

International Journal of Global Warming

ISSN online: 1758-2091 - ISSN print: 1758-2083

https://www.inderscience.com/ijgw

Role of the COVID-19 imposed lockdown in climate change

Arsalan Rasheed

DOI: 10.1504/IJGW.2023.10055637

Article History:

Received: 19 June 2021
Last revised: 29 November 2021
Accepted: 27 February 2022
Published online: 24 April 2023

Role of the COVID-19 imposed lockdown in climate change

Arsalan Rasheed

Department of Zoology, Abdul Wali Khan University Mardan, Pakistan and Khyber Pakhtunkhwa Elementary and Secondary Education Department, Pakistan Email: arsalanrrasheed@gmail.com

Abstract: As the transmission of COVID-19 increases rapidly, the whole world adopted the lockdown activity with restriction of human mobility to prevent its spread. Everyone thinks of the COVID-19 negatively; however, it has some positive aspects too. Before COVID-19, the world was suffering by a high level of urban air pollution especially in the form of CO₂, SO₂, NO₂ and particulate matter. During the COVID-19 pandemic, lockdown and limited human engagement with nature accompanied by social distance have proven to be beneficial for nature. As a result, significant reduction in environmental pollution and improvement in the quality of air, cleaner rivers, less noise pollution, undisturbed and calm wildlife was observed. Knowledge gained from the studies suggests that a substantial relationship exists between the contingency measures and environmental health. It is concluded that the COVID-19-induced lockdown has a positive impact on the global warming, a major issue of the 21st century.

Keywords: positive impacts; COVID-19; SARS-CoV-2; coronavirus; lockdown; environment; global warming.

Reference to this paper should be made as follows: Rasheed, A. (2023) 'Role of the COVID-19 imposed lockdown in climate change', *Int. J. Global Warming*, Vol. 30, No. 1, pp.1–16.

Biographical notes: Arsalan Rasheed holds a Degree of MPhil in Zoology (specialisation in molecular biology and genetics). He is currently working as a SST (Bio-Chemistry) at the Government Sector of Khyber Pakhtunkhwa Elementary and Secondary Education Department, Pakistan. His research lines and interest are the life and chemical sciences.

1 Introduction

In the fight against COVID-19, countries all around the world are implementing standard measures to restrict the transmission of the infection. Developing countries are relying on healthcare workers to track and isolate individuals to slow the spread of the virus because there are not enough diagnostic kits and facilities (Rasheed et al., 2021). In these nations, individuals possibly get tried in the event that they foster side effects (Ghosal et al., 2020). Despite these efforts, the virus 'SARS-CoV-2' has been circulating in several

countries and regions outside China in recent months. Therefore, COVID-19 needs to be controlled through a combination of public health measures such as rapid identification, diagnosis and management of cases, identification and follow-up of contacts, prevention in health care settings to control infection, implementation of health measures by passenger, awareness in population, lockdown, etc. (Rasheed et al., 2021).

Despite the noticeable reduction in CO₂ discharge and air pollution due to the lockdowns, which may, if temporarily, contribute to alleviating climatic changes (Schwartz, 2020; Gross, 2020), there are many parallels between the challenges of combating global environmental change and pandemics. Mandatory lockdowns resulted in a 5°C drop in temperature compared to pre-lockdown timescales, showing that the contemporary region is quick to attribute for energy influences that can dramatically raise the temperature. Though both climate changes and pandemics are potential threats to humanity, they must be addressed. As evidenced by the contemporary COVID-19, floods in Midwest fields, shrubbery fires in Australia, dry seasons in California, developing deserts in Central Asia, withdrawing icy masses in the Alps, and the softening polar ice covers, neither the COVID-19 pandemic nor the environment sees the mainland boundaries, and the consequences of climatic change will affect everyone in some manner (Subramaniam, 2020). Everyone should think about these issues and act together. The cataclysmic result of ecological alteration is very thoughtful and can damage the climate and biodiversity. In any case, gaining from the exercises of COVID-19, we should act presently to stay away from any further worldwide calamity and know about the evil dangers that may emerge step by step. Essentially, disregarding the consistently developing logical proof that both environmental change and the outbreak cannot protect us from hazardous result (Pansini and Fornacca, 2020).

Along these lines, the need of great importance is to settle on choices dependent on logical proof. Battling any worldwide debacle needs global cooperation with the goal that researchers can cooperate and address the difficulties (Steffen et al., 2020). On account of the current COVID pandemic, the worldwide cooperation is great; likewise, the demonstrating and comprehension of environmental change issues are a worldwide communitarian exertion by the Intergovernmental Panel on Climate Change (Schwartz, 2020). The global local region is aiming to limit coronavirus transmission and fatalities without adequate treatment and vaccine but the infection has immediately affected the public authority and general wellbeing frameworks and constrained the administrations to announce a public and global general wellbeing crisis. Given the limitations in open development, shut lines, diminished public vehicle, stopped unnecessary administrations, and sanctuary setup orders, the planet is seeing both the positive and adverse consequences of the COVID-19 pandemic (Zambrano-Monserrate et al., 2020).

