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RESEARCH ARTICLE

IMPACTS OF PANDEMIC ON POLLUTION REDUCTION ON THE ENVIRONMENT

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ABSTRACT

Every part of human life, including the physical universe, is affected by the global epidemic of COVID-19. The aim of this review is to discuss the impacts of positive consequences on the total environment due to the COVID-19 pandemic and how information technology can support sustainability in the longer run. This review was performed by analyzing the published literature, various reports, and official websites of organizations that were available. The scientific literature was collected from PubMed, Scopus, Springer, Science Direct, Tailor and Francis Online, Thomson Reuters Web of Science, Research Gate, and Google Scholar's database via electronic resources. These studies show that the pandemic scenario enhances the quality of air in various places around the globe by reducing various pollutants, which can help to restore the ecological system. This research identifies potential means of achieving long-term environmental sustainability and importance while people learned a lesson about the value of the environment and the impact of pollution. In the environment, innovative technology has been developed, such as tracking, modelling, and conservation of biodiversity. Distance education and learning have gained popularity during the lockdown. The proper application of the suggested policies is supposed to be beneficial in achieving environmental sustainability.

KEYWORDS

COVID-19, Environmental impact, Pandemic, Lockdown, Beneficial implication.

1. INTRODUCTION

The COVID-19 (novel coronavirus) was causing an unusual situation that spread in December 2019 in Wuhan, China (Zhu et al., 2020; Kavanagh, 2020; Wu et al., 2020). So far, the worldwide outbreak of the epidemic had endangered the lives of people all around the globe (Zhou et al., 2020; Wu et al., 2020). Almost one year, the world was transformed during this crisis in each aspect of human life and the global economy (Klemes et al., 2020). The virus itself did not specifically contribute to the environment, but it directly impacted the environment as a result of the shutdown of economic industries, such as heavy industry, transport, and hospitality firms (Cheval et al., 2020; Venter et al., 2020; Rupani et al., 2020). Enforcing several quarantine laws, restricting traffic, decreasing small businesses, closing of colleges, universities, and schools, and closure of trade and travel across the globe decreased the transmission of illness (Wilder-Smith and Freedman, 2020). Although airplanes were cancelled globally and transportation systems were closed due to the quarantine regulations. Since the start of this crisis, the lockdown was resulted in many influences on the environment (Loh et al., 2021).

Preceding the pandemic, the weakened economic activity helped to reduce global warming along with air pollution and contamination, water pollution (Lokhandwala and Gautam, 2020), Nitride oxide level, carbon emission and enhanced wildlife, which was allowed to flourishment of environment slowly (Kanniah et al., 2020; Wang and Su, 2020; Tobías et al., 2020; Sharma et al., 2020; Venter et al., 2020; Bontempi et al., 2022; Weitzel, 2020). A more sustainable future was brought about by the pandemic, including increased resilience of the ecological system, which is a positive development. Due to anthropause, which refers to the reduction in modern human activity, particularly travel, air pollution decreased vitally and was experienced in many regions (Rutz et al., 2020). Decreasing carbon emissions and oxides of nitrogen saved at least 77,000 lives in China (Burke, 2020; McMahon, 2020). A group researcher stated the reduction in population-weighted concentration levels of NO_2 and PM by 60% and 31% respectively in 34 countries (Venter et al., 2020).

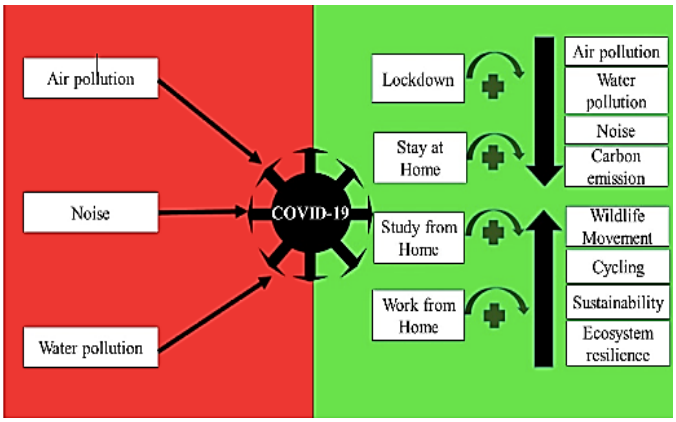

Figure 1: Summary of abstract

Remarkable advances have been made in environmental technology, such as monitoring and modelling, along with improved monitoring systems, innovative climate models, and conservation of biodiversity (Cheval et al., 2020). Through the development of various internet facilities, information technology has linked people in different parts of the world into a single

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network: The World Wide Web (WWW), geographic information system (GIS), the Environmental Information System (ENVIS), Global Positioning System (GPS) and satellite information were generated a wealth of information on different aspects of daily life. In studies of the effect of the pandemic on the ecosystem, those technologies have played a crucial role.

