A

PROJECTREPORT

ON

“ CORONA VIRUS”

SUBMITTEDTO

SHIVAJIUNIVERSITY,KOLHAPUR

INTHEPARTIALFULLFILMENTOFTHEREQUIREMENTOFDEGREE

BACHELOROFCOMPUTERAPPLICATION

B.C.AII(SEM-IV)

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JEEVANVIKASSANSTHA’S

ARTS,COMMERCE&SCIENCEMAHILA

MAHAVIDYALYA,TASGAON

(2020-2021)

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Departmentofcomputer

CERTIFICATE

Thisistocertifythat,

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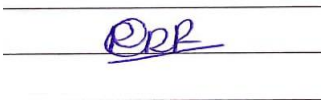
Miss. Pooja Dadaso rajmane.		
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DECLARATION

To,

TheRegistrar,

ShivajiUniversity,Kolhapur.

Respectedsir,

Weareundersignedherebydeclarethattheproject reportentitled“Biodeversity”isoriginalone. Ifourprojectworkisfoundtobecopied,andthenwe areliabletobepunishedbytheruleof ShivajiUniversity,Kolhapur.

ThankingYou.

ACKNOWLEDGEMENT

It is a move men to fgreat satisfactionandpleasure

forustogiveherebythankstoallofthosewhohelpedustocompletethisprojectnamed

“Biodiversity”inTasgaon.Weareherebythankful

toourH.O.D.Mr.MhamaneS.P.,Mr.MahajanS.A.,

forprovidingusrequiredfacilitiestocompleteour

projectandvaluableguidancegivenincompletion

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INDEX

Introduction

On late December 2019 in Wuhan city, in China, an unusual pneumonia was noticed with a link to an animal market that sells poultry, sh and other animals to the public. This event was soon reported to the World Health Organization (WHO). The causal microorganism had been identi ed as a novel coronavirus that was named COVID-19. COVID-19 soon spread to other parts of the world. The World Health Organization has declared the situation a pandemic.

The COVID-19 pandemic has impacted every aspect of human life and the global economy. The number of new cases and deaths is increasing at an alarming rate with no signs of control yet, making the estimates of its economic and other impacts uncertain. Depending on the level of COVID-19 impact in each country, as well as country-specific situations and capacity, the world's Governments are adopting different levels of interventions, including travel restrictions and lockdown to contain the spread of the highly contagious virus.

COVID-19 and its Effects on Environment

Due to the unusual outbreak of COVID-19, almost every big and small city and village in the affected countries like China, Taiwan, Italy, USA, France, Spain, Turkey, Iran, Germany, S Korea, U.K, India, Australia and many more, is under partial or total lockdown for a long period of time ranging from a few weeks up to a few months.

The major sectors contributing to air pollution are transport, industries, power plants, construction activities, biomass burning, road dust resuspension and residential activities. In addition, certain activities such as operation of DG sets, restaurant, landfill fires, etc. also contribute to air pollution. Under the nationwide lockdown, all transport services – road, air and rail were suspended with exceptions for essential services. Educational institutions, -2- industrial establishments and hospitality services were also suspended. As a result, air quality improvement has been noted in many towns and cities across the world.

Due to non-functioning of industries, industrial waste emission has decreased to a large extent. Vehicles are hardly found on the roads resulting in almost zero emission of green-house gases and toxic tiny suspended particles to the environment.

Due to lesser demand of power in industries, use of fossil fuels or conventional energy sources have been lowered considerably. Ecosystems are being greatly recovered. In many big cities, the inhabitants are experiencing a clear sky for the first time in their lives. The pollution level in tourist spots such as forests, sea beaches, hill areas, etc. is also shrinking largely. Ozone layer has been found to have revived to some extent. The pandemic has displayed its contrasting consequence on human civilization, in the sense that, on one hand, it has caused worldwide panic situation, but created a very positive impact on the world environment on the other.

Chapter 1

The Coronavirus is Changing the Environment Perhaps

the most important issue about COVID-19 and the environment is the question of how COVID-19 is affecting the present environment. As people all over the world settle into quarantine, traffic levels decrease and non-essential businesses close temporarily. In addition, lockdown will 12decrease overcrowding and the concentration of human activity, particularly in urban areas. The decrease in human activity is changing the very air we breathe as CO2 and other emission levels go down.

Decrease in travel will also play quite a large role in changing air quality and emission of levels of air pollutants. In short, COVID-19's impact on the human population's lifestyle choices will causechanges in every aspect of the environment that human activity is tied to. This includes not only air pollution levels, but also water quality and wildlife biodiversity.

Many are under the impression that decreased human activity outside auto-matically means abetterment of the natural environment. However, there are aspects of COVID-19's negative effect ton the environment that also must be discussed. Obvious negative changes for the environment include increased production of masks and medical waste, as well as higher levels ofwater and soap consumption.

All of the aforementioned changes in the environment, both good and bad, have profound effects on human health. Needless to say, changes to air quality, water consumption, and other environmental effects brought about by COVID-19 will directly impact human health both in the present as well as far into the future.

How COVID-19 is Affecting our Future Environment

The memory of the fear associated with the virus, as well as the habits that people picked up during the shift to quarantine will linger long after the pandemic abates. Humanity's outlook of the future is rapidly changing as the pandemic continues, and there seems to be more good than bad to this difference.

Firstly, the fear of infection is already motivating people to increase the development and usage of automated equipment. These technologies were already on the market before the virus, but the urgency of the situation brought on by the pandemic has pushed these previously marginalized technologies into the forefront of society's focus. Increased use of technologies foster greater adaptations and developments, and indeed much of these technologies are already seeing major positive changes as they expand to meet the growing demand. In short, there is now a highly viable market in developing automated equipment due to rising demands from health -conscious customers. Once people begin to use automated equipment and see their efficiency, it is likely that this increased usage will continue into the future after the pandemic. A lot of the reasons why the automated technologies weren't in popular demand before the pandemic was because people had only limited knowledge of them. However, the global situation is forcing humanity's hand, acting as a pressuring incentive for people to expand their knowledge and use of automated technology. In other words, the pandemic is a highly effective introduction to automated technology, and people are more likely than not to continue using automated technology once they become accustomed to it.

Secondly, many of these changes in present modes of thinking lead to major paradigm shifts in fields such as architecture and urban design. The coro□navirus has made people realize the important rolethat infrastructure and architecture plays in healthy living. Before the pandemic, health issues were considered by the average layman from an almost strictly biological per□spective. But now the

general public is becoming more and more aware of the modes of infection, as well as the role that public and private spaces play in spreading illnesses. This conscientiousness will no doubt influence future demand for home and public space design, indicating lasting change affecting generations to come.

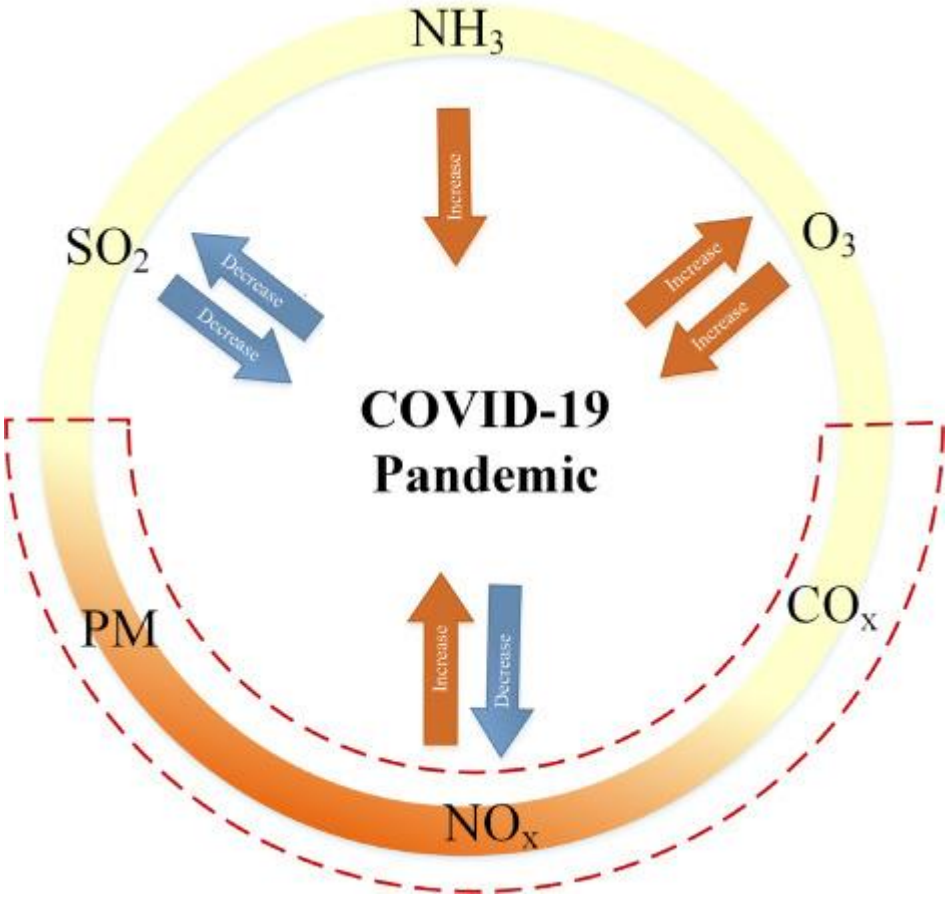
The Pandemic is Environment Dependent

Aspects of the environment such as temperature, humidity, and UV ray exposure are all factors that have been shown to affect the half-life of airborne viruses like the coronavirus. A shorter half-life can significantly reduce the infection numbers - that is, if the environment is able to impact COVID-19 in the first place. Whether or not the environment plays a big role in the life cycle of COVID-19 brings to mind another question: is COVID-19 a seasonal virus, or is it capable of becoming a synchronized

infection spanning the entire globe? It's important not only for scientists, but also for the general public to know these connections between COVID-19 and the environment.

