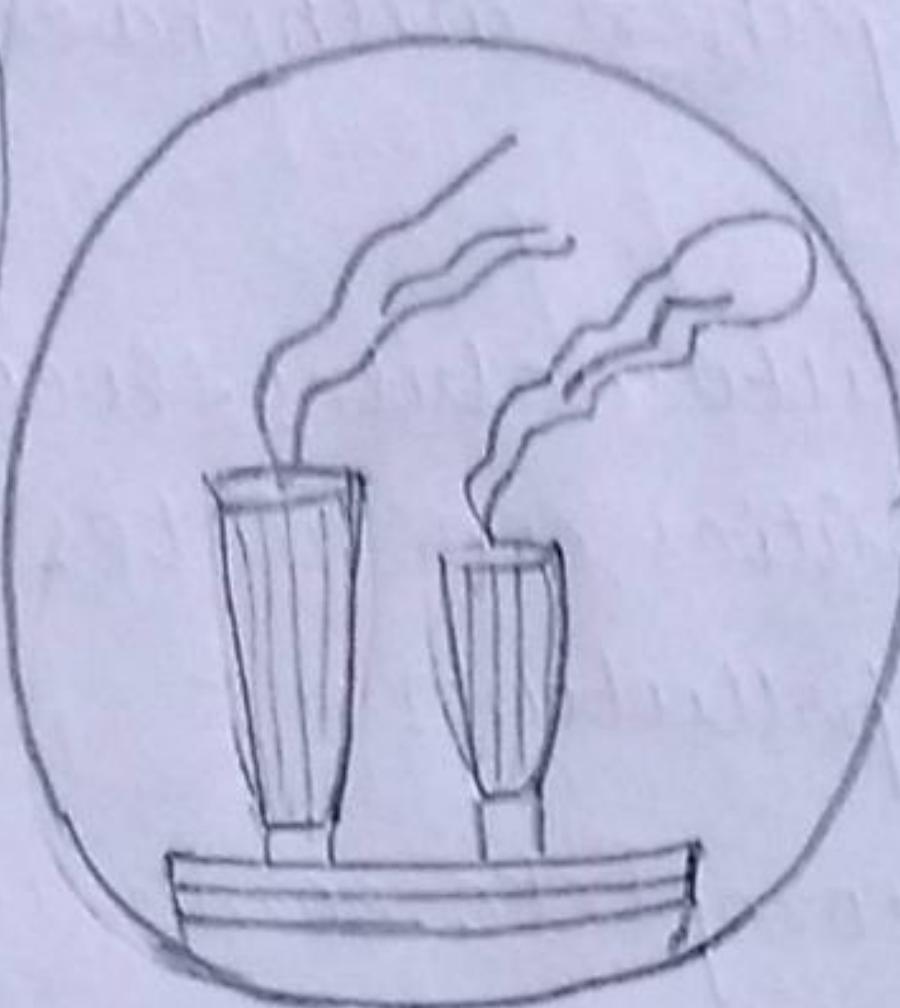
- 1) Smokestack of thermal power plants, smelters and other industries release particulate and gaseous air pollutants together with harmless gases such as N₂ and O₂.
- 2) Pollutants from automobiles, locomotives, aircrafts and exhausts in cities constitutes the major part of the total air pollution.
- 3) Incomplete and complete combustion of the carbon contents of fossil fuel wood and charcoal produce carbon monoxide and carbon dioxide along with sulphur dioxide.
- 4) Natural sources include pollen, dust and smoke (from forest fires and volcanic ash) which are emitted into the atmosphere.

We are dependent on air for our respiratory needs. Air pollutants cause injury to all living organisms. They reduce growth and yield of crops and cause premature death of plants. Air pollutants also deterioriously affect the respiratory system of humans and animals. Harmful effects depend on the concentration of pollutants, duration of exposure and the organism.



transport

PM 2.5



SOx



volcano

CO

PM 2.5



smoking

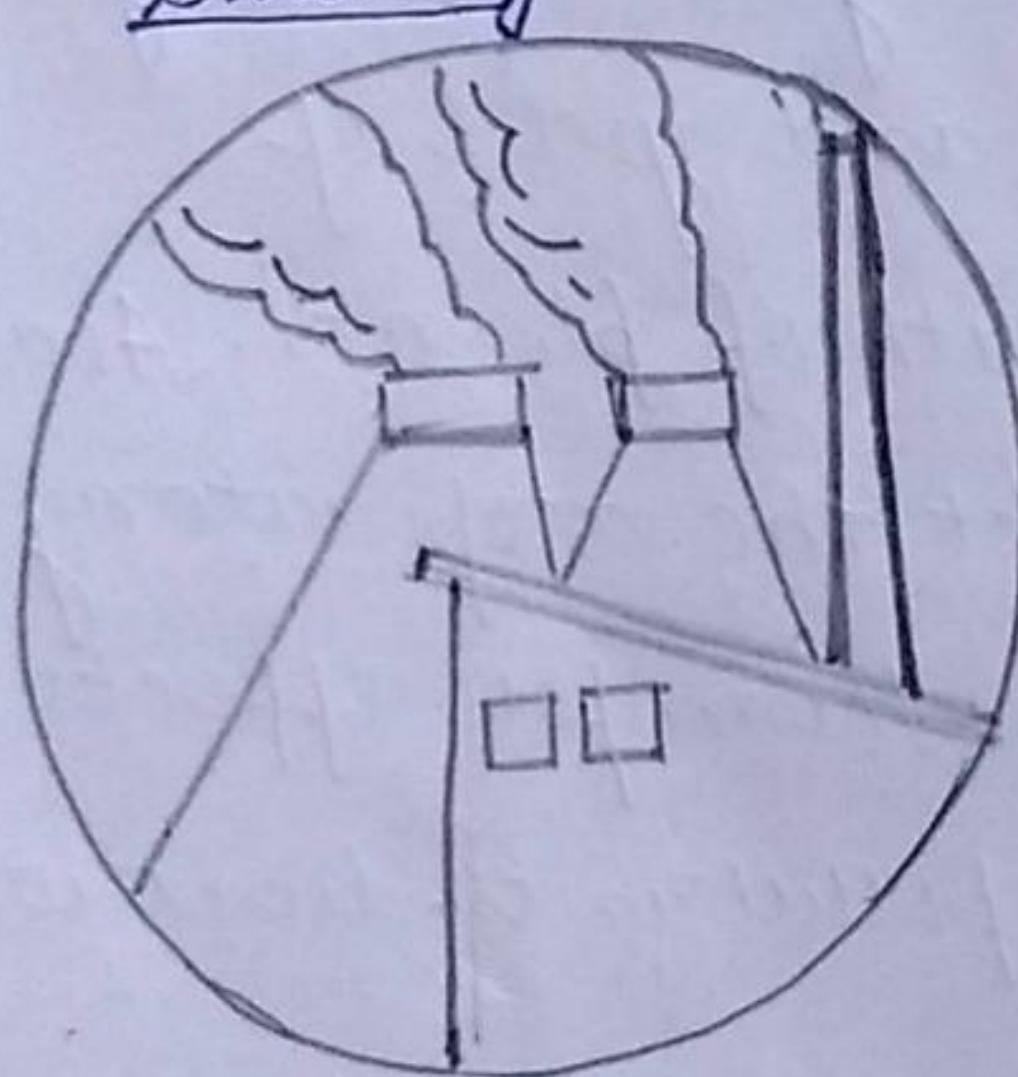


Forest fires

NOx



spray



Industries



boy wearing mask

CAUSES OF AIR POLLUTION

Common air pollutants are basically of two types i.e., gaseous materials and particulate matter.

Table: Gaseous Materials

Pollutant	Source	Effect
1) carbon monoxide (major air pollutant)	Incomplete combustion of fossil fuels in automobiles.	produces carboxy-haemoglobin which reduces O ₂ carrying capacity of the blood resulting in giddiness, decreased vision, headache etc.
2) sulphur dioxide	oil refineries smelters of ores combustion of sulphur containing fuels.	1) Inhibits ETS in plants 2) Acid rain 3) Stone cancer 4) Eye irritation 5) Respiratory problems 6) Phaeophytization in lichens. yellowing of Taj Mahal is reported to be caused by SO ₂ pollution.
3) NO _x	combustion of fossil fuels at high temperature in automobile engines.	Heart and lung problems.
4) Hydro-carbons	Incomplete combustion as unburnt discharge, newly manufactured carpet	Cancer.

Particulate matter are added into the air by industries, automobiles and by many operations like blasting, drilling, crushing, grinding, mixing etc. These pollutants may be either solid or liquid particles. It is differentiated into settleable and suspendable (Suspended) ($\leq 10\mu\text{m}$) remaining in air for weeks. Various pollutants are:

- 1) Aerosols - They are contained in the emission of Jet and supersonic aeroplanes. Refrigerators and air conditioners use aerosols as refrigerant [CF_2Cl_2 or Freon]. Aerosols are solid foam particles of plastic and fog is an aerosol of water droplets. It causes O_3 depletion.
- 2) Smoke - It evolves from burning and smouldering of organic matter. The powerstations throw out large amount of flyashes. Smog is a combination of smoke, chemical fumes and fog. It causes respiratory problems like asthma and bronchitis in humans. It also decreases visibility due to suspension of particles in air.
- 3) Dust and Mist - It is released from industries. It causes byssinosis (cotton dust), Asbestosis (Asbestos industry), Silicosis (stone grinders), Siderosis (iron mills), Pneumoconiosis (coal mines and flour mills) and Manganese poisoning (welders).
- 4) Pollen, spores, cyst, bacteria - It causes allergic reactions, emphysema, TB, lung cancer and hay fever.