The main aim of this review is to explore optimistic environmental influences of the COVID-19 pandemic, in particular, reduction of pollution and the use of information technology, and to suggest possible strategies as potential recommendations for the protection of the environment. As a result, this paper offers a broad overview of environmental sustainability and the value of reducing pollution.

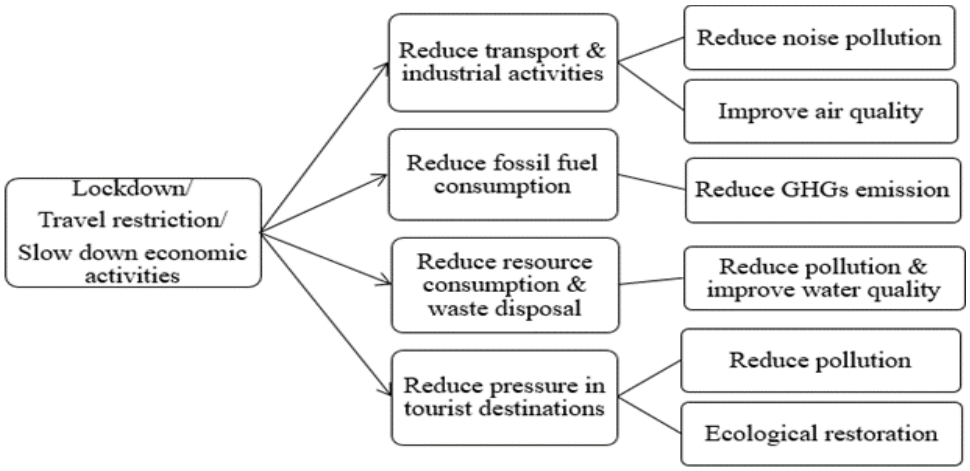


Figure 2: Beneficial environmental implications of the pandemic of COVID-19.

2. METHODS

This research was performed by analyzing the literature published, various reports, and official websites of state and non-state organizations that are available. Abundant knowledge about the consequences of the pandemic has been provided by various sources. The scientific literature was collected from Science Direct, PubMed, Springer, Tailor and Francis Online, Scopus, Research Gate, Web of Science - Thomson Reuters, and Google Scholar's database via electronic resources. This research accumulates and provides data and knowledge from the evidence gathered that applies to the environmental impact of the pandemic and satisfies the study's goals.

3. RESULTS AND DISCUSSION

3.1 The impact of the pandemic on air quality

The nature of the air was highly vulnerable to anthropogenic pollution (Cheval et al., 2020). The pandemic had an impact on business and transportation, several states, and the entire universe saw a decrease in air quality as a result of the lockdown (Watts and Kommenda, 2020; Zhang et al., 2020; Corinne et al., 2020). Reduced air pollution aided to reduce both climate variation and COVID-19 threats (Carrington, 2020). A decline in coal use had also decreased air pollution on a wide scale (Watts and Kommenda, 2020). In contrast to the previous year, the amount of quality of air was around 11.4 percent higher (Ficetola and Rubolini, 2021). At the same time, satellite remote sensing presented an indication of the optimistic effects of the epidemic on air quality to vast extents (Cheval et al., 2020). The influence of the pandemic was seen by near-real-time tracking of global CO_2 emissions (Tan et al., 2021). Besides, the data collected from the Intermediate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite concluded that aerosol levels were substantially decreased by lockdowns (Patel, 2020). The epidemic had drastically reduced air pollution levels by 25-40 percent, particularly in cities such as Wuhan, China and New York by 50% (Zhang et al., 2020; Carbon Brief, 2020; NASA Aura, 2020; Henriques, 2020). Around 1,600 metric tons of carbon dioxide cut by the pandemic which was equal to over 4 percent of the universal total in 2019 (Rume and Islam, 2020; Evans, 2020). Due to lockdown, the number of airborne pollutants such as carbon dioxide (CO_2), carbon monoxide (CO), and nitrous oxides (N_2O) decreased, consumption levels of energy in buildings were being interrupted (Dantas et al., 2020; Saadat et al., 2020). In addition, Carbon monoxide (CO) level reduced drastically related to the reduction of light vehicular emissions (Machado and Mehnaz, 2020). Commercial aviation airlines have suspended worldwide services, ultimately decreasing about 17 percent of the national CO_2 emissions due to reduced travelers and restrictions in China (Zogopoulos, 2020). The Centre for Energy and Clean Air (CREA) Analysis in Finland announced a 25 percent decrease in CO_2 due to travel restrictions and factory closures in China (Carbon Brief, 2020). A group researchers concluded that only considering the PM not reduced due to its origin and the related heat technology (Bontempi et al., 2022). Moreover, data retrieved on the National Aeronautics and Space Administration's Terra satellite by the Moderate Resolution Imaging Spectroradiometer (MODIS) revealed that aerosol levels were significantly decreased by the lockdown. Reduced tourism and travel (aviation and shipping) were dramatically reduced the energy use and emissions, whereas home-based work had reduced the transport needs (Cheval et al., 2020).