2 An unexpected benefit of the corona pandemic

COVID-19 is presumably the most exceedingly terrible scourge the world has encountered lately; it has prompted radical, lifesaving, and unprecedented choices by legislatures of countries. Among such remarkable measures is the conclusion of global lines prompting the scratch-off of air travel by business aircrafts and the effect of COVID-19 lockdown and travel limitations on a worldwide temperature alteration. The impact of COVID-19 lockdown and travel restrictions resulted in a huge reduction in fossil fuel byproducts and a dangerous atmospheric devotion which may be associated

with global temperature change. Expecting the assessed worldwide discharges stay steady every year, an expected nine rigatonis of CO₂ outflows would be kept away from before the finish of 2020. It is suggested that logical investigations should appraise the fossil fuel byproducts created by the couple of airplane allowed waivers to ship fundamental items during the worldwide lockdown and deduct it from the nine rigatonis (Ibn-Mohammed et al., 2021). After the worldwide lockdown, through a movement strategy survey, governments and associations are urged to confine actual gatherings or exercises that include air venture out just to circumstances where an actual presence is unavoidable (Jegede and Olarewaju, 2020).

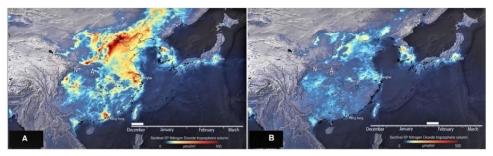
During the global lockdown, the Internet is flourished with articles and the online media outlets with pictures showing that nature appears to have hit the reset button, recovering the spaces to recuperate itself as the anthropogenic exercises have eased back down (Lau et al., 2020). In the midst of all the agony and destruction that the COVID-19 pandemic is giving, there is by all accounts a famous silver lining and some sure outcomes also. A portion of these are referenced underneath: decrease in air pollution level air includes the quick climate of individuals, which is fundamental for their endurance. With 91% of the worldwide populace living in where the air quality is poor, with air quality index (AQI) surpassing as far as possible (WHO, 2016), the conceivable wellbeing impacts of the debased air quality had the biggest impressions owing to the inescapable, poisonous, delayed, and steady openness to contamination. Albeit, the conceivable wellbeing impacts of contamination by and large and air contamination, specifically, are viewed as a glimpse of something larger, in any case, the results of the worldwide air contamination are showed as far as the critical level of global warming worldwide every year (Di et al., 2017).

The Lancet commission covers contamination and wellbeing recommend that contamination represents over 16% of the worldwide pollution, with air contamination alone contributing up to 8% of these pollution, which is multiple times more than the pollution because of tuberculosis, intestinal sickness, and AIDS and 15% more than fighting's and other worldwide viciousness (Landrigan et al., 2018). Assessments propose that over 90% of the contamination related pollution happen in non-industrial nations, like Asia and Africa. The United Nations (UN) General Assembly has effectively embraced 17 maintainable improvement objectives (SDGs) identified with environmental change. The UN general get together has embraced extra SDGs on clean air, clean water, great wellbeing, mindful creation, and the industrialisation of urban communities, marine, and earthbound life. Because of the current COVID-19 pandemic and with nations suspending transport and a large number of individuals put in lockdown to straighten the bend, worldwide air contamination has altogether caught, carbon monoxide emanation decreased by over half. China was simply the primary nation to carry out isolate measures and severe traffic limitations to control the extension of COVID-19. This worldwide prohibition on traffic versatility and lockdown significantly restricted transportation emanations and declined modern and private warming. These activities were found to produce changes, as announced by NASA and European Space Agency (ESA). The degree of NO₂ was diminished by 12.9 and 22.8 μg/m³ in China and Wuhan City in Hubei Province, individually (Figure 1).

Likewise, NO₂ concentrations in China's air pre- and post-lockdown, where NO₂ emissions were cut by 20%–30% from 10 February to 25 February 25 (ESA, 2020a). Pakistan's lockdown has resulted in a significant reduction in pollution levels across the

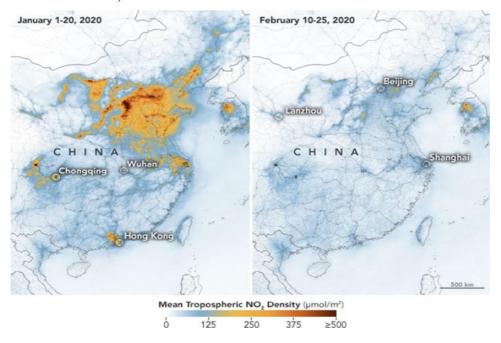
country. Researchers measured the NO_2 level in various Pakistani cities using the TROPOMI/Sentinel-5P satellite. Figure 3 depicts NO_2 concentrations in a handful of Pakistan's most polluted cities before and after the shutdown (1 March–15 April) (CREA, 2020; Siddiqui et al., 2020).