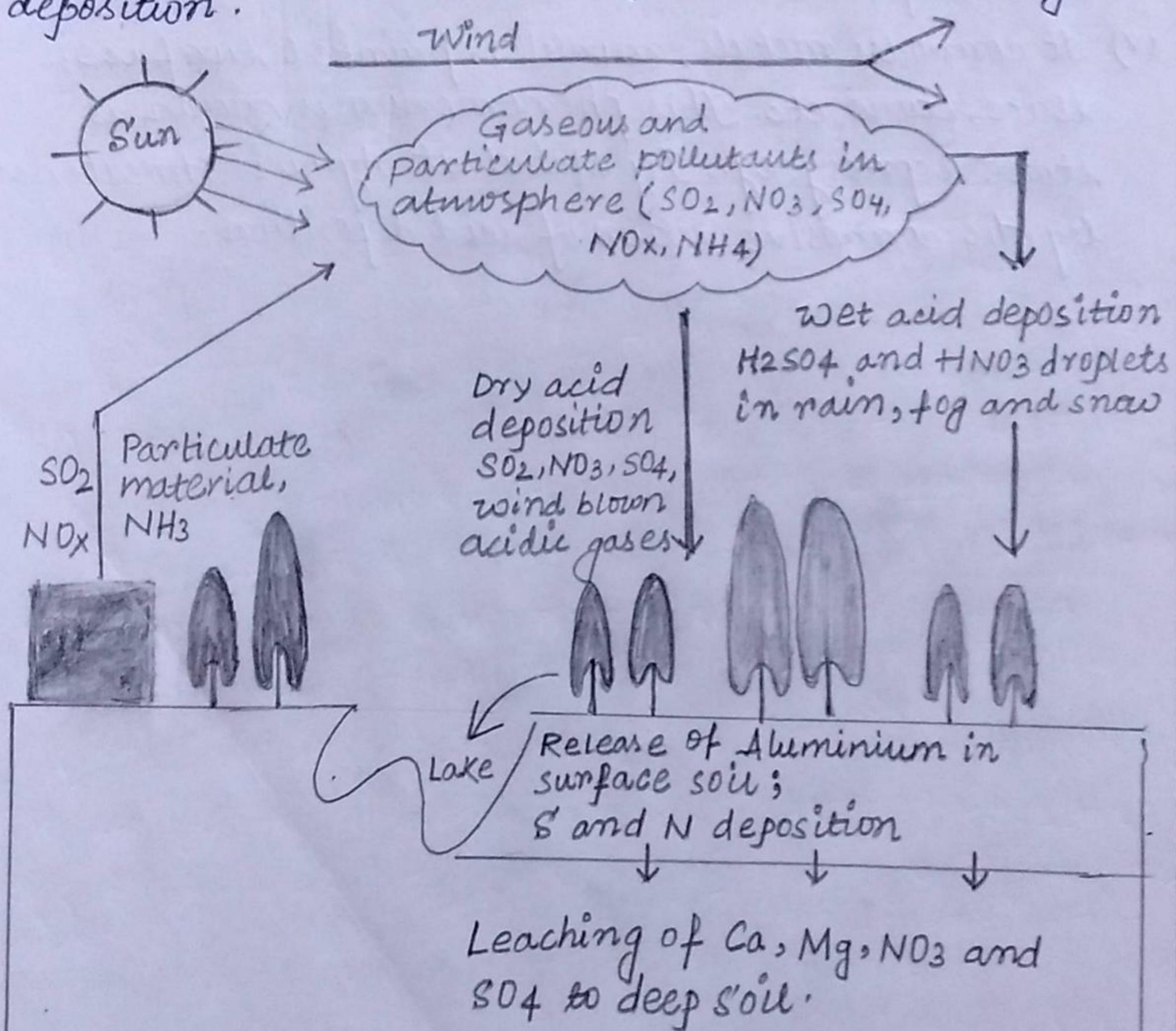
According to central Pollution control Board, particulate size $2.5\mu\text{m}$ or less in diameter are responsible for causing greatest harm to human health.

ACID RAIN (An Invisible Threat)

This term was given by Robert Angus. It is rainfall with a pH less than 5.65. It is due to oxides of sulphur and nitrogen.

Acid rain is a cocktail of H_2SO_4 and HNO_3 and the ratio of the two may vary depending on the relative quantities of oxides of sulphur and nitrogen emitted. On an average 60-70% of acidity is ascribed to H_2SO_4 and 30-40% to HNO_3 .

There are two types of acid deposition - wet and dry deposition.



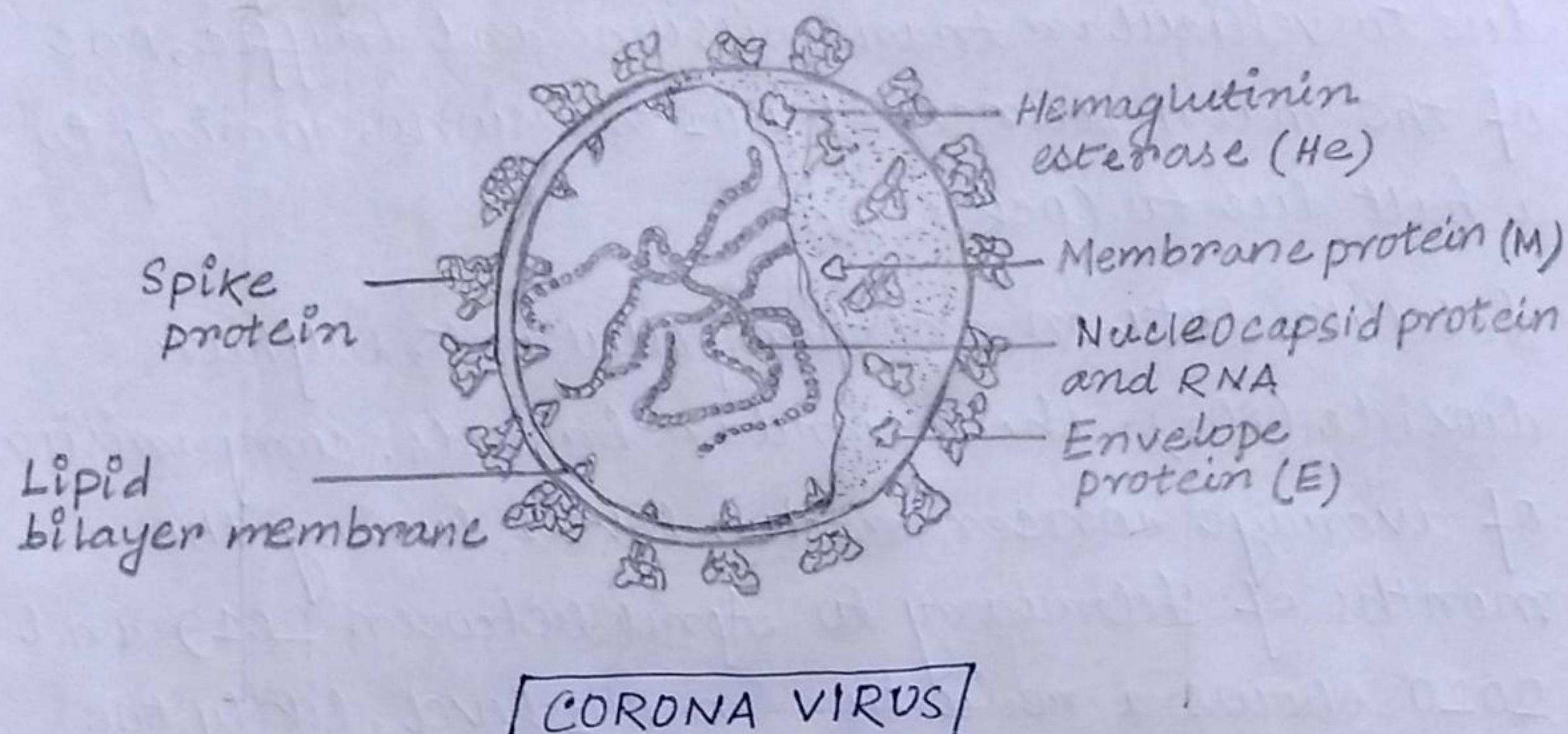
About half of the acidity in the atmosphere is transferred to earth through dry deposition.

Effects:

- i) Damage foliage and growing points of plant.
- ii) Causes leaching of essential minerals of soil like Ca^{+2} , Mg^{+2} , NO_3^- and SO_4^{2-} .
- iii) causes release of Al in soil surface which reaches nearest water body. Soluble Al is toxic to fishes.
- iv) It corrodes metals, marbles, painted surface, slate, stone etc. This phenomenon is known as stone leprosy. e.g.. Taj Mahal at Agra is threatened by the corrosive action of acid deposition.

AIR POLLUTION AND CORONA VIRUS

India is home to some of the world's most polluted cities. As unintended but welcome consequence of the lockdown to contain the corona virus has been improved air quality throughout the country.



Poor air quality has come to be recognised as a serious health risk and drag on social, economic development in India. Though there are many types of air pollutants, the small particles in the air, about one-thirtieth the width of a human hair, are the most harmful to human health. They can penetrate deep into the lungs, enter the bloodstream and cause deadly illness such as lung cancer, stroke and heart disease.

The economic lockdown to contain COVID-19 brought unexpected relief from poor air quality. Reports of clear blue skies have emerged from across the country.

Articles studying satellite data across India have shown a 35 percent reduction in nitrogen dioxide concentration levels. This was in large part due to vehicular transmissions and traffic, one of the main sources of NO₂ emissions, coming to a halt due to lockdown.

Satellite data on another pollutant, sulphur dioxide (SO₂), show similar trends. Comparison of average concentration levels during the months of February to April between 2019 and 2020 shows a reduction in SO₂ level, likely the result of reduction in power production and a major source of SO₂ emissions.

Both NO₂ and SO₂ are the precursor pollutants that lead to the generation of secondary PM 2.5, and also reductions in concentrations of these pollutants is a welcome trend. But because

PM 2.5 is also emitted directly from combustion of fossil fuels and biomass, it is important to consider impact on PM 2.5 concentrations. The lockdown has also reduced PM 2.5 levels in most cities.

CASE STUDY

CASE: Vehicular Air pollution in Delhi

- Delhi leads the country in its levels of air pollution. It has more cars than states of Gujarat and West Bengal put together.
- In 1990's Delhi ranked fourth among the 41 most polluted cities of the world.
- Air pollution problem in Delhi became so serious that a Public Interest Litigation (PIL) was filed in Supreme Court of India. After being censured very strongly by the Supreme court under its directive, the government was asked to take, within a specified time period, appropriate measures including switching over the entire fleet of public transport i.e. buses, from diesel to compressed Natural gas (CNG). All the buses of Delhi were converted to run on CNG by the end of 2002.