Besides factors from the natural environment, the man-made geopolitical environment also may play a role in the severity of the COVID-19 pandemic. Developing countries and first world countries are reacting to the virus very differently. This is because many characteristics of developing nations puts them in a poor position to handle the epidemic once it expands into their borders. Understanding the various geopolitical factors that can im□pact health issues is vital to the process of adapting approaches to solve the issues with minimal collateral damage.

Throughout the book, many of these topics will be explored in depth to yield a greater understanding of the interconnectivity between COVID-19 and the environment, as well as the role that humans play within this interaction. different sources. Throughout the course of the book, we hope to spread more awareness about the way that epidemics and the environment mutually affect each other, as well as dispel common miscon□ceptions about this interaction.

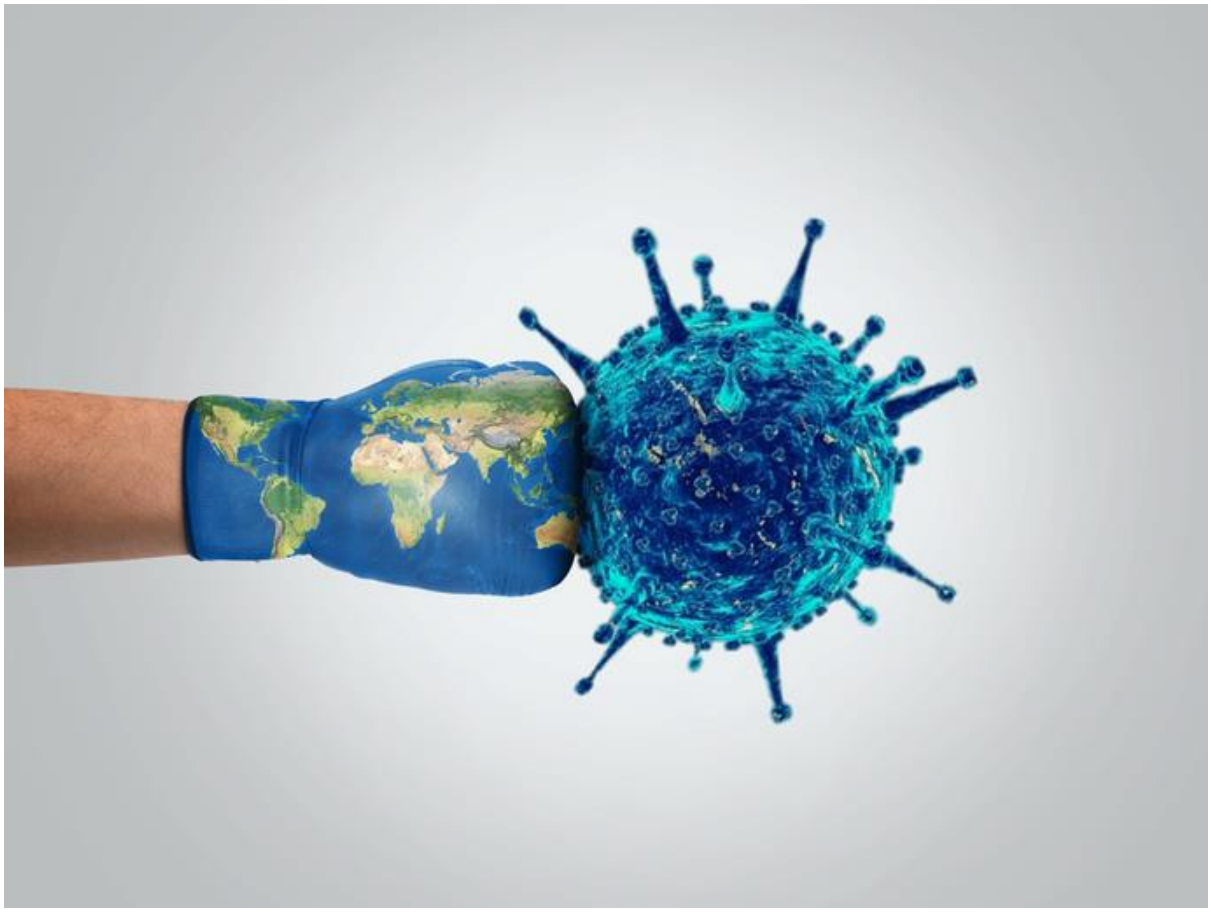


Chapter 2

COVID-19 and Climate Change

The current pandemic has really taken the whole world by storm. Countries around the world have begun discussing what the future may hold and the overall lasting impact this pandemic will have on the earth. As we look at the Earth's history, we can tell that humans have been attributed to most of the damaging effects. Over the years, the amount of scientific research done on combating global emissions have risen astronomically. More and more nations are agreeing on ways to combat this global issue. Now with this new global issue, there needs to be substantial change in order to mitigate the ef fects of CO2 in our atmosphere. During these trying times of the COVID-19 outbreak, there has been rising concern of what will happen to our sur rounding environment and the ongoing issue of global warming. Though the outcomes of the pandemic have been more than horrendous, there have been some positive outcomes in regard to CO2 emissions. As the world becomes subsumed to disaster and outbreak, the CO2 emissions and the very ozone layer effects we once worried about have shown some surprising turn of events.

The research of the ongoing COVID-19 global pandemic has just begun.As this spreads, we can understand the changes it has on not only human population and migration but also the factors on climate change. This topic will encompass the ozone layer and its effects on COVID-19 pandemic. The ozone is a layer that is helping to hold in the heat from natural sun's radi ation like the other greenhouse gases such as carbon dioxide, methane, ni trous oxide and other industrial gases.5 Greenhouse gases trap heat from the sun in Earth's atmosphere which has kept the climate habitable for humans and millions of other species. Those gases over the last couple of decades have been out of balance due to ongoing human activity which is causing climate change and other harmful secondary effects. Climatologists through out the decades have been warning governments and institutions about the excessive amount of greenhouse gases in our atmosphere that is trapping too much heat which is slowly making our global average temperature increase. The risk of the ozone not only at the planetary level but also can have in creased levels of UV radiation that will reach earth and harm those on it.