Figure 3: A comparison of the quality of the air in several of the world's largest and major cities before and after the COVID-19 epidemic (Source: Saadatnet al., 2020).

Nitrogen Dioxide (NO_2) emissions became one of the main indices of international activities in the economy and an indication of reduced air pollution (Biswal et al., 2020; Ghosh, 2020; Saadat et al., 2020; Somani et al., 2020). Meanwhile, Nitrogen Dioxide (NO_2) reduction ultimately reduced the deaths caused by NO_2 pollution in urban areas (Son et al., 2020). NO_2 was commonly produced by the combustion of fossil fuels and from the emissions of motor vehicles (USEPA, 2016). Global NO_X emissions reduced by about 30 - 40 percent and global SO_2 emissions reduced by just around 20 percent (Forster et al., 2020; Myllyvirta, 2020a). Real-time proof for the favourable impact of the pandemic on the quality of air over wide areas was provided by satellite remote sensing. For reference, the emissions monitoring satellites of both the European Space Agency (ESA) and the National Aeronautics and Space Administration (NASA) measured a substantial decrease in Nitrogen dioxide. China and U.S. researchers reported that emissions of nitrogen oxides in China declined by 50 percent (Zhang et al., 2020). The European Environment Agency (EEA) announced that in most European areas, including Barcelona, Madrid, Milan, Rome, and Paris, the NO_2 emissions was fallen from 30 to 60 percent due to the pandemic lockdown (EEA, 2020). Caine reported that the closure of heavy industries in China caused a nearly 50 percent reduction in Nitrous oxide (N_2O) and Carbon monoxide (CO) (Caine, 2020).

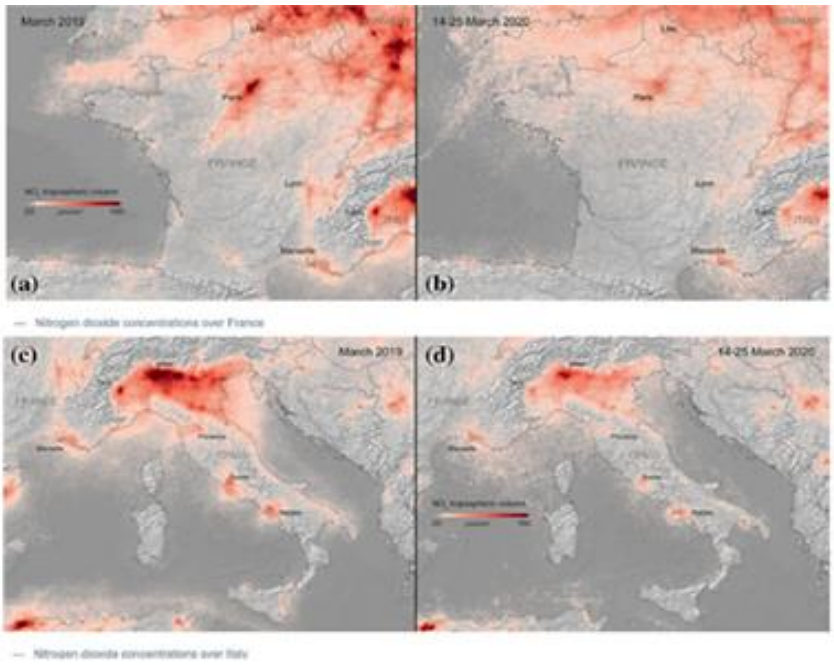


Figure 3: Nitrogen dioxide concentration comparison on Italy (c, d) and France (a, b), before (a, c) and after (b, d) the pandemic of Covid -19 (Source: ESA, 2020)

Furthermore, NO_2 declined 25.5% in the US, nearly 70% in Delhi (India), 70 % in Ontario (Canada) (Adams, 2020), 54.3% in Brazil - Sao Paulo and approximately 50% in Barcelona (Berman and Edisu, 2020; Mahato et al., 2020; Thiessen, 2020; Nakada and Urban, 2020; Tobias et al., 2020). Around 54 percent of non-methane volatile organic compounds (NMVOCs), about 51 percent of nitrous oxide (NO_X), and 25 percent of SO_X emissions were responsible for the energy used by road transport and industrial processing sectors in the European Economic Area countries (EEA, 2020). To investigate and detect the ozone layer and contaminants such as NO_2 and aerosols, NASA used an ozone measurement instrument (OMI) to interpret the results before and after the lockdown (NASA Aura, 2020).

Vehicles and aviation were major polluters, which were accounting for approximately 72 percent and 11 percent of greenhouse gas (GHG) emissions from the transport sector, respectively (Henriques, 2020). Aviation was one of the most impacted industries, accounting for approximately 1-2% of global greenhouse gas emissions and approximately 3 to 5% of universal Carbon Dioxide (CO_2) emissions (Harrison et al., 2015; Kivits et al., 2010). Wallace (2020) also reported that 96 percent of air travel fell worldwide due to the pandemic that ultimately affected the environment. Air traffic declined by about 63 percent in the overall number of flights and by around 75 percent in the number of passenger flights (Serfointein and Govender., 2020). The International Air Transport Association's (IATA) new scenario revealed that traffic in the air was dropped by 48% (IATA, 2020).