Advantages of CNG over Petrol or Diesel

- i) CNG burns more efficiently, unlike petrol or diesel.
- ii) CNG is cheaper than petrol or diesel.
- iii) It cannot be siphoned off by thieves and adulterated like petrol or diesel.

Disadvantages of CNG

The government has faced difficulty in laying down pipelines to deliver CNG through distribution points/pumps and causing uninterrupted supply.

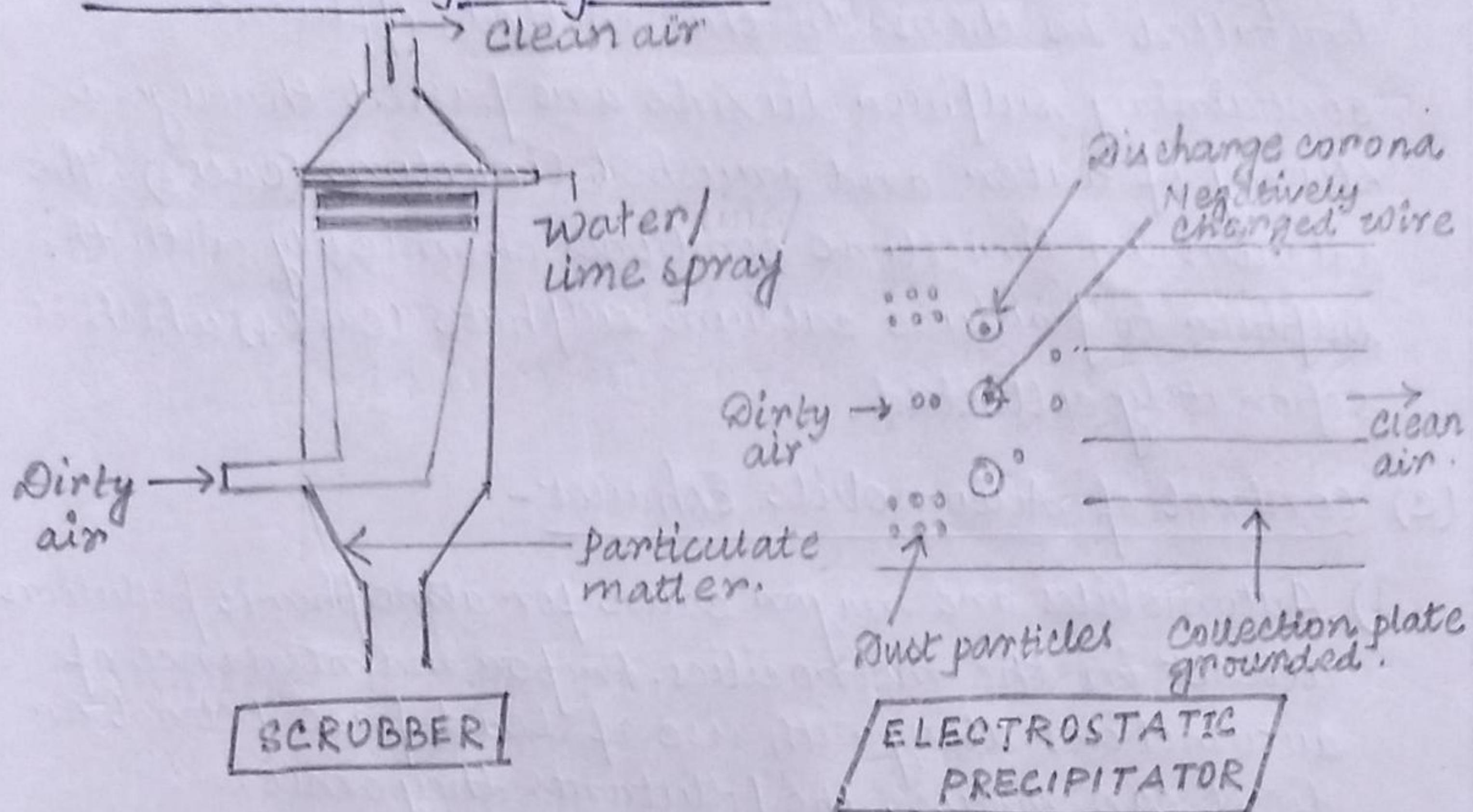
Other measures taken by the government

- i) Use of unleaded petrol
- ii) Use of low-sulphur, petrol and diesel.
- iii) Use of catalytic converters in vehicles.
- iv) Application of stringent pollution level norms for vehicles.

The Government of India through a new auto fuel policy has laid out a roadmap to cut down 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 ruled that all vehicles in India have to meet Euro I or India 2000 norms by June 1, 1999 and Euro II will be mandatory in the NCR by April, 2000.

CONTROLS

(a) Electrostatic precipitator



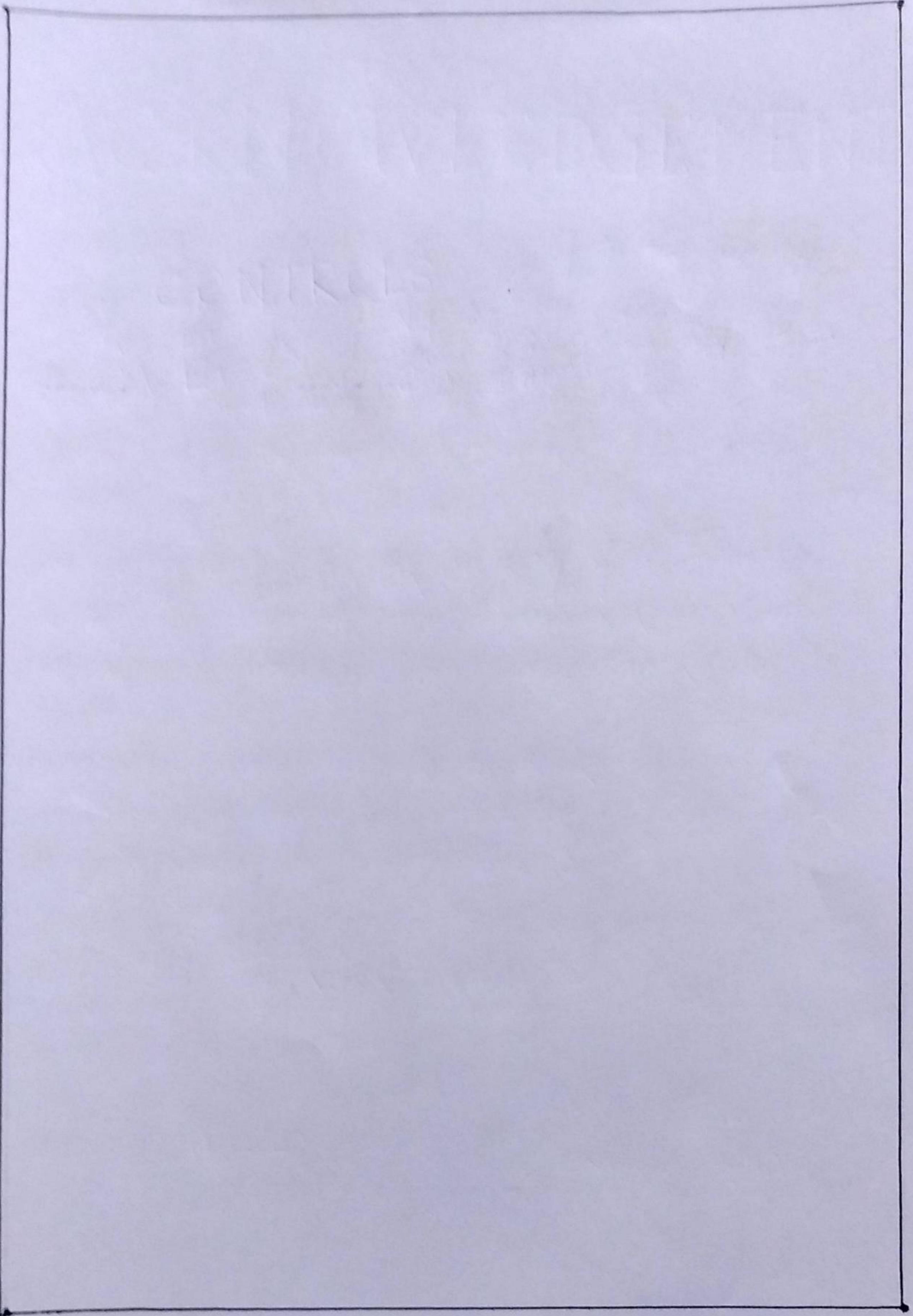
- i) It is the most effective device to remove over 99% of particulate matter present in the exhaust from a thermal power plant.
- ii) It has electrode wires that are maintained at several thousand volts which produce a corona that releases electrons.
- iii) These electrons attach to dust particles giving them a net negative charge.
- iv) The collecting plates are grounded and attract the charged dust particles.
- v) The velocity of air between the plates must be low enough to allow the dust to fall.

(b) Scrubber - The industries which produce SO_2 as a by product must have scrubbing mechanism installed in them. In this method, effluents containing sulphur dioxide are passed through a slurry of water and crushed limestone (CaCO_3). The calcium in limestone combines chemically with the sulphur to produce calcium sulphate (CaSO_4) which is separately collected.

(c) control of Automobile Exhaust -

- i) Automobiles are major cause for atmospheric pollution atleast in the metro cities. Proper maintenance of automobiles alongwith use of lead free petrol or diesel can reduce the pollutants they emit.
- ii) Catalytic converters have cost mostly metals like platinum-palladium and rhodium as catalysts. Exhaust gases first pass through catalytic converters. Hydrocarbons which have been left unburnt are oxidised to produce carbon dioxide and water. Carbon monoxide is also oxidised to form carbon dioxide. However, nitrogen oxide splits up to form nitrogen gas. Automobiles fitted with catalytic converter should not use leaded petrol because lead inactivates the catalyst of the converter.

The Air (Prevention and Control of Pollution) Act, 1981:
The Act deals with the preservation of air quality and the control of air pollution with a concern for the detrimental effects of air pollutants on human health and also on biological world. In 1987, amendment to Air Act 1981 was made and noise was recognised as an air pollutant.



RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

**AIR POLLUTION IN CITIES AND
MEASURES TO CONTROL IT.**

NAME : ARINDAM MONDAL
COLLEGE ROLL NO : ENUG /188 /19
DEPARTMENT : DEPT. OF ENGLISH
YEAR : 2020
SIGNATURE : Arindam Mondal.

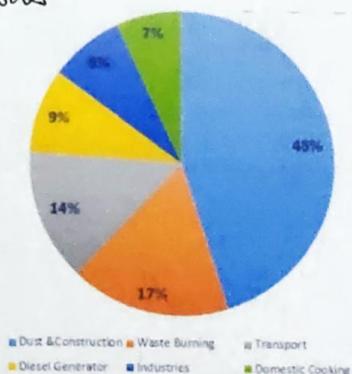
Air Pollution

Air Pollution refers to the release of pollutants into the air that are detrimental to human health and the planet as a whole. Air pollution, releases into the atmosphere of various gases, finely divided solids, or finely dispersed liquid aerosols at rates that exceed the natural capacity of the environment to dissipate and dilute or absorb them. These substances may reach concentrations in the air that cause undesirable health, economic or aesthetic effects. There are different types of air pollutants, such as gases, (such as ammonia, carbon monoxide, sulphur-di-oxide, nitrous oxides, methane and chlorofluorocarbons), particulates (both organic and inorganic), and biological molecules.

The Clean Air Act authorises the U.S. Environmental Protection Agency (EPA) to protect public health by regulating the emissions of these harmful air pollutants. The NRDC has been a leading authority on this law since it was established in 1970.

Causes of Air Pollution

"Most air pollution comes from energy use and production" says John Walke, director of the Clean Air Project, part of the Climate and Clean Energy program at NRDC. "Burning fossil fuels releases gases and chemicals into the air." And in an especially destructive feedback loop,



air pollution not only contributes to climate change but is also exacerbated by it. "Air pollution in the form of carbon-di-oxide and methane raises the earth's temperature," Walke says. "Another type of air pollution is then worsened by that increased heat: Smog forms when the weather is warmer and there's more ultraviolet radiation." Climate change also increases the production of allergenic air pollutants including mold (thanks to damp conditions caused by extreme weather and increased flooding) and pollen (due to a longer pollen season and more pollen production).

Effects of Air Pollution



An air pollutant is a material in the air that can have adverse effects on humans and the ecosystem. Pollutants emitted into the atmosphere by human activity include:

Smog and Soot :

These two are the most prevalent types of air pollution. Smog, or "ground-level ozone", as it is more wookily called, occurs when emissions from combusting fossil fuels react with sunlight. Soot, or "particulate matter," is made up of tiny particles of chemicals, soil, smoke, dust or allergens, in the form of gas or solids, that are carried in the air. The sources of smog and soot are similar. "Both come from cars and trucks, factories, power plants, incinerators, engines — anything that combusts fossil fuels such as coal, gas or natural gas," Walke says. The tiniest airborne particles

in soot — whether they are in the form of gas or solids — are especially dangerous because they can penetrate the lungs and bloodstream and worsen bronchitis, lead to heart attacks, and even hasten deaths.



Smog can irritate the eyes and throat and also damage the lungs — especially of people who work or exercise outside, children and senior citizens. It's even worse for people who have asthma and allergies — these extra pollutants only intensify their symptoms and can trigger asthma attacks.

Hazardous Pollutants

These are either deadly or have severe health risks even in small amounts. Almost 200 are regulated by law; some of the most common are mercury, lead, dioxins and benzene. "These are also most often emitted during gas or coal combustion, incinerating or in the case of benzene, found in gasoline," Walke says. Benzene, classified as a carcinogen by the EPA, can cause eye, skin and lung irritation in the short term and blood disorders in the long term. Dioxins, more typically found in food but also present in small amounts in the air, can affect the liver in



the short term and harm the immune, nervous and endocrine systems, as well as reproductive function. Lead in large amounts can damage children's

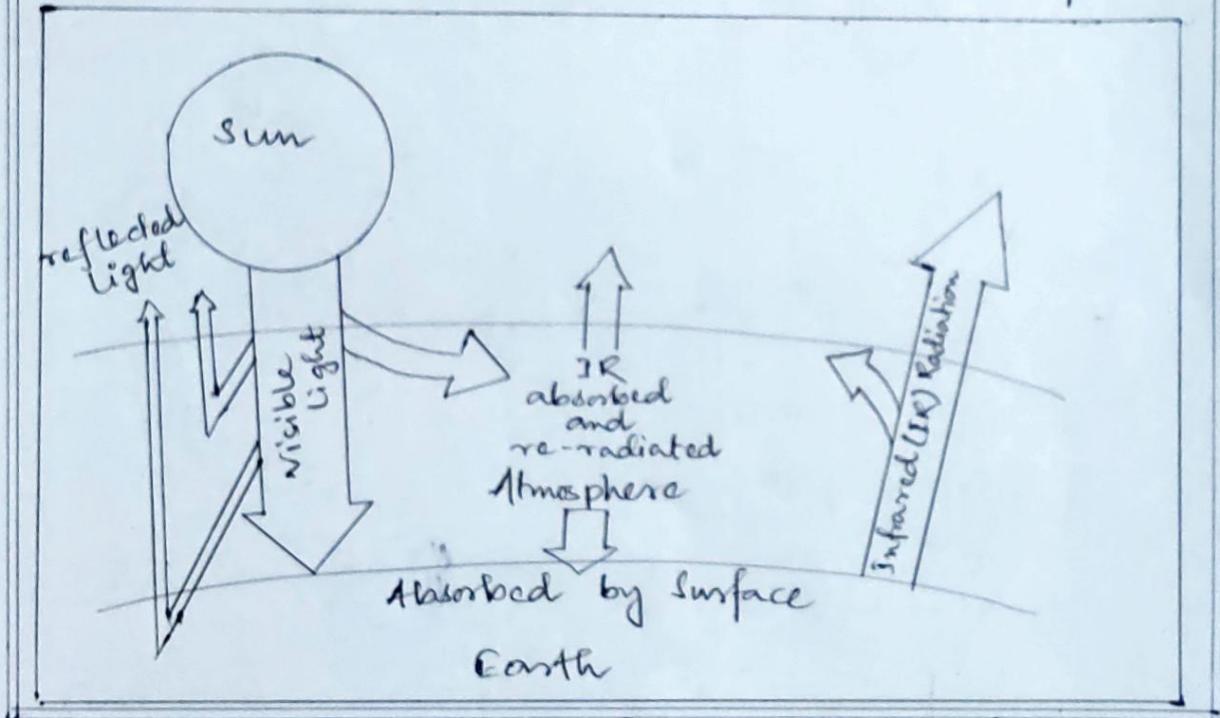
brains, kidneys and even in small amounts of it can affect children's IQ and ability to learn. Mercury affects

the central nervous system. Polycyclic aromatic hydrocarbons, or PAHs, are toxic components of traffic exhaust and wildfire smoke. In large amounts, they have been linked to eye and lung irritation, blood and liver issues, and even cancer. In one recent study, the children of mothers who had higher PAH exposure during pregnancy had slower brain processing speeds and worse symptoms of ADHD.



Greenhouse Gases

By trapping the earth's heat in the atmosphere, greenhouse gases lead to warmer temperatures and all the hallmarks of climate change: rising sea levels, more extreme weather, heat related deaths, and increasing transmissions of infectious diseases like Lyme. According to a 2014 EPA study, carbon-di-oxide was responsible for 81 percent of the country's total greenhouse gas emissions, and methane made 11 percent.



Another class of greenhouse gases, hydrofluorocarbons (HFC) are thousands of times more powerful than carbon dioxide but methane is significantly more potent, so it's also very destructive. In October 2016, more than 140 countries reached an agreement to reduce the use of these chemicals — which are used in air conditioners and refrigerators — and find greener alternatives over time. David Doniger, senior strategic director of NRDC's Climate and Clean Energy program, writes, "NRDC estimates that the agreed HFC phase-down will avoid the equivalent of more than 80 billion tons of CO₂ over the next 35 years.



Control measures

"The less gasoline we burn, the better we're doing to reduce air pollution and harmful effects of climate change," Walke says. "Make good choices about transportation. When you can, walk, ride a bike, or take public transportation. For driving, choose cars that get better miles per gallon of gas or choose an electric car." You can also investigate your power provider options — you may be able to request that your electricity be supplied by wind or solar. Buying your food locally cuts down on the fossil fuels burned in trucking or flying food in from across the country.

Health Regulations

- "When you see in the newspaper or hear on the weather report that pollution levels are high, it may be

"useful to limit the time when children go outside or you go for a jog," Walke says. Generally ozone levels tend to be lower in the morning.

- When you do exercise outside, stay as far as you can from heavily trafficked roads. Then shower and wash your clothes to remove fine particles.

- If the air quality is bad, stay inside with windows closed.
- Wear sunscreen. When ultraviolet radiations comes through the weakened ozone layer, it can cause skin damage and skin cancer.

Air Pollution is responsible for 5 million deaths each year

Air pollution — the combination of outdoor and indoor particulate matter, and ozone — is a risk factor for many of the leading causes of death including heart diseases, stroke, lower respiratory infections, lung cancer, diabetes and chronic obstructive pulmonary disease (COPD).

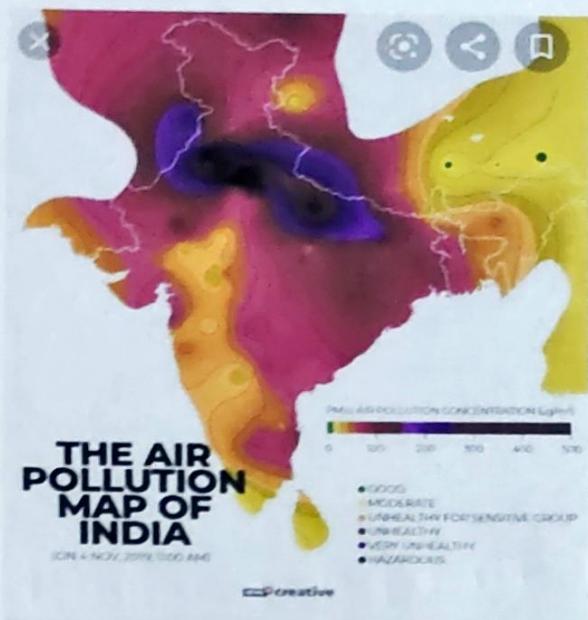
The Institute of Health Metrics and Evaluation (IHME) in its global burden of Disease study provide estimates of the number of deaths attributed to the range of risk factors of disease.

