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1. Impact of COVID-19 on Environment

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Abstract:

The Novel Coronavirus pandemic (COVID-19) struck the world hard in the first half of 2020, forcing numerous countries to put harsh limitations on all human-related activities. The emergence of COVID-19, as an unusual occurrence, has severely harmed world economic growth and had an impact on the environment. To keep the virus from spreading further, governments pose several strict lockdowns, and people were primarily encouraged to quarantine themselves at home. As a result of the lockdown, industrial and vehicle movements were halted, and the rate of contaminants entering the ecosystem was lowered in several places but on the other hand, COVID-19 has a number of disadvantages, including more medical waste, increased hazard utilization, and disposal of disinfectants, masks, and gloves, as well as a huge amount of untreated wastes, are harming the environment. We don't have direct confirmation that climate change is causing COVID-19 to spread, but we do know that it has an impact on how humans interact with other creatures on the globe, which has significance for our health and infection risk. So, in this book chapter, we were talk about the impact of COVID-19 on the environment and climate change from both positive and negative perspectives. We will also discuss mitigation strategies to tackle from negative impacts of COVID-19 on the environment.

Keywords: *COVID-19, Pandemic, Environment, Pollution.*

1.1 Introduction:

Concerns about the environment have risen to become one of the most talked-about themes in society during the past few decades. The planet has gotten overcrowded and severely polluted as a result of the increasing population. People are polluting the environment with harmful compounds as a result of their use of natural resources. From 1947 until 1995, nature had a significant impact on India, resulting in a deterioration of the country's status. India's environment and economy are being hindered by things like air pollution, water pollution, trash, domestically regulated goods, and pollution of the natural environment. Several laws have been passed in India to protect the environment. Some of these laws are the Water (Prevention and Control of Pollution) Act of 1974, the Forest (Conservation) Act of 1980, and the Air (Prevention and Control of Pollution) Act of 1981. The government of

India passed the Environment (Protection) Act in 1986 in response to the Bhopal Gas Disaster. In 2020, a new set of Noise Pollution (Regulation and Control) Rules is enacted, which will become effective in 2021 (1). In spite of this, the globe has undergone a remarkable alteration over the course of the past two years as a direct result of the exceptional tragedy caused by the Corona Virus. The pandemic has resulted in the tragically huge number of human deaths that have occurred as a result. The entire planet was put on high alert after it was discovered. A number of nations had begun taking preventative measures to prevent a pandemic, such as institutional quarantine and social distancing protocols. Because of the lockdown, our lives have changed, and the lockdown has already started to change our environment in a number of ways. According to numerous studies and research, Covid-19 has both beneficial and bad indirect impacts on the environment and climate.

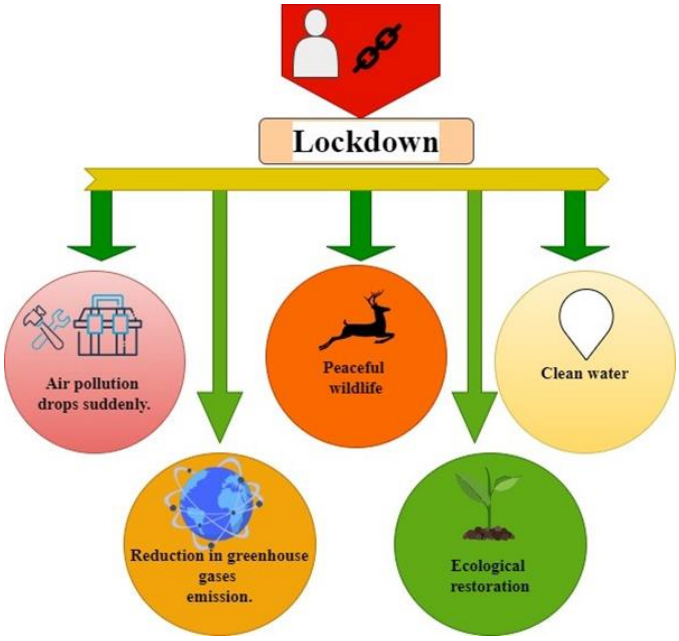

Figure.12.1: Positive Effect of Lockdown on the Environment (28).