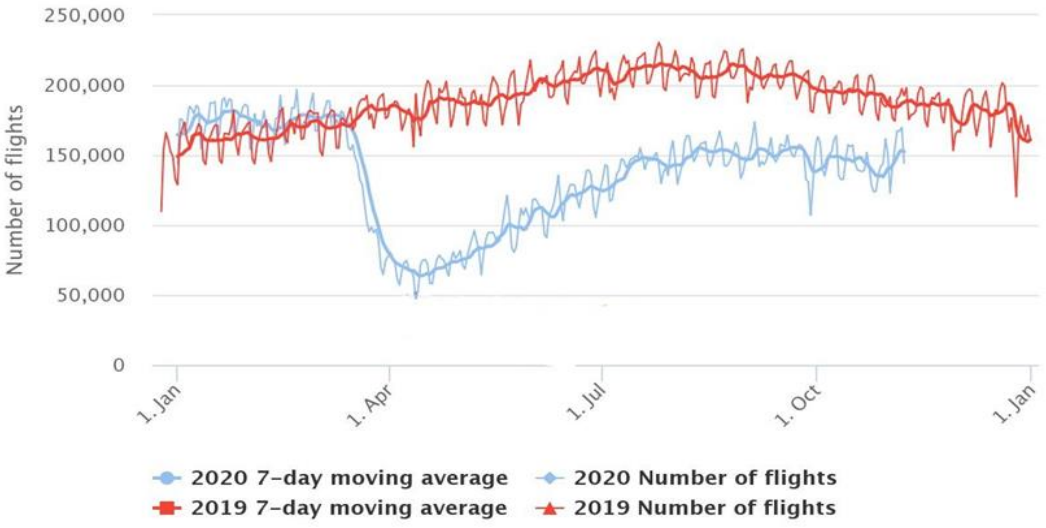


Figure 4: The total number of flights tracked by flightradar24, per day 2019 versus 2020 (Source: Flightradar24, 2020).

Recent estimates based on restriction of people's activities indicated that global greenhouse gas emissions were dropped by an average of around 10 to 30 percent (Lambert, 2020; CDP, 2020). Because of the declining greenhouse effect, the reduction in contrails contributed to a drop in air temperature. The quality of air in the most hazardous areas in the world was greatly increased, and greenhouse gas (GHG) emissions were decreased substantially (Ellis-Petersen et al., 2020; Henriques, 2020; CDP 2020). For Example, air pollution has been decreased markedly in New York, China, and Italy, which in turn drastically declined the global GHGs as expected (Tollefson, 2020). Lower fossil fuel use impacted the emission of GHGs, which eventually helped tackle global climate change (Rume and Islam, 2020).

There was an increament in the level of ozone (O_3), possibly due to less titration of O_3 by nitrogen monoxide (NO). A rise of approximately 33-57 percent in O_3 concentrations recorded during the lockdown (Tobias et al., 2020; Dantas et al., 2020; Conte et al., 2020). A group researchers stated that BC (black carbon) had the most substantial reduction amount, while PM10 (particulate matter of less than 10 in diameter) had the lowest reduction (Tobias et al., 2020). Further, the European Union's Copernicus Environment Monitoring Program (CAMS) noted a decrease in PM 2.5 (particulate matter of less than 2.5 in diameter) of about 20-30 percent (Zambrano-Monserrate et al., 2020). The concentrations of PM2.5 (particulate matter of less than 2.5 in diameter) and PM10 (particulate matter of less than 10 in diameter) in China were declined respectively 10.5 percent and 21.4 percent during the lockdown (Silver et al., 2020).

The Institute of Environmental Science and Meteorology (IESM) reported that the emissions of PM2.5 and PM10 were greatly reduced due to decreased use of crush and grinding machines and low road dust exposures (IESM, 2020). Also, indicated that the reduction of anthropogenic pollution led to a decline in PM2.5 levels (Wang et al., 2020). IEP stated that PM10 and PM 2.5 decreased by 46 percent and 50 percent respectively in India during the lockdown (IEP, 2020). Bao and Zhang and Zhang observed that during lockdowns, the Air Quality Index (AQI) decreased by 7.80%, and the concentration of air contaminants SO_2, NO_2, CO, PM10, and PM2.5 decreased by 6.76%, 24.67%, 4.58%, 13.66%, and 5.93% respectively (Bao et al., 2018). A group researchers estimated the drifts of particulate matter (PM2.5), sulphur oxide (SO_2) nitrogen oxide (NO_2) and ozone (O_3) respectively −6% yr−1, −12% yr^{-1} and −2.2% yr^{-1} and + 2.8% yr^{-1} over 2015 to 2019 (Silver et al., 2020).