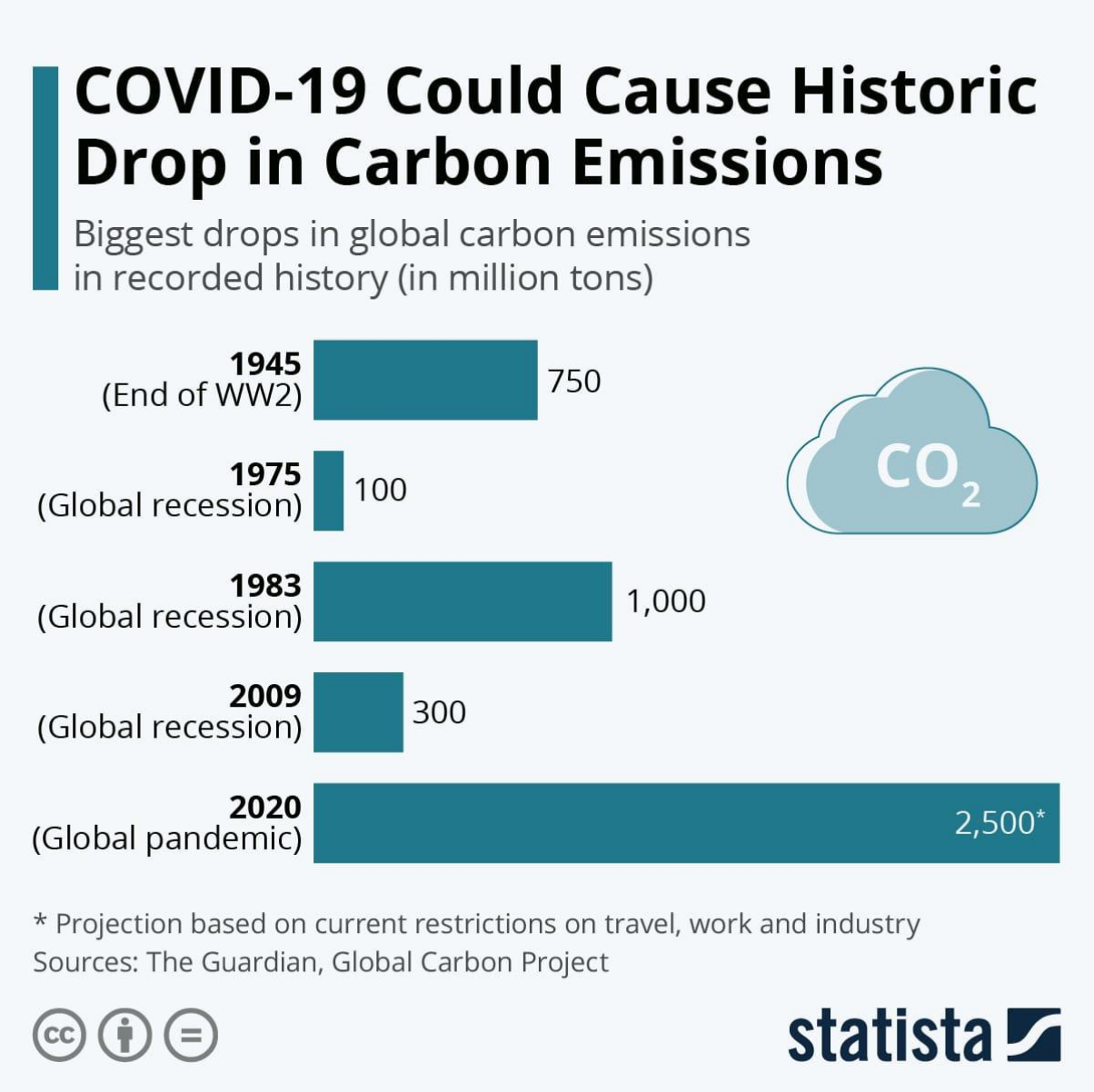
Decreased CO2 Emissions

It only took a few weeks before the once polluted cities in major urban areas like Shanghai and New Delhi became clear of a large amount of smog from pollution in the air. The once air polluted areas were now displaying skies and rays of light that weren't visible before. In India there were photos cir□culating of the Himalayas which were now visible. They were obscured by heavy smog and pollution before. This is a familiar type of event that hap□pened in many parts of the world. Nature began to feel like it was restoring itself. Before the pandemic outbreak, the emissions of carbon dioxide were rising world-wide. Studies show that they were rising 1% per year over the previous decade.3 This change in CO2 in our atmosphere seems to be very minimal but in actuality has any drastic effects on the natural surroundings. Carbon dioxide in itself increases temperatures, can extend the growing season and can increase humidity levels in certain areas of the world. All of these effects which were just mentioned also have a domino effect causing a number of secondary effects such as a fluctuation in soil moisture lev□els and stress on plants. A study published in the Journal Nature Climate Change shows that the daily emissions have dramatically decreased, by 17% or 17 million tonnes of carbon dioxide.6 This occurred globally during the peak of confinement and quarantine measures in April. These numbers were compared to the mean daily levels that were

taken in 2019 dropping to levels that were observed during 2006. Despite this, when looking at carbon emissions as a collective and not at an individual level, the concentration of carbon dioxide in the atmosphere was the highest ever recorded in human history in May 2020.

The emissions from day to day surface transport such as cars, railways and other forms of transportation accounted for almost half of the decrease in global emissions during peak confinement.3 Emissions from industrial plants and from generators powering a multitude of cities account for further 43% decrease in daily global emissions. Other pollutant industries such as avia□tion were shut down during lockdown but only accounted for 3% of global emissions, therefore had a 10% decrease in emission during the pandemic.3In this study they looked at individualcountries and saw that on average 26% of the emissions decreased at the peak of their confinement.3 There is clear indication that society's response to the global pandemic has created a substantial impact on our CO2 emission levels. These numbers seem to be temporary as our social response happened due to the pandemic, they don't reflect any sort of structural or institutional change.

creating systemic change, we can strive towards long term goals.

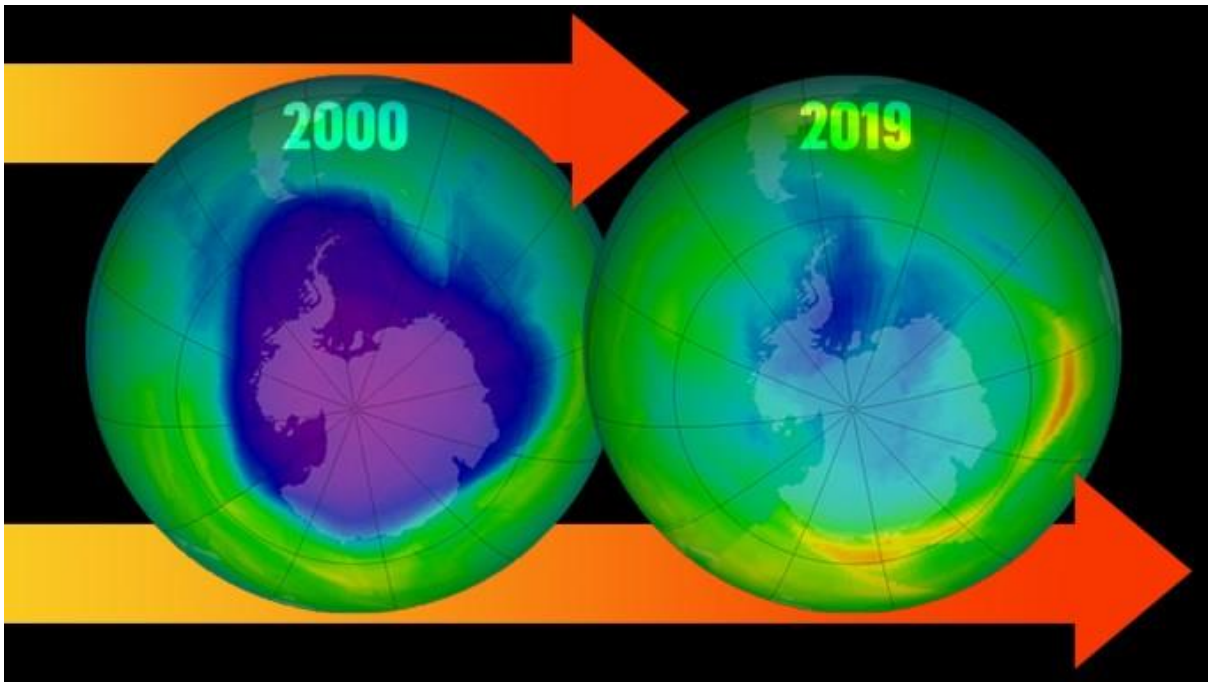


Ozone Layer Effects on COVID-19

The ozone is essentially the region of the upper atmosphere that contains high concentrations of ozone molecules. Its primary role is to effectively block almost all solar radiation of certain wavelengths from reaching Earth's surface including UV and other forms of radiation that can kill or harm liv□ing beings on earth.7 Back in the 1980's ozone depletion was a hot topic and the issue arose by many leading scientists. The ozone depletion they were examining at the time was causing the southern air currents to be driven fur□ther south, subsequently causing major climatic changes all across the globe but primarily in a few concentrated areas. These changes include differing rainfall patterns and ocean currents. These effects had lasting impacts on ocean currents and salinity in places like South America, East Africa, and Australia.4

More recently, there are studies being done that claim that the ozone hole they were concerned about in the 80's have just closed weeks after it formed over the Arctic circle. While pollution levels are continuing to go down worldwide amid the pandemic, they deem it's unlikely that it's due to the global lockdown. Scientists believe this hole was not caused by air quality changes or human activity but by a strong Arctic polar vortex.1 It is common

to have ozone holes developing over the Arctic and Antarctic every year especially during the spring months. It seems that there is a false narrative circulating around the internet that the ozone has started regenerating and healing due to worldwide lockdown procedures. Many images including wild animals trotting around, dolphins in Venice canals and many others that have been circulating through various social media platforms to present this idea in a more digestible fashion. Unfortunately, this is not the case.



Chapter 3

Air and Water Quality

The spread of COVID-19 in this short period of time has brought forth a dramatic decrease in industrial activities and mass production. These restric□tions on processes that would normally cause great harm to surrounding en□vironments have been a blessing for nature. There are reports from countries worldwide that indicate environmental conditions including air and water quality are improving. As emissions continue to decrease the quality of air in even the busiest of cities have shown an unprecedented improvement. With the help of remote sensing images, researchers are able to map the areas that had a significant decline in air pollution after lockdowns. What is important to highlight is that factors influencing pollution in the air also have an effect on the water conditions on the surface. The atmosphere and surface water quality are highly connected. The systems are essentially integrally linked. This raises other concerns such as viral diseases being spread through par□ticulate matter and atmospheric pollutants being carried to our groundwater systems.

Air Quality

Air pollution is a highly important topic for many researchers across the world because it has a big toll on human health in populations. The partic□ular importance is surrounding the studies that show that air pollution is linked to influenza and other viral diseases. There is more research being done on the respiratory tract and certain infections that can be caused by severe air pollution, particularly high nitrogen dioxide content. The particu□late matter which are suspended in the air can be hazardous and can remain in the air for a prolonged period of time. If viral particles, in particular, are deeply inhaled within the respiratory tract, the virus can potentially pen□etrate the lung's epithelial cells and move to other organs and vital parts of the body causing an infection.2 A study that was done during the SARSe pidemic in China in 2003 found that mortality rates were higher in urban regions with high levels of ambient air pollution compared to low pollution areas. This was measured by the Air Pollution Index (API). However, it is important to note that studies show both household and ambient air pollution have led to risks in certain repository diseases and is not just one of these factors but a combination.