Air pollution is one of the leading risk factors for death. In low-income countries it tops the list. In 2017, it was responsible for an estimated 5 million deaths globally. That means it contributed to 9%

- nearly 1 in 10 - deaths.

Air pollution is usually concentrated in densely populated metropolitan cities, especially in developing countries where environmental regulations are relatively lax or nonexistent. However, even

populated areas in developed countries attain unhealthy levels of population, with Los Angeles and Rome being two examples.



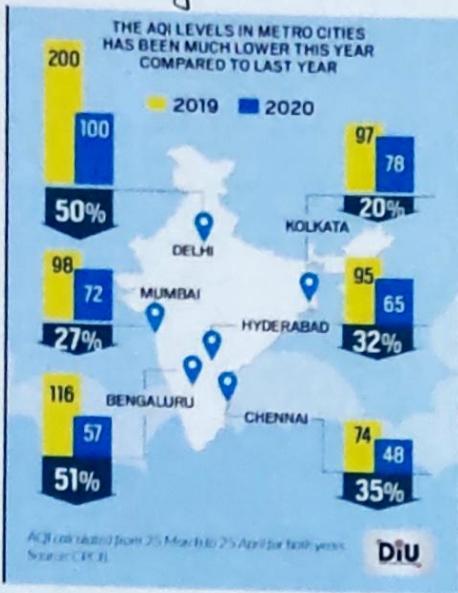
Between 2002 and 2011 the incidence of lung cancer in Beijing near doubled. While smoking remains the leading cause of lung cancer in China,

the number of smokers is falling while lung cancer rates are rising. In 2010, the European Commission (EC) threatened the UK with legal actions against the successive breaching of PM10 limit values. The UK government has identified that if fines are imposed, they could cost the nation upwards of £300 million per year.

Even in India, the government in Delhi launched an Odd-Even Rule in November, 2017 which is based on the Odd-Even Rationing method: This meant that cars running with number plates ending in Odd digits could only be driven on certain days of the week, while the Even digits cars could be driven on the remaining days of the week.

Some goals set for future are :

- Clean up the transportation sector by introducing 1000 electric public transport buses to its 550 strong fleet.



- Upgrade all fossil fuel combustion engined vehicles to BS 6 emission standards.
- Meet a goal of 25% of private vehicles to be electricity powered by 2023.
- Renewable energy in all power plants.
- Provide farmers with a machine called a Happy Seeder

which converts agricultural residue to fertiliser.

- Analyse health data and study the efficiency of different room filtration systems in areas where indoor air pollution is highest.
- Identify effective ways to inform the public about air pollution data.
- Launch new citizen science programs to better document exposures.
- Reduce Carbon Emissions : "According to International government Panel on Climate Change, to limit warming well below 2°C, CO₂ emissions should decline by about 20% by 2030 and reach net zero around 2075; to limit warming below 1.5°C, CO₂ emissions should decline by 50% by 2030 and net zero by around 2050"

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE: Corona Pandemic and the roll of common people in controlling it

NAME: Aritra Das

COLLEGE ROLL NO: ENUG-179/19

DEPARTMENT: Department of English

YEAR: 2020

SIGNATURE:



PANDEMIC

AND **E**MIC

and the role of common
people in controlling it



ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my Environmental science teacher (ENVISER) for giving their guidance and support in completing my project.

~~I would like to extend my gratitude~~
I would like to extend my gratitude to Principal and vice principal Mahoray for providing me with all the facility that was required.

DATE

15/11/2020

sign
Pritha Das

INTRODUCTION

For the first time in the history of mankind such a wide spread attack of a disease called corona occurred. This disease is spread globally on all of over the world. No country was spared. So scientist gave this disease a new name "corona Pandemic". This disease already claimed life lives of millions of people and still claiming more. So mankind declared a war against corona with our warriors like doctors, civil workers and health related workers.

In this situation we civilian ~~also~~ civilians have a very important role in preventing corona from spreading spreading even further.

The COVID-19 pandemic, also known as the corona virus pandemic is an ongoing pandemic of corona virus disease caused by severe acute respiratory syndrome coronavirus 2, (SARS-CoV-2), first identified in December 2019 in Wuhan, China. The World Health Organization declared the public health ~~outbreak~~ of a public emergency of international concern in January 2020 and on March 2020. As of 13 November 2020, more than 52.6 million cases have been confirmed, with more ~~than~~ 1.29 than 1.29 million deaths confirmed with attributed in COVID-19.

COVID-19 mainly spreads through the air when people are near each other long enough, primarily primarily via small droplets or aerosols as in

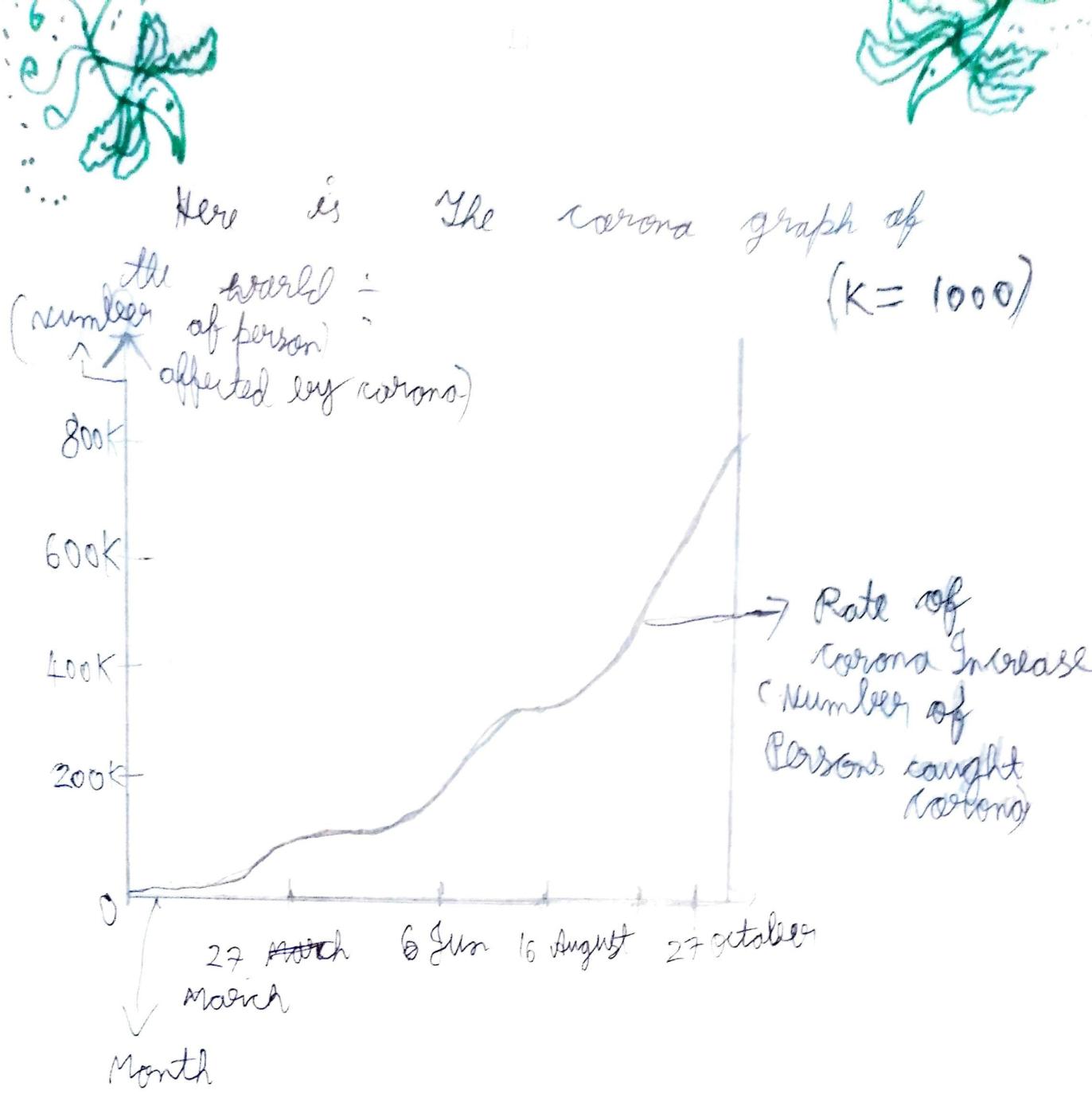
infected person breathes, laughs, sneezes, sings, or speaks. It can spread as early as two days before infected person shows symptoms, and form asymptomatic individuals. People remain infected for 10 days in normal cases and ~~to~~ two weeks in severe cases.

Common symptoms include fever, cough, fatigue, breathing difficulties, and loss of taste. Complication may include pneumonia and acute respiratory distress syndrome. The incubation period is typically around five days but may range from one to 14 days. There are various candidates in development, although ~~most~~ none have completed the clinical trials. There is no known specific antiviral medication, so primary treatment is currently symptomatic.

Recommended preventive measures include hand washing, covering one's mouth when sneezing or coughing, social distancing, wearing a face mask in public, ventilation and air-filtering, disinfecting surfaces and monitoring and self-isolation for people exposed or ~~symptomatic~~ symptomatic. Authorities worldwide have responded by implementing travel restrictions, lockdowns, workplace hazard controls, and facility closures.

ROLE OF COMMON PEOPLE IN PREVENTING IT

The corona virus, a pandemic has made us realize that we are all connected and this entire world is a family. Corona has claimed many millions of lives and is still claiming more and the country which is most affected by corona is USA.



Countries and the Number of corona cases:

<u>Location</u>	Number of cases	Recovery	Death
USA :	11 million	5.6 million	245 K (thousand)
INDIA :	8.8 million	5.8 million	130 K
BRAZIL :	5.85 million	5.29 million	166 K
FRANCE :	1.95 million	139 K	44,246
RUSSIA :	1.9 million	1.43 million	32,834

$K = 1000$

Medical experts suggested social distancing is one of the perfect solution to fight against this new devil known as corona. We as a responsible citizen of this country should participate in this battle against the zoonotic disease.