Another widely observed phenomenon due to coronavirus is that the big boom of distance education, where carbon emissions and social mobility were fallen drastically (Zhou et al., 2020; Harapan et al., 2020). Furthermore, almost all the scientific events (conferences/workshops/training programs) have begun to take place in the form of a virtual conference that decreases global environmental pollution. The use of teleconferencing and distance education began in most schools, colleges, universities, and organizations (Rohwer-Kahlmann, 2020). During the epidemic, the studies began in the home atmosphere with increased workplace applications at home that lowered CO_2 emissions by limiting movement of people in their external environment (Zhou et al., 2020). In addition, private and corporate meetings, lectures, interviews, and political activities began to take place in the form of video conferences, teleconferences, webinars, and other virtual communication software such as zoom, hangouts, Webex, cloud meetings, and skype (Rohwer-Kahlmann 2020). A group researchers found that during the epidemic, restricting individuals and social interactions decreased food waste while displaying behaviors to prevent food waste (Jribi et al., 2020).

3.2 The impact of the pandemic on water quality

Water pollution was a frequent scenario in developed nations where domestic and agricultural waste was pumped without treatment into waterways and water bodies (Didar-Ul Islam and Azam, 2015; Islam and Huda, 2016; Yunus et al., 2020; Bodrud-Doza et al., 2020). The primary industrial sources of contaminants were reduced or terminated during the lockdown, which helped to minimize the pollution load (Yunus et al., 2020). Globally, soil contamination, water pollution, and marine pollution had been reduced due to the reduction of food waste, solid waste produced by building and manufacturing process, export-import business, the movement of merchant ships and other vessels (Jribi et al., 2020; Rume and Islam, 2020). Lokhandwala and Gautam observed during the lockdown circumstances, the primary cause of water pollution was reduced due to the reduction of hazardous industrial effluents that entered the rivers (Lokhandwala and Gautam, 2020). Many other factors have led to improving water quality, such as decreasing high snowfall melting with summer, demand for irrigation purpose water, and even factors born to humans, including decreasing religious and cultural practices such as swimming, cremation. The increase in water visibility due to fewer boat traffic, tourism activities, and the decrease in air quality along the rivers has helped sediment to settle (Srikanth, 2020).

Indeed, due to the water turned into transparent and wide water flow in Italy Grand Canal, various aquatic species reappeared in the canal (Clifford, 2020). Compared to the past, the water in the waterways was cleaner, although people were amazed to see the clean and clearness of water and the fishes had been seen again in the canals (CNN, 2020). The data collected from real-time monitoring stations have shown that the water reached a significant level of purity and met the permissible level in the rivers in India due to the absence of tourists, industrial waste, and sewage during the lockdown (Somani et al., 2020; Singhal and Matto, 2020).

Figure 5: A comparison of the view of Venice region on April 13, 2020, and April 19, 2019, respectively. Satellite images released by the Copernicus Sentinel-2 European Space Agency mission (Source: ESA, 2020).

Real-time water quality monitoring data on physicochemical parameters of water including electrical conductivity, pH, dissolved oxygen (DO), and chemical oxygen demand (COD) and biochemical oxygen demand (BOD) were significantly reduced during the lockdown period, coinciding with a public gathering ban, a reduction in visitors as tourists and water activities in numerous locations (Arif et al., 2020; Zambrano- Monserrate et al., 2020; Cripps, 2020). Beaches, which offer resources such as property, sand, leisure, and tourism, are one of the most valuable natural resource assets found in coastal areas. While the pandemic lockdowns caused many beaches throughout the world to noticeably alter in appearance due to the lack of tourists, many beaches were now looked cleaner and had crystal clear seas **(**Zambrano-Monserrate et al., 2020; Kundu, 2020; Rahman, 2020).

3.3 The impact of the pandemic on wildlife

The lockdown had stopped the actions of people meanwhile, it offered wildlife an evolving release to move from its natural habitats to places where humans predominate (Rupani et al., 2020). Via a "Lockdown Wildlife Tracker" platform, the Wildlife Institute of India released new data to demonstrate simple movement of wildlife in people-reigning areas (Paital, 2020). Rainer Froese, a German scientist, said that due to the sharp decrease in fishing, fish biomass will rise (Tristram, 2020). In cities with free movement, several wild animals have been spotted. Because of lower levels of Intervention of humans and lesser emission, sea turtles were found on beaches laying eggs that were once neglected (The Bay of Bengal's coast) (*Living*, 2020).