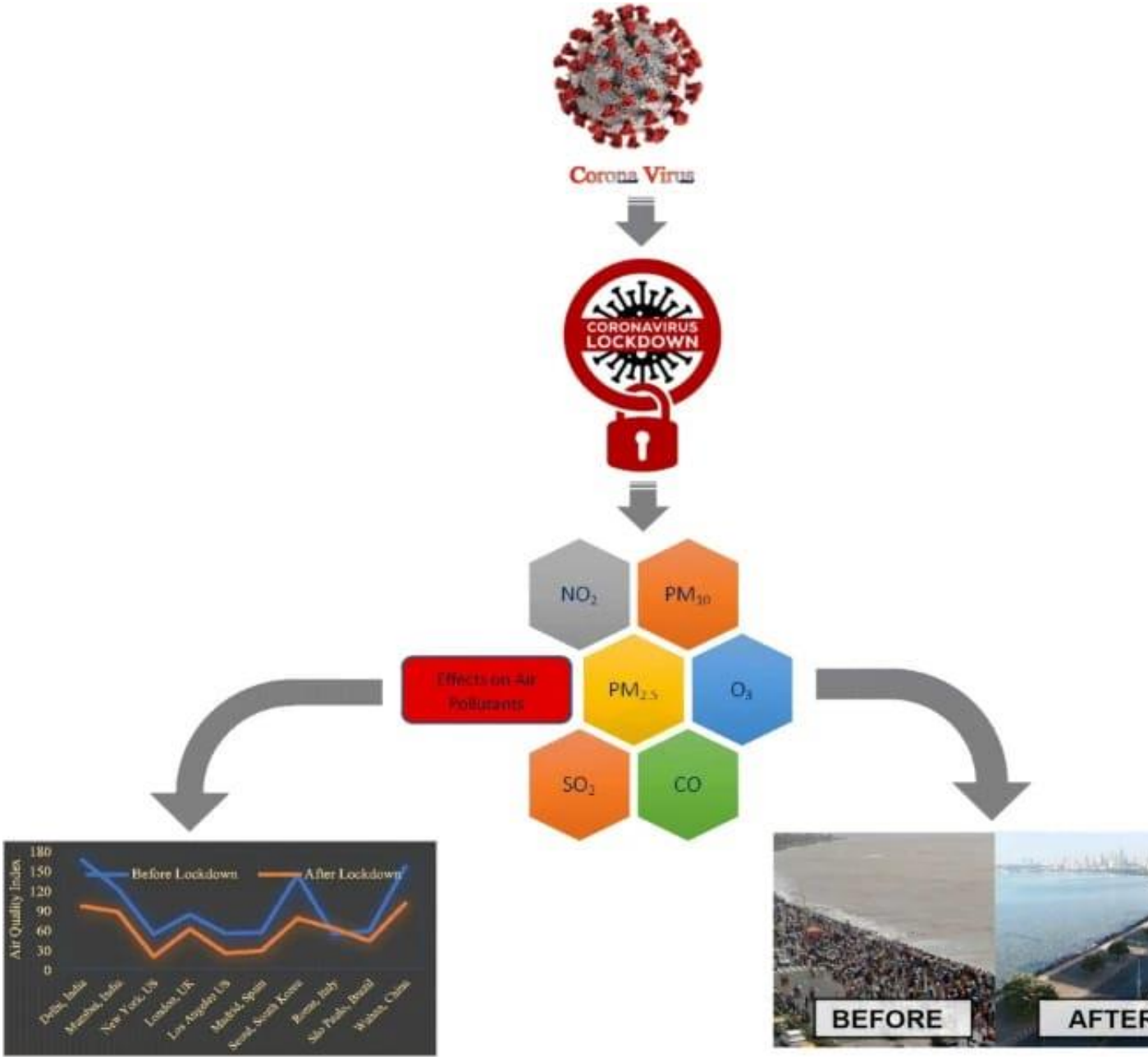
The risks of COVID-19 have been claimed to be transmitted more rapidly between people living in close proximity such as centralized urban communities with high densities.The Centre for Research on Energy and Clean Air reported that methods to contain the spread of the coronavirus such as mandatory quarantine for individuals and travel restrictions has resulted in the outcome of a 25% reduction of carbon emissions just in China.1What they did in this study was compared China to the two different time periods.

Water Quality

What is happening in our air also has impacts on the other Earth Systems such as water quality and health. The pandemic has resulted in a dramatic decrease in atmospheric nitrogen pollutants worldwide yet the impacts on deposited nitrogen are still being studied. The effects this has on aquatic ecology remains unknown. In general, the overabundance of nitrogen in our waters and other harmful chemicals can cause excessive algae growth. When these plants decompose, the processes consume an enormous amount of oxygen and the water can be left depleted of oxygen that is needed to sustain life, thus affecting the various aquatic life in the waters. Inherently water systems are quite complex. Water quality improvements can take time to show up and carry by location. Water in a sense needs to infiltrate the ground, which in itself filters out most of the pollution. If the pollutants have the ability to reach the groundwater system, it can stay there for months before it's swept back into lakes and rivers and the rest of the hydrological cycle. Due to the complexity of water systems and the outlook of poten□tial water improvements for the time being due to the level of urbanization occurring, many scientists believe that water improvements are going to be only for the time being. The improvements are more likely going to be at local scales.

There have been varying results of this lockdown in different countries. The most immediate results are obviously on a local scale. In India for example, there was a strict 21-day lockdown across the nation. Many industries and offices closed due to the lockdown, restricting industrial pollutants and waste. The Yamuna river is known for its tons of extreme toxins and effluents that are discharged freely into it. This type of system is not uncommon throughout India. It is estimated that every day almost 40 million litres of waste and sewage enters river bodies and only 37% of that is adequately treated.5 The nationwide lockdown imposed on March 25 has suggested signs of improvement in water quality. Since all the major polluting industries were closed, the toxic load was lifted temporarily from the river. The issue that arises is how long will these effects last and will things resort back to normal after lockdown or will the lack of industries at the moment exacerbate these effects further? With the help of remote sensing technology to produce high quality images, scientists were able to quantitatively demonstrate the improvement in surface water quality in terms of suspended particular.

ulate matter (SPM) in Vembanad Lake, which is the longest freshwater lake in India.7The SPM concentration during the lockdown period decreased by 15.9% on average compared to the period before lockdown.7These findings also draw further attention to what will happen after the lockdown period. Due to the pollutants decreasing considerably because of industries being suspended for the time being, there needs to be considerable action done to keep this trend moving in this direction even after COVID-19.Although there have been positive impacts there are still growing concernsover the health of our waters on a long-term scale.


Corona Virus
CORONAVIRUS LOCKDOWN
NO_2
PM_{10}
Effects on Air Pollutants
$PM_{2.5}$
O_3
SO_2
CO
Air Quality Index
180
150
120
90
60
30
0
Before Lockdown
After Lockdown
Delhi, India
Mumbai, India
New York, US
London, UK
Los Angeles US
Madrid, Spain
Seoul, South Korea
Rome, Italy
Sao Paulo, Brazil
Wuhan, China
BEFORE
AFTER

Chapter 4

Impact on Wildlife and Nature

This pandemic which brought forth tragic circumstances to human life but has also provided important insights into human and wildlife interactions. The interest lies on how wildlife and mother nature has responded to these new conditions. The lockdown measures being done by humans have not only created a lasting impact on the environment and air quality, but a so for the surrounding wildlife. COVID-19 in itself is quite complex. To understand this more clearly, it's better to look at Coronavirus as a large family of viruses.2 Some of these viruses cause cold-like illnesses while others cause illnesses in various types of animals such as cows, camels and bats.2 There is still much to learn about the virus, but it appears that it can spread from people and animals in various situations. It is also important to realize the impact it has on wildlife as an entity. The global pandemic also had some interesting effects on nature. These effects are directly caused by the virus it□self, but more so the human led impacts as a result of lockdown and reducedtravel. We will begin by discussing the impacts that COVID-19 have on our natural surroundings and ecosystems.