1.2 COVID-19:

The coronavirus disease-2019 (COVID-19) outbreak began at the Hunan seafood market in Wuhan City, China, around the end of December-2019 (2). After a few weeks, the World Health Organization labelled it an international public health emergency. The virus that causes this infection is known as SARS-CoV-2 (severe acute respiratory syndrome coronavirus- 2) (3). According to the findings of the genome study, SARS-CoV-2 is phylogenetically related to SARS viruses, and bats are the most likely main source of the virus (4). Even though we don't know where this virus came from and how it got to humans, we know that it can spread quickly from person to person. The virus spreads primarily through direct touch or droplets produced by coughing, sneezing, and talking. COVID-19 infection typically induces fever, chills, cough, sore throat, difficulty in breathing, muscle pain or exhaustion, nausea, vomiting, and diarrhoea. In severe cases, it can cause heart

damage and breathing issues acute respiratory distress syndrome, and even death. Coronaviruses are single-stranded RNA viruses that are capable of infecting not only humans but also a large variety of animals. Tyrell and Bynoe were the first people to study these viruses in 1966, they grew them in labs from people who had the common cold. COVID-19 has been responsible for a great deal of disruption all across the planet, which has led to a variety of environmental and climatic concerns.

1.2.1 COVID-19 Impact on the Environment:

The new Coronavirus has massive implications around the world, affecting people's health, social welfare, economic well-being, and the environment. It appears as though the entire universe has been forced into reset mode. As a result of the cessation of industrial services and power plants, as well as a reduction in transportation and shipping traffic, it was observed that the levels of standard pollutants such as carbon monoxide (CO), nitrogen oxide (NO2), methane (CH4), sulphur oxide (SO2), black carbon (BC), and particulate matter decreased (5). Noise pollution decreased as a result of the decrease in economic operations and public transit (6). COVID -19 had a mixed effect on the environment. Even though the pandemic made the environment better, it also had other bad effects, some of which are obvious and some of which are not.

Population growth, more agricultural and industrial works are putting more burden on the world's freshwater reserves (7). These activities produce contaminants that enter the water cycle and harm the earth's natural balance. Water is the preferred venue for receiving complicated human and industrial waste from an environmental viewpoint, and this is especially true for aquatic environments. Freshwater resources are important to all countries around the world, either because they don't have enough water or because they pollute the water they do have. The imbalance between the demand for water and the supply of water required the development of novel modes of transportation and treatment in order to boost the availability of water resources. Protecting water assets become much more challenging as a result of the COVID-19 outbreak, which has a significant impact on water quality. First and foremost, there is a significant possibility of transmitting and detecting SARS-CoV-2 ribonucleic acid in wastewater through the faeces of persons who have been infected with this virus in the first place. This can happen when infected individuals urinate or defecate into wastewater systems (8). Additionally, because of the excessive consumption of water and detergents during the period of COVID-19, various organic and metallic compounds were introduced into home water supplies, resulting in the degradation of the quality of water as a result of the transmission of these compounds.

The COVID-19 pandemic has resulted that more people using one-time protective equipment. This has put a lot of strain on the waste recycling sector and given it a lot of challenges to deal with. The majority of people's everyday lifestyles and eating habits have changed dramatically as a result of food intake during the pandemic. In addition to this, the pandemic was caused new sources of waste to arise, which makes the management of municipal solid waste more difficult for the governments and enterprises that were responsible for collecting and sorting the waste in the first place.

Various investigations have confirmed that the coronavirus is affected by changes in temperature and humidity (9). The researchers were able to show that there is a link between

the weather, the number of new positive cases, and the number of deaths in the population. At maximum and normal temperatures, a study in Oslo, the capital of Norway, showed that the number of daily cases of COVID-19 was linked to temperature and rainfall (10). At maximum and normal temperatures, the temperature is linked to COVID-19 in a positive way, while rain is linked to COVID-19 in a negative way.

As a result of the shutdown of companies, transportation, and campaigns, it has been seen that greenhouse gas (GHG) emissions have decreased dramatically. Because the vehicles, as well as the inhabitants, were now inside the residences, air pollution has also been reduced. It has been calculated that the shutdown of heavy industries has resulted in a roughly 50% reduction in N2O and CO emissions.

On the other hand, there were unfavourable impacts that were observed in the surrounding environment. During the global pandemic of COVID-19, biomedical waste production increased drastically, posing serious concern to both human health and the natural environment. The hospitals create diagnostic tests, medications, and biochemical wastes that are used for the sample collection of suspected patients and other purposes. To deal with the situation, the local waste management authorities were faced a difficult challenge. In order to protect oneself from the viral infection, various pieces of protective gear, such as a mask and hand gloves, are utilised. However, because of the lack of sufficient understanding, the vast majority of individuals dispose of these in open areas, causing harm to the local environment. The increased output of garbage in metropolitan areas has direct effects on the air, water, and soil pollution levels (both organic and & inorganic).