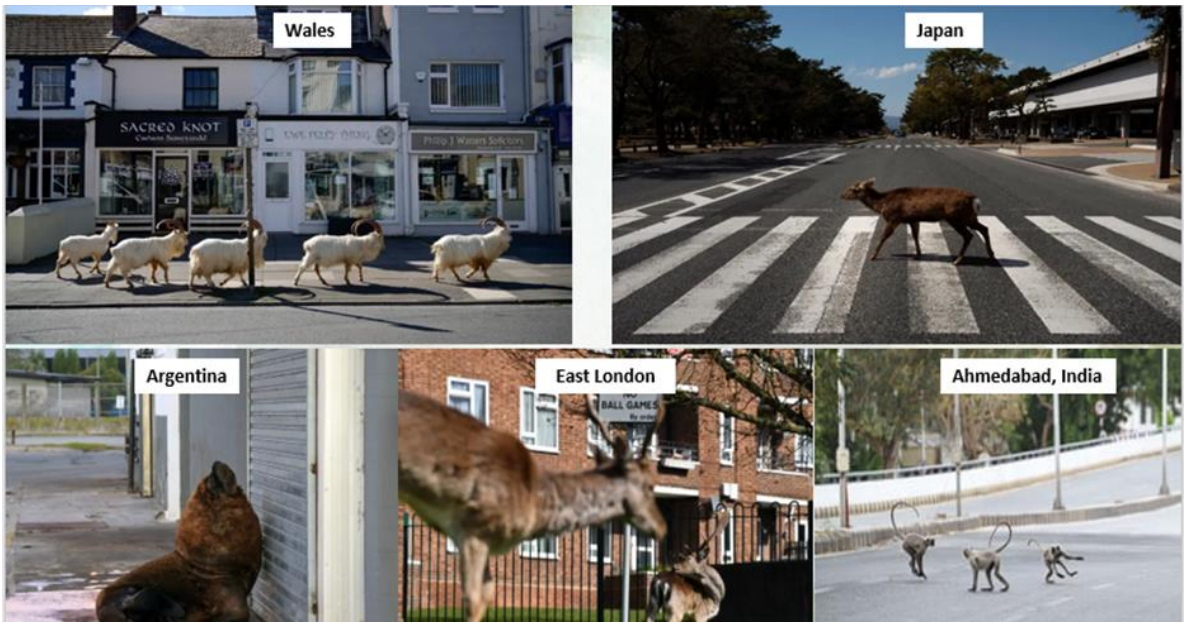
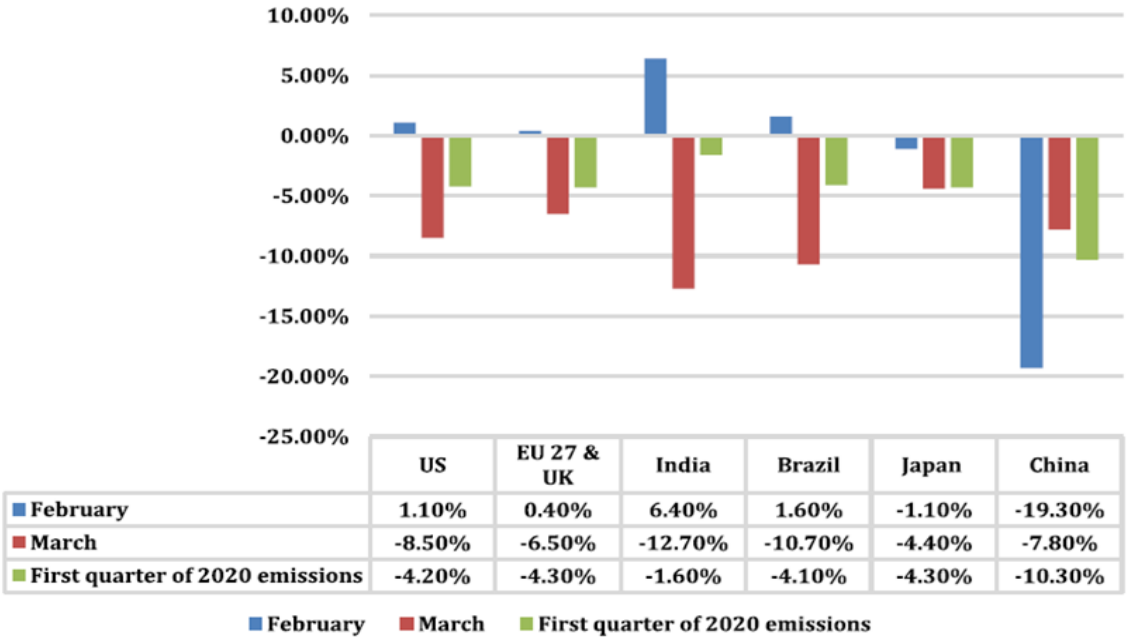


Figure 6: The animals were roaming in the streets during the lockdown in Wales, Japan, Argentina, East London, and India (Source: The guardian, 2020).