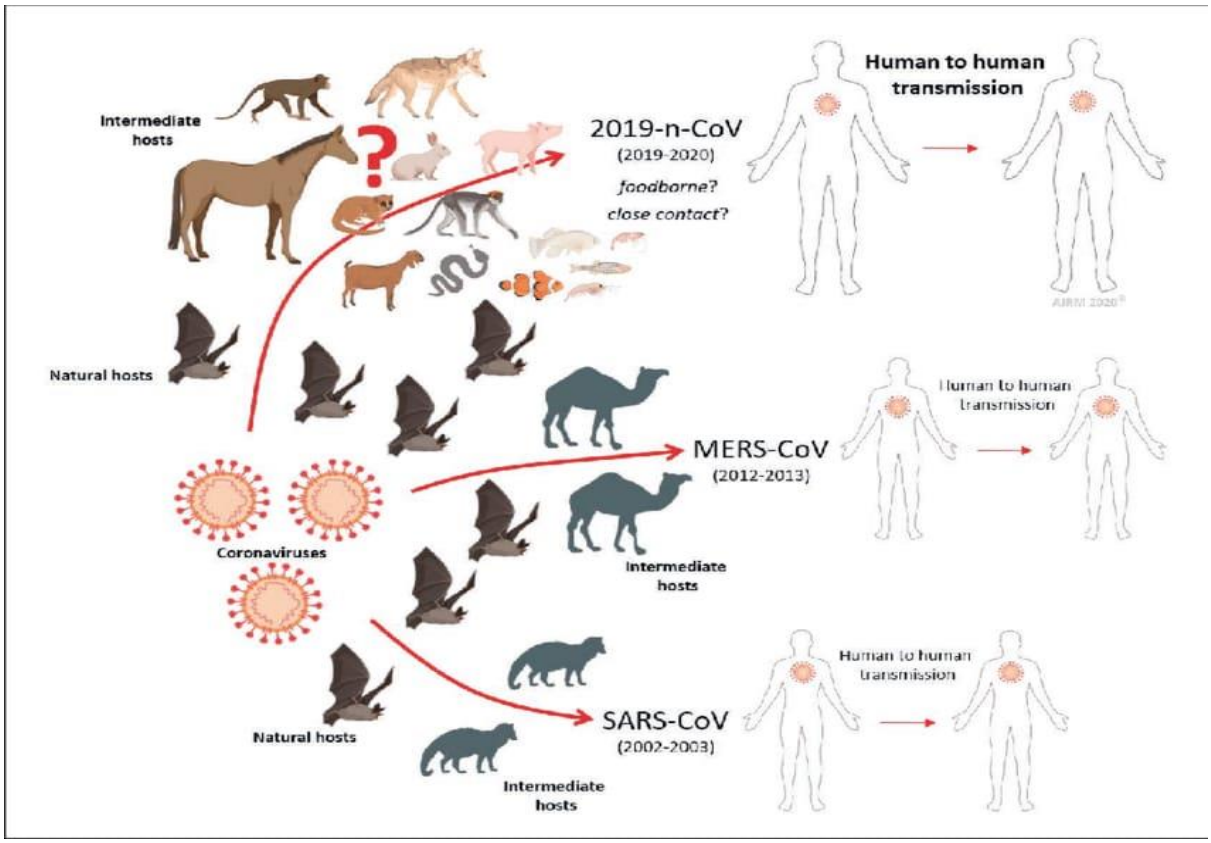
Nature

Ecosystems in nature function like the human body. When the body is healthy like a forest with diverse species and a balance in animal relation□ships they are less likely to be prone to diseases and potential threats. In turn, there is a common misperception that nature is "getting a break" from human activity during the pandemic. The main issue people are trying to raise currently is that outside the main urban areas the situations becomeExtreme problematic. In rural areas, there is an ongoing increased pressure for natural resources. There have been reports of criminal activity involv□ing land-grabbing, deforestation and illegal mining during these times. Due to the fact that governments and institutions are focused on battling this pandemic instead of using resources for conservation purposes, it has led to numerous instances where people are illegally extracting natural resources. There are numerous areas where activities and sites are left unguarded leav□ing easy access and ways to get away with these types of criminal activity without any sort of government intervention. These acts are expected to only increase until economies rebound and governments are able to shift their focus again on environmental conservation.5has worsened during the start of the pandemic. The panic and urgency of the pandemic has continuously diverted the attention away from the ongoing deforestation issues. Essentially the acts of deforestation have only exacerbated rather than improve during the pandemic. The issue with deforestation is that it takes away one of the largest carbon sinks in the world. These carbon sinks act as huge atmospheric carbon recycle areas so that trees and other plants can use up a big chunk of the carbon dioxide. This is only contributing towards climate change. The results of the deforestation that are happening in major parts of the world will see the outcome in years to come. Events that are likely to occur because they are indicators of the ongoing deforestation issues are droughts, fires, and extreme weather.

Wildlife

Due to the decrease in human activity during quarantine, there has been more wildlife activity. The start of lockdown also initiated a drop in tourism where this had positive outcomes for certain animal populations. Coastlines and beaches dropped in visitors leaving the animals who reside there to be able to move more freely and produce offspring with ease. Similar success stories were echoed in other regions of the world. There are some studies that indicate that the decrease in human activity really brought forth these positive results of freeing up space for wild animals. There have also been numerous stories circulating on how the pandemic has impacted animal mi□gration. There have been many unusual animals being spotted in urban cities that were not commonly found there before the pandemic. With this unfor□tunate increase of mining and logging, this ultimately affects the habitats of animals living in these areas. The animals are then essentially forced to be confined and live in more tight areas, coming into contact with humans moreoften. This can offset a bunch of risks such as transmission of diseases.

The spread of COVID-19 has really only exacerbated the effects of things that were already happening. The pandemic is essentially serving as a wakeup call to our habits and actions as mankind. One interesting topic that arises when looking at the pandemics impact on wildlife are the apes. The pandemic is not only affecting human beings, but many other species are impacted as well. The great apes share about 85% of the same DNA we as humans have, the only issue is that they don't practice social distancing and merely go wherever they please in their habitat. As of now there have been no cases of COVID-19 among apes/primates.



Chapter 5

Health Effects of Changes in Environment

The drastic changes in lifestyle brought about by the pandemic has led to equally dramatic changes to the environment as people shack up indoors amid quarantine. These environmental changes in turn affect humans in var□ious ways. Factors impacted by the public response to the pandemic include air quality, waste production, deforestation, water use and biodiversity. All of these factors have important implications for human health, which will be explored in this chapter.

Air Quality

With everyone staying at home, the decrease in factory production as well as the drop in traffic has decreased the amount of air pollutant released into the atmosphere.7 However the positive impact of this decrease in air pollution is not immediate, seeing as how the recent decrease in pollutants is mini□mal compared to the amount of pollution already in the air. Decrease in air pollution doesn't mean what is there just goes away, greenhouse gases in the atmosphere are still at large, producing record temperatures yet again this year.7 In addition, the economy cannot stay in this stalled state forever, and reopening would place air pollution levels right back where it was, potential□ly even higher as the economy scrambles to produce in order to catch up to what it has missed during the closedown.7 With that in mind, there are still some positive postulates about the potential health benefits from an increase in air quality.

It goes without saying that air pollution has an effect on overall lung health. However, a less obvious effect of air pollution is its negative impact on the circulatory system.2 Different components of air pollution act differently within the human body. For example, nitrogen dioxide from traffic and sulfur dioxide from burning fossil fuels can reduce lung function and exac□erbate asthma.5 Out of all the components of air pollutants, by far the worst for human health is particulate matter, some of which are small enough to enter the bloodstream to increase the risk of cardiovascular illnesses.5 The majority of particulate matter in urban areas is generated from the burning of fossil fuels by power plants, industrial facilities, and vehicles.5 All of these sources of particulate matter have seen a drastic decrease in their use during the quarantine, leading to postulation of a possible decrease in air pollution due to inactivity of pollution sources. In sum, it is evident that air pollution has direct effect on human health, and thus a decrease in pollutant release levels during quarantine can be assumed to have a reductionary effect on the prevalence of many illnesses.

This positive effect will likely be most visible within young children and older adults, who are sensitive to the effects of air pollution. Young chil□dren not only breathe in more air per body mass than people of other age groups, but they also have a still-developing respiratory system and immune system.2 The combined effect of the aforementioned factors makes this age group particularly vulnerable to changes in air quality. Aweaker immune system and may have undiagnosed cardiovascular issues that can worsen under the effects of air pollution.5

Increased Water Use

The usage of water has seen a worldwide increase as people become more aware and concerned about modes of infection.7 Although on an individ□ual household's scale, this increase in water usage does not seem to be a large change, however multiplying this slight increase by the couple billion households all over the world, this change in water use then becomes a sig□nificant statistic with many implications.7

It is a well-known fact that 75% of the Earth's surface is taken up by water. However, only 1% of all that water is freshwater available for human con□sumption. While it's true that water in the atmosphere can be collected and the salty sea water can be filtered, both processes are complicated, costly, and economically unfeasible. Therefore, the human-usable portion of the water cycle consists only of the places near or on the surface of the groundwhere rainwater and snowmelt collect. Because of this restriction, the entire human population is finding water to be an increasingly scarce resource as demand and use of water far exceed nature's rate of freshwater production.

Water is not destroyed when households use it for various purposes. Instead, it is contaminated and converted into an unusable part of the water cycle.1The term 'wasting water' doesn't mean that water is somehow disappearing after it's used, rather it refers to the conversion of usable water into unusable parts of the water cycle, which then decreases the overall supply of usable water.1 For example, if nature was able to recycle dirtied water back into usable water faster than human civilization is using up freshwater, then there would be no water waste.

Counter to the anecdote, in reality nature's water cycle does not produce freshwater at a faster rate than the rate at which it is being used up.1 This phenomenon is especially visible in many African countries as well as de□veloping countries like India - countries that have alot of population but not enough natural water resources to keep up with the demands of its people.