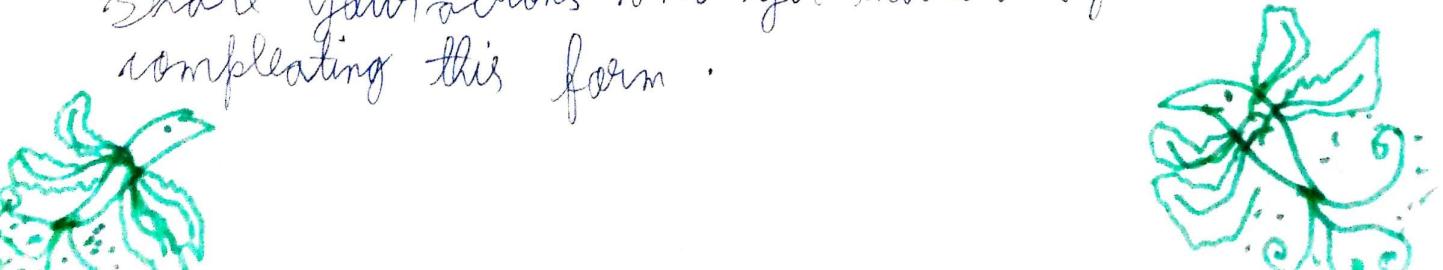
Now, let's understand the role of youth in this battle. This battle can be won by helping the government in this time of exigency or by spreading awareness through digital media.

India initiated the most extreme step in the mitigation strategy of ~~Covid-19~~ COVID-19 control. "The Lockdown", this is the every ~~courageous~~ courageous step taken by the government, and as a responsible citizen it is our duty to be abide by that rule.



Organisations and Employers play a big role in combatting the virus. Encourage your office to take precautions: for example, insure spaces spaces are clean and hygienic & promote regular handwashing, test remote working and communicate clearly to the employees.

There is no ~~there~~ hierarchy in doing what's right. You can be an influence in your organisation by passing on vetted business message from the WHO, focusing on accuracy and relevance and acting collectively. It is our responsibility as global ~~sho~~ shapers to help others and build more resilient, inclusive and informed communities. If you're taking actions we want to know and help you. Share your actions and get involved by completing this form.



RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE: Air pollution in cities and
measures to control it

NAME : Arka Ghosh

COLLEGE ROLL NO : CHUG/056/19

DEPARTMENT : Chemistry

YEAR : 2020

SIGNATURE : Arka Ghosh

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I would like to express my special thanks and gratitude to Ramakrishna Mission, Narayana Dham, who gave me this the golden opportunity to do this wonderful project on "Air pollution in cities and measures to control it". Because of this project I came to know about so many new things and I am really thankful to them. Secondly I would also like to thank my parents and friends who helped me despite this unprecedented situation of COVID-19, in finalizing this project within the limited time frame.

Arka Ghosh
(CHUG1056/19)
Department of chemistry,
RKMRC

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Overview

Air quality in cities is the result of complex interaction between natural and anthropogenic environmental conditions. Air pollution in cities is a serious environmental problem - especially in developing countries. The air pollution path of the urban atmosphere consists of emission and transmission of air pollutants resulting in the ambient air pollution. Each part of the path is influenced by different factors. Emission from motor traffic are a very important source group throughout the world. During transmission, air pollutants are dispersed, diluted and subjected to photochemical reactions. Ambient air pollution shows temporal and spatial variability. As an example of the temporal variability of urban air pollutants caused by motor traffic, typical average annual, weekly and diurnal cycles of NO, NO₂, NO₃, O₃ and O_x are presented for an official urban air-quality station in Stuttgart, Southern Germany. They are supplemented by weekly and diurnal cycles of selected percentile values of NO, NO₂ and O₃.

Ambient air pollution: Pollutants

Outdoor air pollution originates from natural and anthropogenic sources. While natural sources contribute substantially to local air pollution in arid regions more prone to forest fires and dust storms, the contribution from human activities far exceeds natural sources. Human activities that are major sources of outdoor air pollution, includes:

- Fuel combustion from motor vehicles (e.g. cars and heavy duty vehicles)
- Heat and power generation (e.g. oil and ~~co~~ coal powerplants and boilers)
- Industrial facilities (e.g. manufacturing factories, mines and oil refineries)
- Municipal and agricultural waste sites and waste incineration/burning.

Poor urban planning, which leads to sprawl and over-dependence on private vehicle transport, is also a major factor in accelerated pollution emission.

Averse health consequences to air pollution can occur as a result of short- or long-term exposure. The pollutants with the strongest evidence of health effects are particulate matter (PM), ozone (O_3), nitrogen dioxide (NO_2) and sulphur dioxide (SO_2).

Cause of air pollution

⇒ Traffic congestion

Traffic congestion is severe in urban cities and towns. Traffic congestion is caused by several reasons, some of which are:

- increases in number of vehicles per km of available roads.
- a lack of intra-city divided-lane highways and intra-city express network.
- lack of inter-city express way.
- traffic accidents and chaos due to poor enforcement of traffic laws.

Traffic congestion reduces the average traffic speed. At low speeds, scientific studies reveal that vehicles burn fuel inefficiently and pollute more per trip. Fuel efficiencies similarly were much worse with traffic congestion.

Traffic gridlock in Delhi and other cities across the world is quite extreme. The average trip speed on these cities is less than 20 kmph.

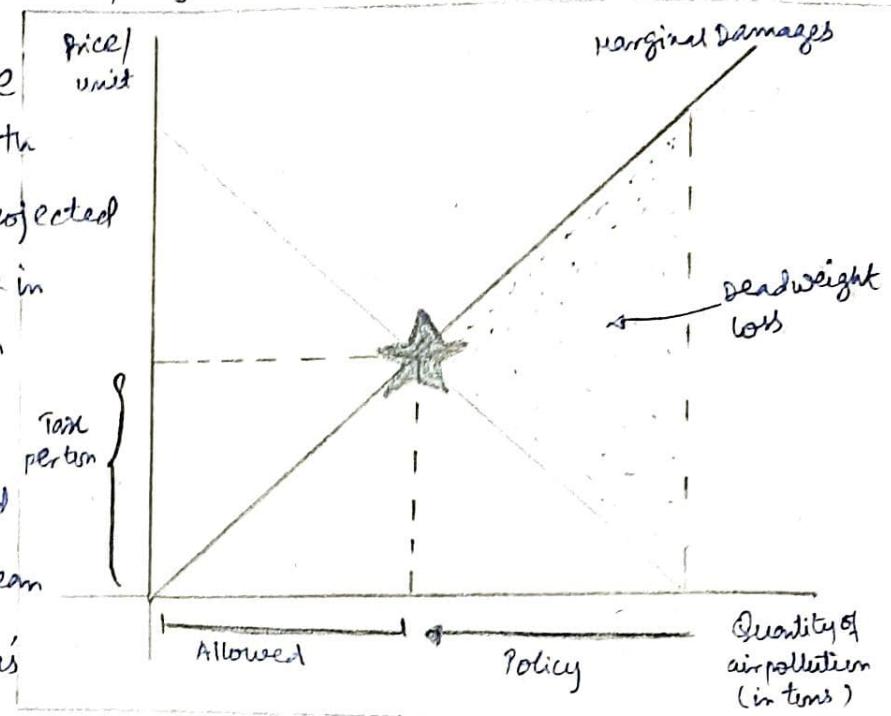
At such speeds, vehicles emit pollutants 4 to 8 times more than they would with less traffic congestion. Emission of particles and heavy metals increase over time because the growth of the fleet and mileage outpaces the efforts to curb emissions.

\Rightarrow Greenhouse gas emissions

India was the third largest emitter of CO₂ in 2017 at 6.28%. share of CO₂ emission, after China (27.21%) and the United States (14.58%). According to a report by the Global carbon project, "after low growth during 2014 to 2016, fossil CO₂ emission have now risen two years in a row with 1.6 percent rise in 2017 and a projected 2.7 per cent rise in 2018. The peak in global CO₂ emission is not yet in sight." India's coal-fired, oil-fired and natural gas-fired thermal power plants in European Union (EU-27) countries. India's thermal power plants emit 50 to 120% more CO₂ per kWh produced. This significant part to inefficient thermal power plants installed in India prior to its economic liberalisation in the 1990s.

\Rightarrow Fuel adulteration

Taxis and auto-rickshaws in developing countries run on adulterated fuel blends. Adulteration of gasoline and diesel with lower-priced fuels is common in South Asia, including India. Some adulterants increase emissions of harmful pollutants from vehicles, worsening urban air pollution. Financial incentives arising from differential taxes are generally the primary cause of fuel adulteration. In India and other developing countries, gasoline carries a much higher tax than diesel, which in turn is taxed more than kerosene meant as a cooking fuel, while some solvents and lubricants carry little or no tax.



As fuel prices rise, the public transport driver cuts costs by blending the cheaper hydrocarbon into highly taxed hydrocarbon. The blending may be as much as 20-30 percent. For a low wage driver, the adulteration can yield short term savings that are significant over the month. The consequences to long term air pollution, quality of life and effect on health are simply ignored. Also ignored are the reduced life of vehicle engine and higher maintenance costs, particularly if the taxi, auto- rikshaw or truck is being rented for a daily fee.