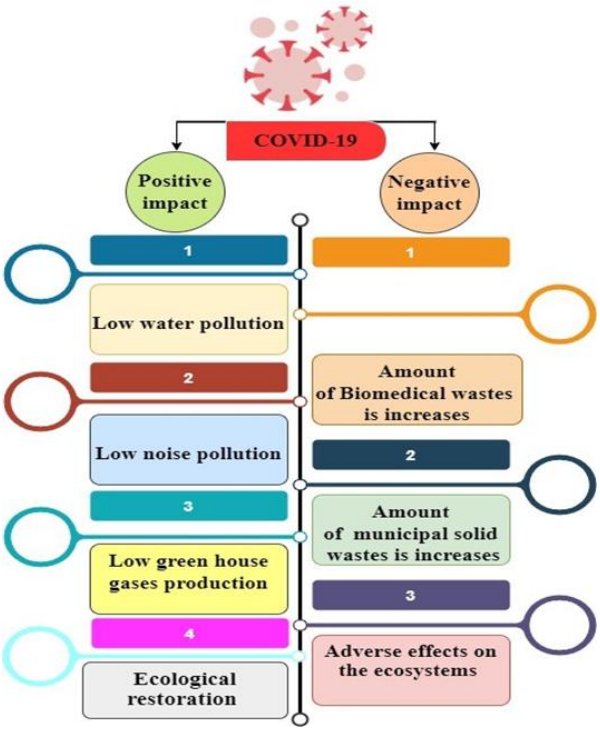

Figure 1.2: Positive and Negative Impact of COVID-19 On The Environment (28)

A. Positive Impact of COVID-19 On The Environment:

a. Low Water Pollution:

Overpopulation, irrational land usage, and pollution caused by humans are important global challenges in the twenty-first century. These problems have serious effects on the aquatic environment and river health. Rapid urbanisation and industry are the root causes of river pollution, resulting in a significant increase in sewage output and untreated effluent on riverbeds across the country. River water quality (RWQ) is critical for aquatic ecosystems and riverside creatures. In aquatic habitats, a variety of zooplankton, phytoplankton, bacteria, fish, and mollusc species establish their habitat.

As a result, it is an ecologically sensitive and diverse area that sustains the ecosystem's natural cycle. Physico-chemical and biological characteristics play a big role in riverbed and riparian habitats. Any modifications to one of them can have major consequences for the water's entire biotic community. Not only that, but ecological deterioration of water quality may pose a threat to human and other animal species, as well as plant species (15).

Water pollution is common in developing countries like India and Bangladesh, where waste from homes and factories is dumped directly into water bodies without being cleaned first (11). In the course of the shutdown, the largest industrial sources of pollution have either diminished or totally ceased operations, which has assisted in reducing the overall pollution burden. Because of the lack of industrial contamination during India's shutdown times, the rivers Ganga and Yamuna have attained an extraordinarily high level of purity (12). The improvement in the water quality in Haridwar and Rishikesh was liable for a big drop in the number of tourists and a 500% drop in the amount of sewage and industrial waste (13,14).

b. Reduction in Green House Gases and Air Pollution:

The transportation sector's greenhouse gas emissions are dominated by vehicles and aeroplanes, which together account for 72% and 11% of total emissions. The demand for passenger transportation has declined as a consequence of restrictions placed on travel to other countries, as well as a reduction in the amount of tourism and business travel. Emissions of greenhouse gases (GHG) have reduced significantly as a direct result of the closing of enterprises, transportation facilities, and factories. The closure of heavy enterprises in China has been estimated to have reduced N2O and CO2 emissions by nearly half (16). NO2 is normally produced as a consequence of fossil fuel burning.

Automobile exhaust accounts for 80% of all NO2 emissions (17). It has been claimed that NO2 creates acid rain as a result of the interaction of oxygen and water vapour, as well as a variety of respiratory ailments in people (18). According to the European Environmental Agency, NO2 emissions in key European cities such as Barcelona, Madrid, Milan, Rome, and Paris are predicted to decline by 30-60% as a result of the COVID-19 closure (EEA) (19). It was also reported that NO2 and PM 2.5 levels in Delhi had dropped by more than 70% since the beginning of the year (20). During the nationwide lockdown, there was a 46 percent and a 50 percent reduction in PM 2.5 and PM 10, respectively, according to the Indian government (21).