Water filtration is an energy intensive process that also takes up a lot of time and money.3 From another perspective, wasting water is equivalent to wast□ing the energy-intensive process of filtration. In other words, the resourc□es used up in the steps of this filtration process are being wasted.3 These resources include non-renewable fossil fuels that add to the current problems with air pollution and climate change when burned.3

Thus, the impacts of wasting water has complex, multifactorial effects on human health. On one hand, wasted water must be treated, using up a lot of resources in the process. The treatment process not only depletes resources from other potential uses, but also releases pollutants that could be detrimen□tal to human health. On the other hand, drawing increased amounts of water out of ground aquifers is a highly unsustainable process.1 Thus the sudden increase in water usage during the epidemic could have a negative effect on the long term availability of water resources all over the world, which puts countries with already scarce water resources at risk.

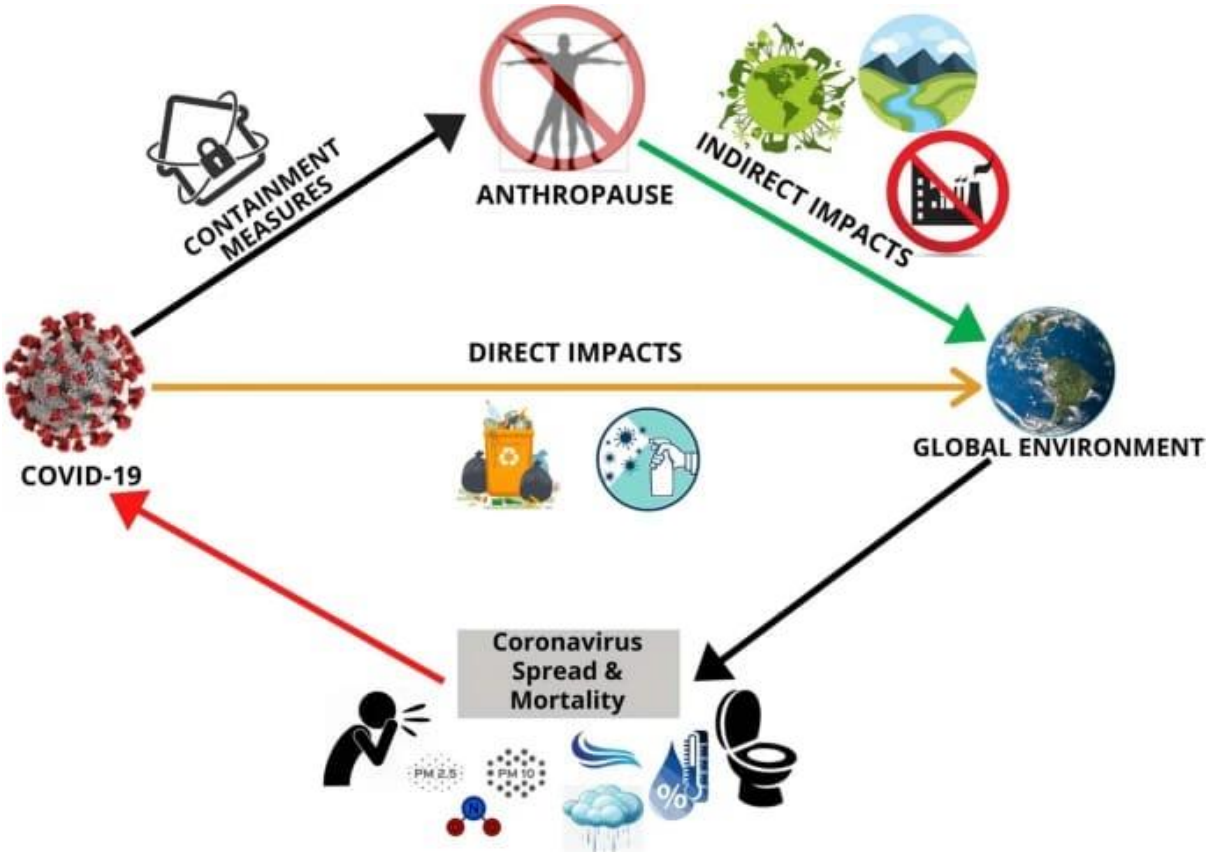
Wildlife and Biodiversity

The decrease in human activity during quarantine has given wildlife more breathing space. During the quarantine, the drop in tourism rates has had positive effects on sea turtle populations as they were able to lay eggs on beaches without interference from tourists.7 Idle fishing boats meant that at least some of the fish population has been allowed a moment's respite, and the decrease in road traffic has also decreased roadkill rates significantly.7Perhaps the best effect of the Coronavirus is its effect on the use of animal parts in traditional Chinese medicine.7 Due to the Coronavirus scare, there has been assumptions made about a possible decrease in demand for medic□inal ingredients involving animal parts. This is good news for endangered species such as pangolins, which are often a prized ingredient in traditional Chinese medicine.

It must be noted however, that there is some fake news intermingled into the information available online. For example, the dolphins and swans in Venice canals, wild turkey in Oakland, and puma in Santiago are not sights specific to the epidemic.7These animals were already known to visit urban and suburban areas long before the epidemic began. However, decreased human activity does produce good results in terms of freeing up space for wild animals. Though the epidemic didn't make them appear, the lesser boattraffic in Venice did help the dolphins. Other areas where human civiliza□tion overlapped natural habitats (i.e. when roads cut off natural crossings) has seen similar sites of increased animal activity in the absence of human interference.7The effects of lessened human impact on the ecosystem is not obviously linked to human health, but it is well known that biodiversity has important implications for the natural environment that human food security is entirely dependent on.13 Crop diversity depends on the availability of wild species that breeders must use to crossbreed with domestic species.13 On top of that, the overall ecosystem plays a large role in the crop growth itself. From providing pollination, to nutrient cycling and pest control, ecosystems and biodiversity is no doubt vital to the agriculture system that feeds the world.

Humans derive medicine from natural compounds. The medicines used in daily life all had connections to nature's collection of unique chemicals.11From secondary plant compounds, to animal toxins, to the antibiotics pro□duced by bacteria and fungi, nature provides humans with a host of chem□icals to discover and use.11 Loss of diversity before scientists have had the time to adequately explore the potential application of natural chemicals means that many medicines will never be discovered. Afterall, how can sci□entists work with an already extinct species? Thus, loss of biodiversity willdirectly impact human health by influencing the number of pharmaceuticals available to humans.

But how does less roadkill and more turtles link to these grand benefits of biodiversity? The answer lies in the incredible interconnectivity of nature. No one can say exactly what butterfly effect can be caused by having more turtles, but one message is very clear: the only way that humans can 'save the planet' and themselves is by increasing biodiversity wherever possible.



Deforestation

Brazil's deforestation has only worsened during quarantine as the urgency of the Coronavirus diverted attention away from the deforestation issue.

This increase in deforestation is taking away one of the largest carbon sinks on the planet. Brazil is home to the Amazon rainforest, which acts as a huge atmospheric carbon recycle station as its many trees use up atmospheric carbon dioxide. Deforestation exacerbates climate change, which means more unpredictable weather changes much like what 2020 has already seen. The results of climate change have devastating effects on human health a different areas around the world each face their own climate change induced issues. Forest fires, droughts, locust swarms, and extreme rainstorms are only a taste of what is to come; and deforestation is only accelerating the process of climate change.

A more direct effect of deforestation is the increase in disease that it brings.12The sudden clearance of large areas of forest leaves perfect breeding ground for malaria-carrying mosquitos as shrub vegetation grows in.12 Other factors also come into play in increasing the mosquito population, but overall one thing is clear: deforestation has a direct impact on the spread of infectious diseases that are detrimental to human healt.

Increased Waste Production

Masks are commonly made from polypropylene polymer derived from pe□troleum oil.8 Not only is the production process costly, the disposal of masks is also problematic.