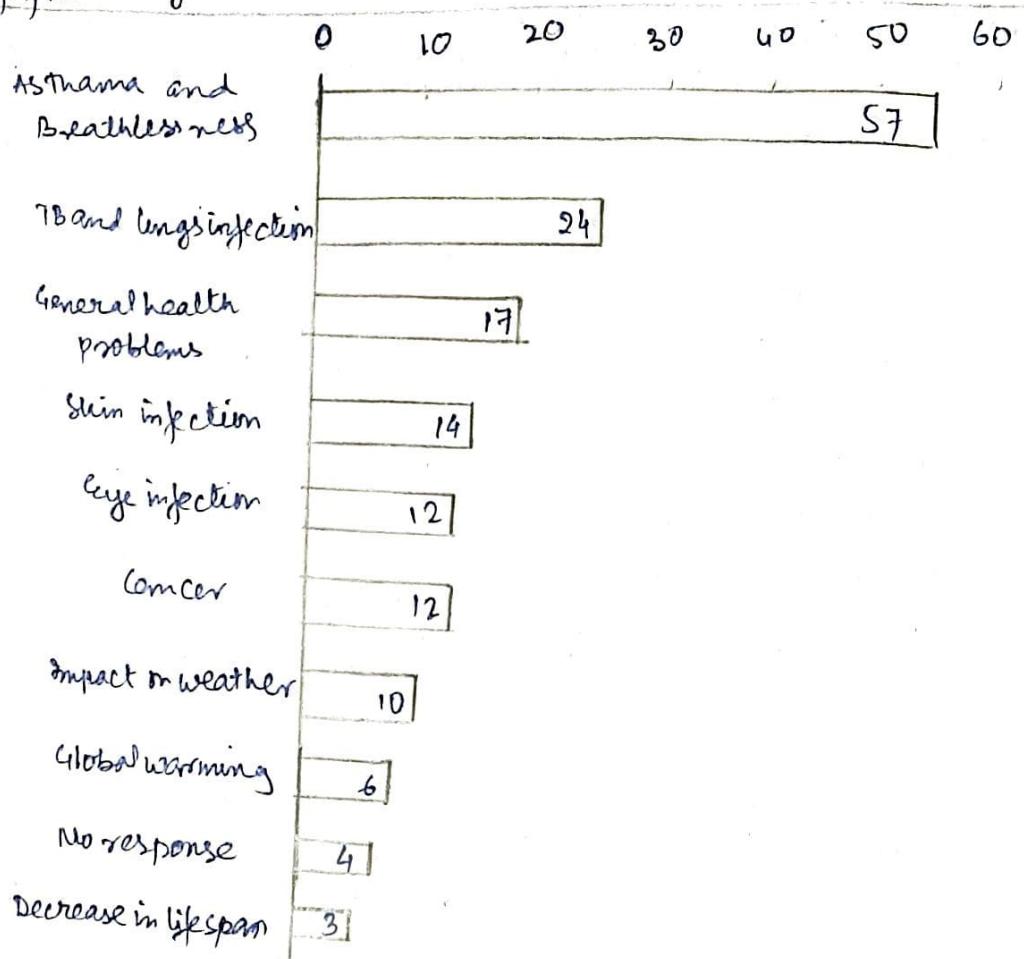
Adulterated fuel increases tailpipe emission of hydrocarbons (HC), carbon monoxide & nitrogen (NO_x) and particulate matter (PM). Air toxin emission - which falls into the category of unregulated emissions - of primary concern are benzene and polyaromatic hydrocarbons (PAHs), both well-known carcinogen. Kerosene is more difficult to burn than gasoline, its addition results in higher levels of HC, CO and PM emissions even from catalyst-equipped cars. The higher sulfur level of kerosene is another issue.

Effects: Health costs of air pollution

The most important reason for concern over the worsening air pollution in the country is its effect on the health of individuals. Exposure to particulate matter for a long time can lead to respiratory and cardiovascular diseases such as asthma, bronchitis, COPD, lung cancer and heart attack. The global Burden

of Disease Study from 2015 published in 2018, has found that outdoor air pollution was the fifth-largest killer in developing countries and around 620,000 early deaths occurred from air pollution-related disease in 2015. According to WHO study, 13 of the 20 most populated cities in world are in India; however the accuracy and methodology of the WHO Study was questioned by the Government.

Over a millions of people die prematurely due to air pollution, according to non-profit health effects institutes.



Reason for concern

Over two million children - half the children in Delhi - have abnormalities in their lung functions. Asthma is the common health problem suffered by the people around the world.

Ambient air pollution in cities is estimated to cause 67,000,000 deaths annually and particular aggravates respiratory and cardiovascular conditions including chronic bronchitis, lung cancer and asthma. Ambient air pollution is linked to an increase in hospital visits, with a higher concentration of outdoor pollution particulates resulting in emergency room visit increases of between 20-25% for a range of

conditions associated with higher exposure to air pollution. Approximately 76% of households in rural India are reliant on solid biomass for cooking purposes which contributes further to the disease burden of ambient air pollution experienced by the population of India.

Methods to control air pollution in cities

There are simple steps one can adopt in everyday life to help improve air quality. Every time you drive to work or school, use your heater or air conditioner. Here are few steps air pollution in cities can be controlled:

- Strong laws for government and its proper execution.
- Walk or ride a bike when possible
- Take public transport
- When driving accelerate gradually and obey traffic rules
- Maintain your vehicle and keep the tires properly inflated.
- Contact the vehicle workshop for the proper updation of parts of the vehicle
- Limit idling and stop the car when it is not in motion.
- Replace energy-hungry incandescent lights with LEDs.
- Opt for fan instead of air conditioner.
- Install low-flow shower heads.
- Replace paper, plastic, metals and organic materials.
- Look for alternative source of energy like solar panels.
- Ensure gas appliances and heater regularly maintained.
- Use recycled materials.
- Use a rake, broom, or electric leaf blower instead of gasoline leaf blower.
- Use water based cleaning products that are labeled zero VOC.

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- - - - THANK YOU - - - -

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

NITROGEN CYCLE AND IT'S IMPORTANCE
IN HUMAN BEINGS

NAME : ARNAB BANERJEE

COLLEGE ROLL NO : STUGI/235 /19

DEPARTMENT : STATISTICS

YEAR : 2020

SIGNATURE : Arnab Banerjee

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Total words count :- 1294

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I would like to express
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Science dept. of my College
RKMRC, Narendrapur (Auto.)

DATE

31/10/2020

ARNAB BANERJEE

STUG1/235/19

INTRODUCTION:-

Nitrogen is one of the important elements in biological compounds, mainly of nucleic acid and protein and therefore it is essential for life. Atmosphere contains about 78% nitrogen, but free nitrogen cannot be utilised by most of the organisms, except a few blue green alga and some bacteria.

Nitrogen atoms constantly moving in a giant circle from the air, through the soil, into the bodies of plants and animals and eventually back to the air. This known process is called the Nitrogen cycle. All living things need nitrogen to develop and grow.

Five stages of Nitrogen Cycle :-

Stage 1:- Nitrogen Fixation

In this stage, nitrogen moves from the atmosphere into the soil. Earth's atmosphere

into the soil. Earth's atmosphere contains a huge pool of nitrogen gas (N_2). To be used by plants, the N_2 must be transformed through a process called Nitrogen Fixation. Fixation converts nitrogen in the atmosphere into forms that plants can absorb through their root systems.

A small amount of nitrogen can be fixed when lightning provides the energy needed for N_2 to react with oxygen, producing nitrogen

oxide, NO and nitrogen dioxide, NO_2 . These forms of nitrogen then enter soils through rain or snow. Nitrogen can also be fixed through the industrial process that creates fertilizer. The bacteria gets energy through photosynthesis

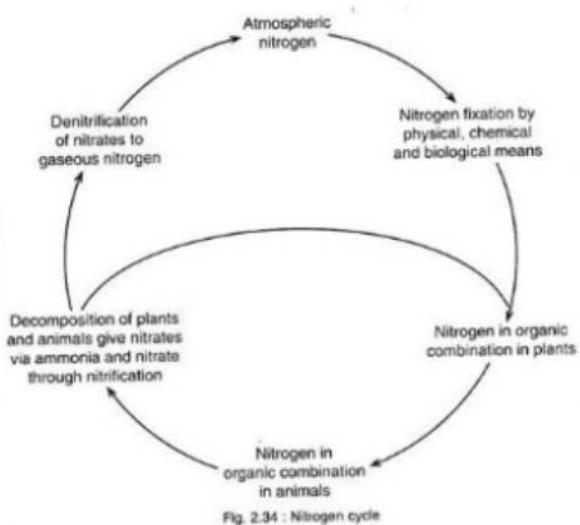
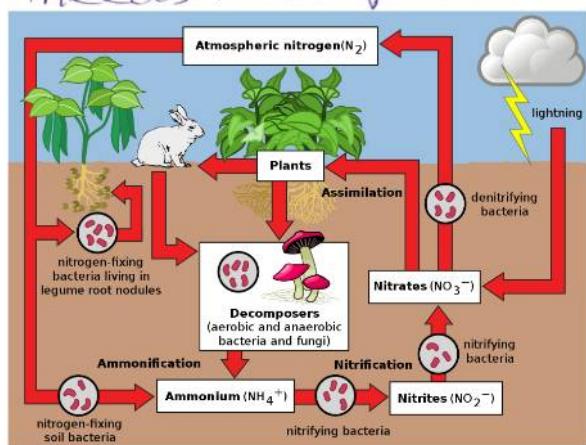


Fig. 2.34 : Nitrogen cycle

and in return, they fix nitrogen into a form the plant needs. The fixed nitrogen is then carried to other parts of the plant and is used to form plant tissues. So the plant can grow.



Other bacteria live freely in soils or water and can fix nitrogen without their symbiotic relationship. These bacteria can also create forms of nitrogen that can be used by organisms.

Stage 2: Mineralization

This stage takes place in the soil. Nitrogen moves from organic materials, such as manure or plant materials to an inorganic form of nitrogen that plants can use. Eventually, the plants nutrients are used up and the plant dies and decomposes. This becomes

important in the second stage of nitrogen cycle. Mineralization happens when microbes act on organic material, such as animal manure or decomposing plant or animal material and begin to convert it to a form of nitrogen that can be used by plants. All plants under cultivation.

Stage 3 :- Nitrification

The third stage, nitrification, also occurs in soils. During nitrification the ammonia in the soils, produced during mineralization, is converted to

compounds called nitrates, NO_3^- and nitrites NO_2^- . Nitrate can be used by



plants and animals that consume the plants. Some bacteria in the soil can turn ammonia into nitrite. Although

nitrate is not usable by plants and animals directly, other bacteria can change nitrites into nitrates - a form that is usable by plants and animals. This reaction provides energy for the bacteria engaged in this process.