The movement of vehicles declined significantly which was decreased the number of species of animals killed by the road accidents, such as feral dogs, stray cats and snakes, and wild animals such as moose, tigers, mountain lions, deer, elk during the lockdown (Shilling et al., 2020; Katz, 2020). The pandemic has allowed animals more freedom to play in urban environments: Deer played in around the grounds and a pelican sat at the park in Britain and Japan; Fox was moving in Ontario Canada; Sealion sat outside the hotel in San Cristobal, Ecuador; A deer was founded inside the home in the Mumbai, India; An African penguin walked in the parking in Cape town; Jackals rested in the middle of the highway in Israel; Horses roamed in the highway in Bolivia; goats walked across the street in Wales; A hare ran over a field in Germany; Flamingos were sighted in large numbers in Mumbai's Talawe Wetland; a wild deer roamed the deserted streets of the port city, Trincomalee in Sri Lanka (CNN, 2020; Rosie, 2020; Loring 2020). In addition, the animals began to take advantage of cities while all individuals lamented the lockdown, but animals roamed in most of the streets around the world. There were a whole host of unusual animal sightings from Paris to Sri Lanka, Turkey, India, and Wales, as the absence of people allowed them to explore the urban area (Rosie, 2020; Loring 2020).

3.4 The impact of the pandemic on carbon emissions

According to analysts, daily global carbon emissions dropped by 17 - 18 percent, leading to an average reduction in the emissions of carbon up to 7 - 9 percent, which was the greatest decline since World War II (CBSNEWS, 2020; Chow, 2020; Corinne et al., 2020). These reductions are primarily due to the decline in the use of transport and manufacturing practices, the introduction of policies for remote employment, the use of interactive conference technology, and widespread telecommunications. Despite this, the CO_2 concentration in the atmosphere in May 2020 the lowest ever recorded in the period of mankind's existence (Borunda, 2020). Energy and climate analyst Constantine Samaras stated that " a worse possible way to reduce pollution is by a pandemic" and that "the only and only way to reduce emissions is by technical, behavioural and structural reform". Zhu Liu of Tsinghua University mentioned that "Only if we reduced our pollution even more than this for longer will we be able to see a drop in atmospheric levels" (Borunda, 2020). The Centre for Energy and Clean Air Research observed that coronavirus prevention strategies, such as lockdowns, isolations, and travel restrictions, have resulted in a decrease in carbon emissions (Myllyvirta, 2020; McMahon, 2020). China produced around 200 to 250 million lesser metric tons of CO_2 in the lockdowns than in the same period in 2019, which was a 25 percent decrease as a result of decreased air traffic, refining of oil, and use of coal (Myllyvirta, 2020; McMahon, 2020).



	US	EU 27 & UK	India	Brazil	Japan	China
February	1.10%	0.40%	6.40%	1.60%	-1.10%	-19.30%
March	-8.50%	-6.50%	-12.70%	-10.70%	-4.40%	-7.80%
First quarter of 2020 emissions	-4.20%	-4.30%	-1.60%	-4.10%	-4.30%	-10.30%

Figure 7: CO2 emissions in 2020 compared to 2019 (Source: Liu et al., 2020)

3.5 The impact of the pandemic on the fossil fuel industry

The International Energy Agency noted the worldwide market for fossil fuels declined by almost 10 percent, and oil demand plummeted by 435,000 barrels worldwide due to the pandemic (IEA, 2020). As the market of oil and gas declined, the pandemic forced the fossil fuel sector into a "terminal collapse" as policymakers seek to speed the transition to the renewable energy stated in the report by the London-based think tank Carbon Tracker (Ambrose, 2020). An estimated 2 percent decrease in the market of fossil fuels projected that the future earnings of coal, oil, and gas producers will fall (Ambrose, 2020; Chapman, 2020). The IEA concluded that such a slowdown will see energy expenditure plunge by a fifth based on the current expenditure statistics and project details, reports from companies and governments, and interviews with business leaders. Over the last few years, the portion of global energy investment on clean energy, containing renewables along with developments in nuclear energy and production, had been steady at about one-third in the last few years (IEA, 2020).

Moreover, by reason of lower energy demand during the lockdown time, universal coal use had also decreased. CREA stated that power generation based on coal in India decreased by 26% with a 19% decrease in the overall generation of power after lockdown (CREA, 2020). China was the world's biggest producer of gas, falling 36 percent after the lockdown (CREA, 2020; Ghosh, 2020). The renewable energy use limited the need for fossil fuels, which had played a crucial role in lowering GHG emissions and increasing the consistency of the ambient air in many parts due to the COVID-19 pandemic (Ellabban et al., 2014; CCAC, 2019; Somani et al., 2020; Zambrano-Monserrate et al., 2020). The use of alternative sources of power such as hydropower, geothermal heat, solar, wind, and biomass had surpassed the market of energy (Ellabban et al., 2014; Rume and Islam, 2020). The International Energy Agency (IEA) used monthly fossil fuel energy demand projections to reduce global CO_2 emissions by 5 percent (IEA, 2020).

3.6 The impact of the pandemic on cycling

In this pandemic, another fascinating revolution emerged where most people limited their movement by public transportation and even own vehicles due to the lockdown. Many individuals began cycling and bike purchases after the pandemic, which had a positive effect on the atmosphere by decreases in carbon emissions as well as health benefits (Smith, 2020; Villafranca, 2020; Winkelmann, 2020; Earls, 2020; Lee, 2020; Francke, 2022). A group researchers discussed the impacts of cycling in Switzerland where the cycling has supported not only as a mode of transport but also as a leisure activity (Rerat et al., 2022). In Europe, North America, and Australia, cycling had been increased substantially in between 2019 to 2020 (Buehler and Pucher, 2022).