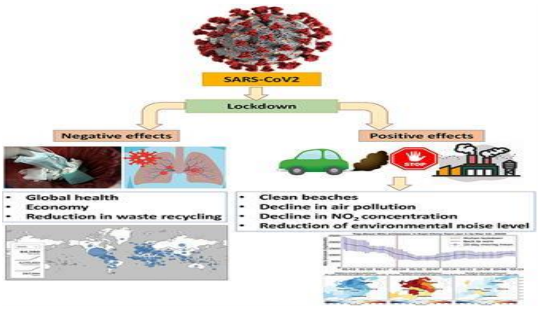
Chapter 6

Negative Impacts of Covid-19

With the start of quarantine around the world much of the world's popula□tion moved indoors, staying in their homes. This caused the air to clear up as CO2 emission caused by factories and transportation decreased, beaches and bodies of water started to clear up and animals started to return to their habitats and roam around freely. Many people were optimistic that we were heading in a positive direction in terms of the environment and climate change. But, as quarantine rules eased and governments tried to boost up their economies once again, emissions started to go up again and we began to pollute once again. Many experts have noticed that even with the promis□ing beginning our numbers have returned to pre-covid and now instead, we have added more problems as a result. Covid will lead the world to a futurewith more traffic, more pollution, changing government priorities and cli□mate change that is now worsening faster. "We still have the same cars, the same roads, the same industries, same houses. So as soon as the restrictions are released, we go right back to where we were," says Corinne Le Quéré, professor of climate change at the University of East Anglia in Britain. Back during the 2007-2008 financial crisis, emissions dropped and then ros back up, many experts are worried that this will happen again3 An example of this can already be seen; China was the first country to reduce quaran□tine rules and the air quality improvements that were seen in February and March as manufacturing and transportation largely came to a halt have now disappeared. With the constant changes and the pandemic still on the rise in some countries it is too soon to have definite answers but there are many red flags we must pay attention to.Changing Government Priorities and Easing of Laws As countries begin to ease up quarantine rules and open up once again we are starting to see many changes. Many countries were forced to close up businesses and factories due to the health of their citizens and were hit with a decline in their economy, and now they are desperate to boost it back up.For example, a new coal project has started in northern China, this in the future will lead to multiple health and climate problems because these infrastructures are used for many years.2 As new projects are getting approved.and factories start to open again, pollution levels have returned to pre-coro□navirus levels and in some places have surpassed. Similar actions can be seen happening around the world. Another example is in the U.S; industries such as automobiles, fossil fuels and airlines have been pleading for cash, regulatory rollbacks and other special requests which the government is complying to.2 Another industry benefiting is the oil and gas industry in the U.S. The aid they have received includes tax changes, breaks on the royal□ties they have to pay to drill or mine on public land, as well as, access to the Federal Reserve's $6000-billion Main Street Lending program2. Lukas Ross who is a senior policy analyst for Friends of the Earth, an advocacy group says that "the program has already been modified specifically along the lines the oil and gas industry has requested." The Trump administration has also pushed many regulatory rollbacks which includes; suspending enforcement of air and water pollution regulations, suspended a requirement for envi□ronmental review, cut back the states' ability to block energy projects and public input on new mines, pipelines, highways as well as other projects.

Waste Management and Recycling

Waste and recycling has greatly been impacted due to COVID-19, there has been an increase in waste production and a decrease in waste and recycling management. This reduction continues to pollute and contaminate our water ways, the air and our land. There are some cities in the U.S which have ceased recycling programs due to concerns related to spreading of the virus in these recycling centers.5 In many European countries, such as Italy, have stopped sustainable waste management measures.5 An example of this would be infected residents not sorting their waste. Single use plastics have once again increased, many companies have switched from advising customers to bring their own reusable bags to using single-use bags, others such as Starbucks, have put a temporary ban on the use of reusable cups.5 Single use plastics can still house viruses and bacteria. With the lockdown many people started to online shop and order food more frequently, this has resulted in an increase of domestic, organic and inorganic waste. The increase in waste can lead to a variety of environmental issues, these included, but are not limited to; soil erosion, deforestation, and air and water pollution. Another source is the increase in medical waste, hospitals in Wuhan, the origin of the coro□navirus, produce an average of 240 metric tons of medical waste per day during the outbreak, compared to a pre-corona average of less than 50 tons.5All around the world there has been an increase of PPE waste, this includes things such as gloves and masks. While there is no evidence of the survival of the SARS-CoV2 virus in drinking and wastewater China has ordered wastewater treatment plants to increase the use of chlorine as a means to strengthen their disinfection routines.5 Increasing the use of chlorine in wa□ter can be harmful to people's health. A decrease in waste management and recycling can have an impact on the environment in a variety of different ways, these will be long-term changes.TrafficWith the increase in social distancing, the need to stay 2m (6 ft) away from others and the limit to the number of people who can hang out together has made it hard for many to use public transportation, many people fear contracting the virus. This has led to people using cars instead of more eco-friendly options of transportation such as public transportation and carpooling with others. A transportation news website fears for a post-quar□antine "carpocalypse". In China, the first country to lift the quarantine rules, has reached pre-coronavirus traffic.Many people still have yet to resume commuting and travelling. In the past many cities and countries around the world have pushed to expand bike lanes to try to shift away from bus, subway and train use but now it is unsure if it will be enough. It is still early to have qualitative data to analyze but many experts believe that traffic will increase and this will create a lot more pollution. The Amazon forest has been used by the native people for food and resourc□es for thousands of years. These resources included rubber, palm fruits, nuts and many different medicines2. Since the 1970's and 80's deforestation has begun. The deforestation is due to highways such as the Trans-Amazonas and the soy highway2. Illegal logging has continued and accelerated during Covid-19. According to satellite data from the space research agency INPE, since April 2020, 64 percent more land in April 2020 was cleared than in April 2019, this is true even with 2019 being the biggest year for deforesta□tion in the Amazon in more than a decade. Brazil's president, Jair Bolsonaro has been an advocate for increasing commercial exploitation of the Rainforest2.



“You can do whatever you want in the Amazon and you won’t be punished.” The pandemic has been used “as a smokescreen, a distraction” to cover up the deforestation and to allow the destruction to continue. Brazil, the Ama□zon and its indigenous population has been one of the worst hit parts of the world. The deforestation has added a second crisis and the two issues are threatening to merge. Once vegetation has been cleared it is typically set on fire. Starting in July, once the vegetation has dried the thick smoke that it creates can lead to heart and lung problems to arise in those that live near□by2. This occurs every year but this year it is much worse with Covid-19, which is a respiratory illness. Additionally, those who are suffering from the illness can experience aggravated symptoms due to the smoke, this puts an additional pressure on the hospitals which are already struggling with the pandemic. The Amazon rainforest is an important resource to all around the world and is home to 10% of the world’s species.1 If the deforestation continues to occur it will decrease biodiversity, a loss of medical advance□ment and treatment - 90% of human diseases are treatable with drugs which include ingredients from the Amazon, rainfall will decrease creating a ripple effect, drastically changing the world climate along with many other issues that will arise.1

Changes to Make

It is still too soon to have definitive answers to all of the impacts Covid-19 has had on the environment but that does not mean we have to wait to make changes. It is important for everyone from the government to businesses to individual citizens to make changes in their lifestyle before it is too late. Certain questions arise for the government; what will their priorities be, will governments try to boost the economy by using old, polluting industries such as fossil fuels and oil or will they encourage a “green stimulus” and use funds to create jobs and fund businesses in areas such as clean energy and energy efficiency? It is important for them to use recovery funds towards a future which is low-carbon. When quarantine bans lift the global economy is going to rise once again and activity is going to return in most countries, and a short-term decrease in greenhouse gas emission is not sustainable. There are changes that individuals can make as well, for example if possible try to grow your own vegetables to limit the number of plastic bags used and online grocery shopping. Other changes that can be made are; using public transit with proper protection and social distancing, using reusable masks and other forms of PPE, if you do wish to shop online choose to shop ethical and environmentally sustainable, and making sure to continue to property separate your waste. There are many alternatives that can be made and many of them are small lifestyle changes, such as using reusable straws. We have seen such changes in the past but it is now important to continue these forts once the lockdown rules are lifted and to expand our sustainable ways to better the environment and our future.

Chapter 7

COVID-19 Impact on education system in India:

Education is the most important and powerful instrument to shape and mould the individual and society in a desirable manner. But today education is in crisis. Because Corona Virus disease 2019 is profoundly affecting life around the globe. The global impact of corona virus is immense as educational institutes all over the world. The speed of the spread of the epidemic , the closure of higher education institutions and the transition to online teaching was so swift that it hardly gave any time to plan and to reflect on the potential risks or the potential opportunities that such as a sudden change could bring. The COVID-19 has created paramedic situation in all the sector including tourism, institution , transport as well as education in India .The COVID-19 pandemic has had a major impact on education system both negative and positive.

There are a number of areas of potential risks for global education. Here are some negative impacts of Covid-19 on education system in India.

Majority of the students who are caught in the limbo on account of education outcomes being withheld due to the Covid 19 pandemic. Some of them don't have a result because exam either didn't or left in the middle. Many of them face uncertainty as to their future because their next step further education or careers are dependent upon them clearing their school or college leaving exams. Because of Covid-19 pandemic there is not only education process is disrupted but students also face a big challenge of proving themselves for their next journey.

No doubt technology may play an important role in the lockdown period. But low income private schools and government school may not be able to adopt online teaching methods. Online learning is a special kind of methodology and not all teachers are good at it or at least not all of them were ready for this suddentransition from face-to-face learning to the online learning. Thereis a risk that in such a situation, learning outcomes may not be achieved and it may be only resulting in engaging the students.

Positive Impact on Education System

Any change that is so disrupted is also likely to bring with it some new opportunities that will transform the higher education system worldwide and especially in a country like India which is planning to bring about a planned reform in this sector, some of the key areas of opportunity are following --

There is a great opportunity for universities and colleges to start improving the quality of the learning material that is used in the teaching and learning process. Universities and colleges will shift to a model of blended learning where both face-to-facedeliveries along with an online model will become a norm. This will require all teachers to become more technology savvy and go through some training to bring themselves to the level that would be required. There is a new opportunity where collaborative teaching and learning can take on new forms and can even be monetized.

Large number of academic meeting , seminar and conference will mobile online and there is a possibility that some new form of an online conferencing platforms will emerge as a business model. That teaching community to a large extent has been very insulted and more so in a country like India.

Online Education System - Its Challenges and Opportunities:

The target of the present study is to discuss the challenges and opportunities of the online system of education that have to be tackled by us. Moreover, we can't also deny the opportunities of online education which is very encouraging for us. So, here is the explanation of some challenges and opportunities of the online education system.