Stage 4 :- Immobilization

The fourth stage of the nitrogen cycle is immobilization, sometimes described as the reverse of mineralization. These two processes together control the amount of nitrogen in soils. Just like plants, microorganisms living in the soil require nitrogen as an energy source. These soil microorganisms pull nitrogen from the soil when the residues of decomposing plants do not contain enough nitrogen when the micro-organisms take in the ammonia (NH_4^+) and nitrate (NO_3^-), these forms of nitrogen are no longer available to the plants and may cause nitrogen deficiency or a lack of nitrogen. Immobilization, therefore ties up the nitrogen.

in microorganisms. However, immobilization is important because it helps control and balance the amount of nitrogen in the soil by tying it up, or immobilizing the nitrogen, in microorganisms.

Stage 5 :- Denitrification

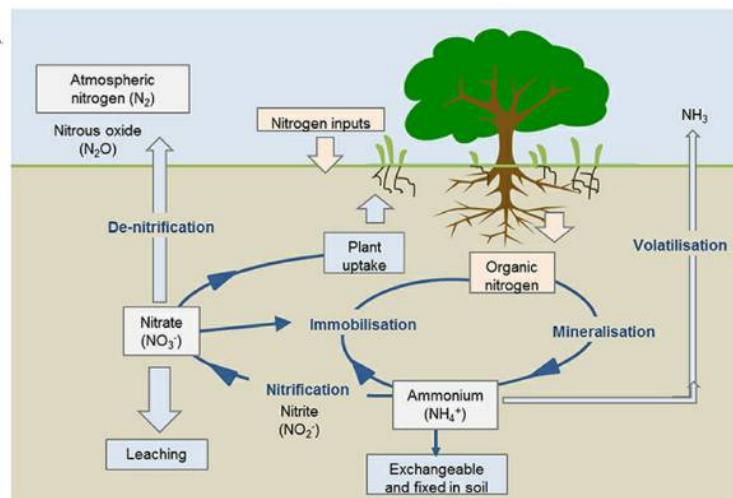
In the fifth stage of the nitrogen cycle, nitrogen returns to the air as nitrates are converted to atmosphere nitrogen(N_2) by bacteria through the process we call denitrification. This results in an overall loss of nitrogen from soils, as the gaseous form of nitrogen moves into the atmosphere back where we began our story.

■ 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 nitrogen, they are unable to produce amino acids. Without amino acids, plants, cannot make the special protein that the plant cells need to grow without enough nitrogen, plant growth is affected negatively with too much nitrogen.

Plants produce excess biomass or organic matter, such as



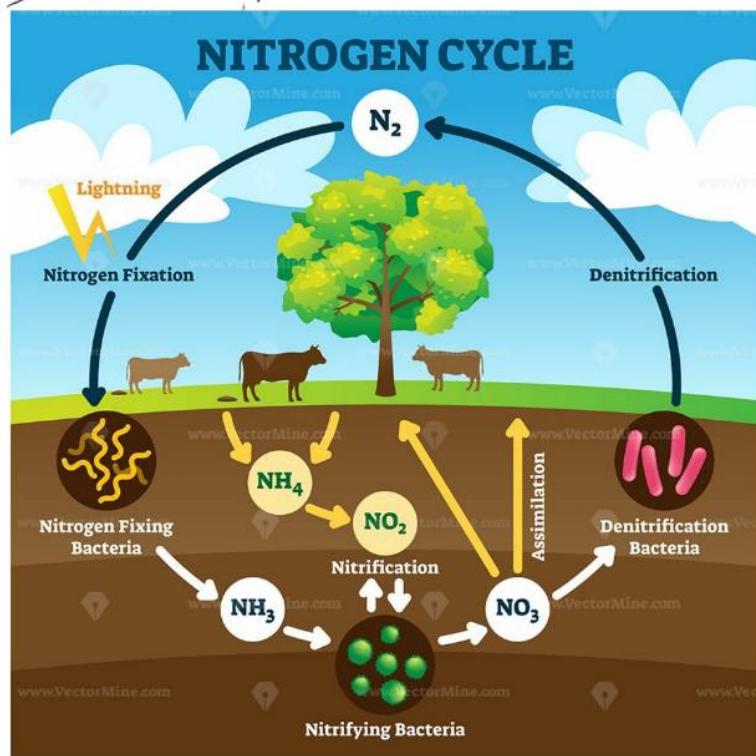
stalks leaves but not enough root structure. In extreme cases, plants with very high levels of nitrogen absorbed from soils can poison farm animals that eat them.

Nitrogen is crucial for life :-

The cycling of nitrogen through the ecosystem is crucial for maintaining productive and healthy ecosystems with neither too much nor too little nitrogen. Plant production and biomass (living material) are limited by the availability of nitrogen. Understanding how the plant-soil nitrogen cycle works can help us make better decisions about what crops to grow and where to grow them, so we have an adequate supply of food. Knowledge of nitrogen cycle can also help us reduce pollution caused by adding too much fertilizers to the soil. Certain plants can uptake more nitrogen or other nutrients such as phosphorus, another fertilizer, and can even be used as a "buffer" or filter to prevent excessive fertilizer from entering waterways. For example, a

study done by Haycock and Pinay showed that popular trees used as a buffer held on to 99% of the nitrate entering the underground waterflow during winter, while a river bank zone covered with a specific grass (Lolium perenne L.) held up to 84% of the nitrate preventing it from entering the river.

As we have seen, not enough nitrogen



in the soil leaves plants hungry, while too much of a good thing can be bad excess nitrogen can poison plants and even livestock! Pollution of our water sources by surplus nitrogen and

other nutrients is a huge problem, as a marine life is being suffocated from decomposition of dead algal blooms.

Farmers and communities need to work to improve the uptake of added nutrients by crops and treat animal manure waste properly. We also need to protect the natural plant buffer zones that can take up nitrogen run off before it reaches water bodies. But our current pattern of clearing trees to build road and other construction worsen this problem, because there are fewer plants left to uptake excess nutrients. By working towards a more complete understanding of the nitrogen cycle and other cycles at play in Earth's interconnected natural system, we can better understand how to better protect Earth's precious natural resources.

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RAMAKRISHNA MISSION RESIDENTIAL COLLEGE



NARENDRAPUR

ENVIRONMENTAL STUDIES

PROJECT TITLE:

Corona Pandemic and Role of
Common People to Control it

NAME : Arunab Maity

COLLEGE ROLL NO : ENUGI/023/19

DEPARTMENT : ENGLISH

YEAR : 2020

SIGNATURE : Arunab Maity

Overview:

Coronavirus disease (COVID-19) is an infectious disease caused by a new discovered Corona virus.

Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease and cancer are more likely to develop serious illness.

The best way to prevent and slow down transmission is to be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands often and not touching your face.

Where Did the Coronavirus Come From?

Experts say SARS-CoV-2 originated in bats. That's also how the coronaviruses behind Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS) got started.

SARS-CoV-2 made the jump to humans at one of ~~the~~ Wuhan's open-air "wet markets". They're where customers buy fresh meat and fish, ~~as well as~~ including animals that are killed on the spot.

Still, the Wuhan market didn't sell bats at the time of the outbreak. That's why early suspicion also fell on pangolins, also called scaly antcaterers, which are sold illegally in some markets in China. Some coronaviruses that infect pangolins are similar to SARS-CoV-2.

As SARS-CoV-2 spread both inside and outside China, it infected people who have had no direct contact with animals. That meant the virus is transmitted from one human to another. It is now spreading across the globe, meaning

people are catching it unwittingly catching and passing on the coronavirus. This growing worldwide transmission is what is now a pandemic.

Evolution Of Coronavirous

Scientists first identified a human coronavirus in 1965. It caused a common cold. Later that decade, researchers found a group of similar human and animal viruses and named them after their crown-like appearance.

Seven coronaviruses can infect humans. The one that causes SARS emerged in Southern China in 2002 and quickly spread to 28 other countries. More than 8,000 people were infected by July 2003, and 774 died. A small outbreak in 2004 involved only four more cases. This coronavirus causes fever, headache and respiratory problems such as cough and shortness of breath.

MERS started Saudi Arabia in 2012. Almost all of the nearly 2,500 cases have been in people who live in or travel to the Middle East. This coronavirus is less contagious than its SARS cousin but more deadly, killing 858 people. It has the same respiratory ~~syst~~ symptoms but can also cause kidney failure.

COVID-19 Pandemic in India

The COVID-19 Pandemic in India is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2). The first case of COVID-19 was reported on 30 January 2020. India currently has the largest ~~the~~ number of confirmed cases in Asia, with almost 8 million reported cases of COVID-19 infection, more than 1 lakh deaths and more than 7 million recovered.

The pandemic has left a severe impact on Indian economy, leading to a negative growth rate for the first time in decades. Nevertheless, the economy started to rebound after the lockdown was eased. Increased requirement for consumption had led the government and private firms to repurpose their factories and production lines for manufacturing of more hospital beds, PPE and ventilators. India emerged as the world's second largest manufacturer of PPE during the pandemic. The Union Government also launched a major Self Suffering campaign to substitute imported products with domestically produced counterparts, especially to replace goods imported from China.

COVID-19: Prevention and control measures in community

Preventive measures are the current strategy to limit the spread of cases. Early screening, diagnosis, isolation, and treatment are necessary to prevent further spread. Preventive strategies are focused on the isolation of patients and careful infection control, including appropriate measures to be adopted during the diagnosis and prevention provision of clinical care to an infected patient. Important COVID-19 prevention and control measures in community are listed below.

The most important strategy for the population to undertake is to frequently wash their hands and use portable hand sanitizer and avoid contact with their face and mouth after interacting with a possibly contaminated environment. To reduce the risk of transmission in the community, individuals should wash their hands diligently, practice respiratory

hygiene, and avoid contact with ill individuals and crowds, if possible. There are posters and brochures prepared by many organizations on all issues related to protection from COVID-19 and are widely used all over the world.

Social distancing is advised, particularly in locations that have community transmission.

Many countries have installed quarantine and Social / physical distancing as measures to prevent the further spread of the virus.

The measures can include:

- full or partial closure of visitors and limiting the contact between the residents of confined settings, such as long term care facilities and prisons
- Clean hands often. Use soap and water, or an alcohol based rub.
- Stay home if you feel unwell. Don't touch your eyes, nose or mouth.
- If you see COVID symptoms, seek medical attention.