The precautions that are being taken as part of international efforts to limit the virus are having a big effect on the aviation industry. Worldwide flights are being cancelled by commercial aviation firms as a result of a decline in passengers and tightened security measures. For example, because of the pandemic, China has cut the number of flights leaving the country by 50–90% and the number of flights within China by 70% as of January 20, 2020. This has cut the country's CO2 emissions by nearly 17%. Reports said that after the lockdown, the amount of electricity made in India using coal dropped by 26%, and the amount of electricity made overall dropped by 19% (22). In the end, lowering one's consumption of fossil fuels leads to a reduction in their emissions of greenhouse gases, which helps in the battle against the adverse effects of global warming.

c. Reduction in Noise Pollution:

The noise from traffic has a major effect on the quality of life in cities than any other kind of noise pollution. When exposed to noise pollution for long periods of time, it can cause discomfort, sleep disruptions, hypertension, psychological diseases, and hormone irregularities. Increased urbanisation and industrialisation have been identified as an environmental nuisance that has an impact on human health and well-being (23). A study done in India showed that the level of noise during the lockdown phase was much lower than during the pre-lockdown and unlock phases (24). In residential and quiet zones, the reduction was much bigger than in industrial and business zones. For example, the noise level in Delhi, India's capital, dropped by 40–50% during the recent lockdown. Since there was less traffic at the Govindpuri metro station in Delhi during the lockdown, the noise level has gone down from 100 dB to 50–60 dB (25).

d. Ecological Restoration and Tourism Integration:

As a result of advancements in both technology and infrastructure, the tourism industry has experienced a phenomenal expansion in recent years and is now a considerable contributor to the world's total gross domestic product (GDP). Natural features (such as beaches, islands and mangroves) attract tourists and generate a large amount of revenue. To accommodate them, many hotels, restaurants, and markets have been built, all of which require a lot of energy and other natural resources. A study indicated that hotels in Spain's coastal zones are the greatest carbon emitters due to power and fuel use (26). Because of the COVID-19 pandemic and local restrictions, fewer people are travelling to popular tourist spots around the world. At Cox's Bazar sea beach, which is famous as the world's longest undisturbed natural sandy sea beach, the local authority has imposed a ban on public gatherings and visitor arrivals. As a result of the restriction, the colour of the seawater changes, which is normally muddy due to various human activities (27).

B. Negative Impact of COVID-19 On The Environment:

a. Rise in The Amount of Waste Generated by Medical Procedures:

A large amount of medical waste and plastic garbage has been generated as a result of COVID-19. This sudden increase in biomedical waste and plastic waste has made it hard for waste management systems to keep up, especially in developing countries. The greater

use of medical technology in hospitals and precautions to prevent COVID-19 have increased biological waste. Personnel protection equipment (PPE) such as aprons (boots), face shields (gloves), goggles (masks), and tissues (bandages) have expanded significantly. During the first part of the lockdown, the amount of medical waste in Ahmedabad, India, went from 550–600 kg per day to 1,000 kg per day (13). The rapid increase in hazardous waste, as well as its efficient handling, has posed a considerable challenge to local waste management agencies.

b. High Amount of Municipal Solid Waste and Less Recycling:

An increase in the amount of garbage produced by cities, which includes both organic and inorganic waste, has both direct and indirect environmental effects, such as polluting the air, water, and soil. The recycling of waste, on the other hand, is an effective method for lowering pollution levels, conserving energy, and protecting natural resources. However, as a result of the pandemic, many Nations delayed their waste recycling activities in an effort to lower the risk of viral infection spread.

Concerns about the spread of COVID-19 among recycling facilities led the United States government, for instance, to prohibit recycling activities in a large number of locations (nearly 46 percent of the total) (13). In general, problems with regular municipal waste management, waste disposal, and recycling are caused more wastes to be dumped in landfills and more pollution to be made around the world.

c. Negative Effects On the Ecosystems of the Water and The Soil:

Individual ecosystem components are closely interconnected. More frequent hand washing with soap, government and community-based mass disinfection, and the development of single-use plastics containing bisphenol-A (BPA) are all likely to degrade soil and water quality. Products with alcohol that get into the water are bad for aquatic life, and if they get into the soil, they can pollute the groundwater.

The significant increase of soapy waste from every household in a short period of time could elevate pollutants levels and change the chemical composition of greywater. This trash from residences will contaminate the water in rivers, which will subsequently reach lakes and oceans. This series of bad things are going to cause a big problem soon. (5).

1.3 Conclusion:

COVID-19 had some good effects on the environment, most of these were short-term effects caused by the lockdown that was put in place across the country. In fact, it is expected that the pandemic will have negative long-term effects on the environment in the future. Additionally, the worldwide response to COVID-19 teaches us the importance of collaborating with one another in order to successfully combat the danger that faces humanity. Despite the fact that COVID-19 will have only a short-term influence on the environment, a combined effort focused on the time frame will promote environmental sustainability and save the planet from the effects of global climate change and upcoming pandemics.

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