Challenges

One great challenge of online learning is the lack of face-to-face contact, human contact or the absence of collective learning. As a result, most important factor of education motivation in learning through eye contact, gesture, posture will definitely be missing in education.

The network problem is a very common challenge of the online education system. Not having a Network facility in remote area is also challenge in our education system. Because, a huge number of institutions, teachers and student community stay in remote areas and network connectivity is not there in these areas and we have to consider and take necessary action for them.Another great challenge before us is the lack of devices. Because, many students still don't have an android phone, computer or laptop with them. Due to their economic condition, it is not possible to buy and to have it. So, from the point of view, online education is challenging.

Lack of digital infrastructure is also another challenge. Many colleges of ours are not still digitally well-equipped and classrooms are not digitalized.Immediate use of the online education system due to pandemic caused mental stress among the learners. Both teachers and students were not prepared for the same and tried to adjust to the new system caused mental stress.

Opportunities

Online education system makes our learning very easy through mobile. Learning is now in our hands in our fingers. With one touch in mobile everything makes accessible and we can learn. Without any time bound and space bound at any time at any place we can learn. Online education system develops digital and ICT skills among learners. Necessity is the mother of invention and people are no learning how to deal with computers, desktops, android mobile etc. and their various applications. The online education system broadens the experiences of both students and teachers. It helps to meet with a broader field and more large number of people within the classroom. The online education system is a Blended Model of learning where both physical and online classroom benefits can gather by learners. Online educational system encourages self-learning more than a physical classroom . As a result , students will develop the habit of self-learning through the system. The online education system is the demand of the hour. No doubt we may have many challenges and difficulties in the way of implementing the system but we must to tackle it and implement the system. Moreover, we can't also deny the opportunities of the online education system while we implement it .So, considering all related issues it is the The online education system is the demand of

the hour. No doubt we may have many challenges and difficulties in the way of implementing the system but we must to tackle it and implement the system. Moreover, we can't also deny the opportunities of the online education system while we implement it .So, considering all related issues it is the demand of the hour now to implement it in a better way. Learning must continue.

Impact of Covid-19 on Higher Education in India:

The petrifying and severe impact of Covid-19 has shaken the world to its core. Covid-19 has disrupted every sector of human life including education sector. Most of the governments around the world have temporarily closed educational institutions in an attempt to contain the spread of the Covid-19 pandemic. In India too, the Govt. as a part of nationwide lockdown, has closed all educational institution, as a consequence of which learners ranging from school going children to post-graduate students are affected. So due to Covid-19 higher education sector is majorly affected, which is the determinant of a country's economic future. It affected various educational activities at higher education level leading to a huge anxiety and uncertainty. The Government of India has come up with many e-learning programmers. The education system has to adjust itself to the new reality. All the Higher Education Institutions have employed advanced online technologies to reach out to students at home and are teaching on digital platform. Covid 19 pandemic has a major impact on higher education - both negative and positive.

Positive Impact of Covid-19 on Higher Education In India

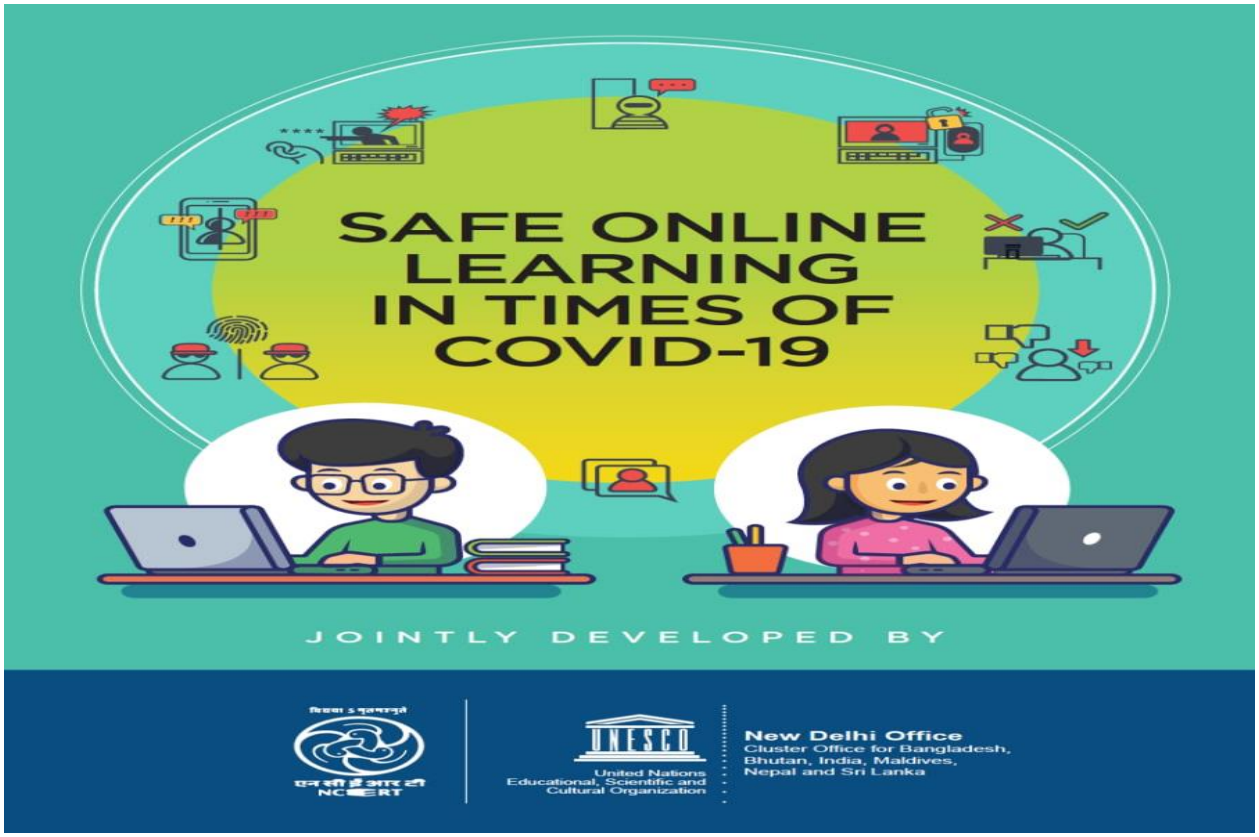
A complete revolution in the way we learn has been brought about by technology to deliver education, higher educational institution move towards blended learning. Enhancement of digital literacy is another positive impact because this pandemic situation introduces people to learn and use digital technology and resulted in increasing digital literacy. It increases the demand for Open and Distance Learning because ODL system is the best solution to meet the challenges of higher education during this pandemic. Another positive impact is world-wide exposure educator and learners are getting opportunity to interact with peers from around the world either through international webinar and other online learning platform.

Negative Impact of Covid-19 on Higher Education In India

The sudden shift to digital learning mode without proper planning specially in a country like ours where the backbone for online learning was not ready and the curriculum was not also suitable for online teaching , has created lot of problems . Moreover, teachers are also unprepared for sudden transmission from face-to-face learning to online learningCovid-19 has badly disrupted academic activities such addmission, entrance examination, final semester examination, teaching-learning process and competitive examinations which are held during this period .medical etc .It has also affected research activity as they couldn't travel for data collection and so on. And also, scientific research work, laboratory testing etc. are also disturbed.

Covid-19 pandemic has created an opportunity for change on pedagogical approach and introduction of virtual education at all levels of education. MHRD and UGC have initiated various digital platforms in order to prevent academic loss and continue the teaching - learning process. But at time it should be kept in mind that online education is not education

for all, it's an education for few. So the government should take some initiative for the economically and socially disadvantaged people so that they can also take the advantages of online education. Also the government should be given their attention towards disable students .



Conclusion

It has been well established that COVID-19 and the environment have between them a complicated two-way link. The way that humanity has been reacting to the COVID-19 pandemic has profound effects on planet earth. As mentioned before, lockdown procedures that limit human activity will have a significant impact on aspects of the immediate environment such as air quality and biodiversity. These positive effects of lockdown will increase environmental sustainability and overall human health respectively, giving people great hope for the future after COVID-19. As humans recede into quarantine, more wild animals have been left with more breathing space, thereby increasing the biodiversity and the overall ecosystemic welfare of planet earth. In addition, the decrease in factories and cars that actively release air pollutants has decreased levels of air pollution. As the virus continued to spread to different countries around the world more of them started to implement lockdown and social distancing rules. The lockdown has led to some positive short-term impacts such as reduced carbon dioxide and nitrogen dioxide emissions over countries like China and the decrease in tourists and overcrowding have led to the canals in Venice to clear up along with other effects.

The study affirms the devastating effects of COVID-19 pandemic on education and the various barriers that hinder students and instructors engagements in online education for continued learning during theCOVID-19 lockdown. The results show that educational activities were badly affected due to the COVID-19 pandemic lockdowns. Some of the identified effects include; learning disruption, limited access to learning facilities such as laboratories, job losses in the education sector, increase in students' debts, reduced funding for education, research constraints, and loss of learning interests among learners. More than 70% of the respondents agreed that inadequate facilities such as lack of computer, internet facility, were the major factors that limited their engagement in Online education.

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