3.7 The impact of the pandemic on noise

Sims estimated that globally almost 360 million individuals were vulnerable to lose of hearing as a result of noise pollution (Sims, 2020). Noise from the atmosphere was considered as an annoying sound that caused by high-volume activities of anthropogenic such as commercial or industrial operations, motor vehicle transportation, construction work, and melodies. One of the key causes of irritation for the community and the climate that altered the ecological environments of the habitats was high frequent noise (Zambrano - Monserrate and Ruano, 2019). Seismologists recorded that, owing to quarantine, lockout, and other steps to contain the COVID-19 pandemic, the substantial decrease in seismic sound was observed at both remote seismic sound sensing stations and borehole sensors mounted several hundred meters under the ground eventually resulted in a 50 percent average mean worldwide high-frequency seismic noise reduction coinciding with declined traffic and transport declined, decreased manufacturing production and lessened economic activity. The decreased noise level has made it easier to properly track and detect instinctive seismic emissions, such as earthquakes and volcanic activity (Lecocq et al., 2020).

Moreover, by the shifting equilibrium in the identification and avoidance of predators and prey, anthropogenic noise production has harmfully affected ecosystems which were improved during the lockdown because of the reduction of anthropogenic activities. Also, the invertebrates were often adversely impacted by unwanted noise, which was reduced during the pandemic helped to regulate environmental processes that were essential to the ecological equilibrium (Solan et al., 2016). In the lockout time, the noise level of the capital of India was significantly reduced by about 50 percent, resulting in city residents enjoyed the humming of birds (40-50 decibel range sound) (Sharma et al., 2020; Somani et al., 2020; Gandhiok and Ibra, 2020; Rume and Islam, 2020; Lelieveld et al., 2019; Hassan et al., 2020; Muhammed et al., 2020).

4. Conclusions

The crisis of COVID -19, in conclusion, was a world-wide health tragedy with a significant effect on health and industry, while having a positive impact on the climate based on global emissions reduction. Every day, the pandemic was progressed quite fast, and the number of people placed on quarantine and lockout was rising, more than one million people have died to date, and more than forty million people had been affected globally, and the global economy was directly losing. There was a bright side of the pandemic that the epidemic had decreased pollution of air and water, as well as many beneficial changes in the environment. The elimination of emissions of carbon and other contaminants allowed seeing a better picture of the sky. Still, by reducing carbon emissions, COVID-19 will increase air quality, leading to increased environmental health. The individuals learned a lesson about the ecological concerns created by the COVID-19 effect. Human beings began to feel the global recovery by the fresh air, cleaner water, and free movement of wild animals. Such positive environmental consequences were more prone to transient, but they can shed light on how changes in human behaviour can lead to positive effects.

The desired result on nature affected the restrictions of human-occupied areas of wild animals to overcome. If the lockdown induces a large halt in public and private transit, animals in people-dominated areas enjoy noise-free zones. The world was rapidly restored its wellness. People had begun to accept that urban life could be carried out without severe environmental destruction. It was a glimpse of what the world could be like without energy sources based on fossil fuel and the expectation that the pandemic will help us live better and healthier. This could happen, if individual attitudes, social communities, and multiple institutions adopt a long-lasting mind set, accompanied by stringent rules and strategies to stop the environmental destruction. Post-COVID-19 has retarded the dominance and nature destruction by the individuals.

Perhaps the most profound effect of the pandemic on the ecological transformation, though, was based on biodiversity and the potential decisions that humanity must make to ensure its long-term existence. "It's tragic, this pandemic," when humankind was united around a goal, big changes can be taken place on a short time scale. A "Blessing in Disguise," in which pollution reduces and nature reclaims itself. These environmental benefits might be immediate, but this lockdown has taught policymakers and people how to minimize emissions on a long-term basis. This pandemic brought to light the future mitigation of pollution of air contaminants by increasing the use of technologies to extend remote work. Directives and quarantines on social distancing have led to enormous reductions in transport and travel, as many workers switch from home to work.

The European Space Agency (ESA), the National Aeronautics and Space Administration (NASA), the European Environmental Agency (EEA), The Centre for Research on Energy and Clean Air, International Energy Agency (IEA), Copernicus Atmosphere Monitoring Service (CAMS) of the European and other country-wise monitoring stations, agencies, and services played a vital role in the impact of pandemic especially on the environment by using numerous and advanced technologies. The pandemic of COVID-19 was a crisis of public health with major health and economic consequences, but it also acted as an indication of changes in transport and growth raised the air quality easily and dramatically and lowered the carbon footprint that contributed to increase the environmental health. It continues to remain to be seen to what extent the changes brought on by the pandemic, such as increases in e-working and reduced travel, will persist after the current crisis has finished. Nevertheless, “be a part of the solution, not a part of pollution”.

Author Contribution Statement

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