Figure 1 NO₂ drops down in the corona virus epicentre Wuhan, Hubei Province-China, (a) in December 2019 (b) February 2020 (see online version for colours)



Source: ESA (2020a)

Figure 2 Comparison of NO₂ emissions in China pre- and post-lockdown (see online version for colours)

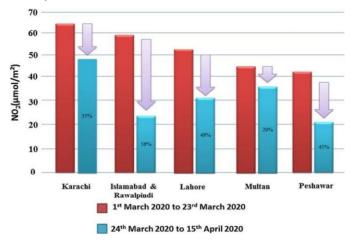


Source: ESA (2020a)

Similarly, particulate matter (PM 2.5) decreased by 1.4 g/m³ in Wuhan while decreased significantly (18.9 g/m³) in the bulk of the cities (over 350). Figure 4 shows a significant drop in NO₂ concentrations in European nations such as Germany, Italy, Spain, and France. Similarly, the Copernicus Sentinel-5P satellite recorded an improvement in air

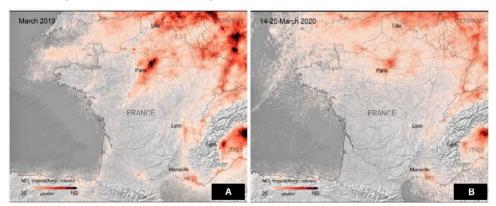
quality across China and also indicated a significant decrease in air pollution, notably in NO₂ emissions, across Italy throughout the lockdown.

Figure 3 Approx. reductions in NO₂ levels across main cities in Pakistan (see online version for colours)



Source: CREA (2020)

Figure 4 Satellite pictures from ESA showing a sensational decrease in the measure of hurtful ozone depleting substance emanations in the climate, (a) March 2019 (b) March 2020 (see online version for colours)



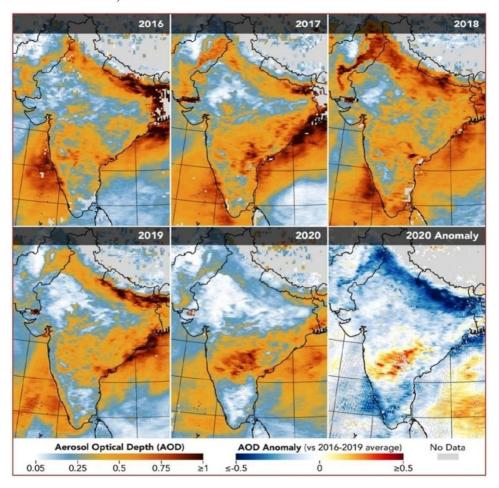
Note: Contamination drops down in European nations in the midst of COVID isolate.

Source: ESA (2020b)

Furthermore, in view of the reports of CAMS, the European Union noticed a huge drop in PM 2.5 (20–30% approx.) in February 2020 contrasted and the month to month normal of 2019, 2018, and 2017 (Chen et al., 2020; Ogen, 2020) (Table 1). As indicated by Fei Liu, an air-quality researcher at NASA's Goddard Space Flight Center, such sensational drop-off noticeable all around contamination was seen interestingly from January 2020. China additionally saw a critical dropdown (36%) in coal-terminated force from 3 February to 1 March 2020 (Ogen, 2020). COVID-19 has cut discharges quicker than

long periods of environment arrangements, e.g., due to severe lockdown in India, the AQI brought from 500 down to 600 in winters, to as low as 50 in April (Figure 5).

Figure 5 Pre- and post-lockdown level of airborne aerosols over India (see online version for colours)



Source: NASA (2020)

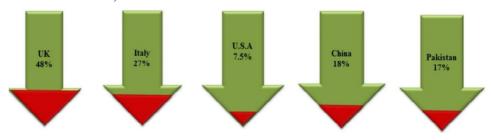
In China alone, every one of the mediations to contain the SARS-CoV-2 episodes prompted air quality upgrades with conspicuous medical advantages that dwarfed the affirmed COVID-19. As referenced, the securing of urban communities has essentially enhanced the natural quality with a severe descent in air contamination levels across a few nations (WHO, 2020; Chakraborty and Maity, 2020; Corlett et al., 2020; Mandal and Pal, 2020; Arora et al., 2020; Basner and McGuire, 2018; Saadat et al., 2020). Though the association between lockdowns and air quality is problematic since it requires legitimate counter-factual, there is evidence to suggest that air pollution has improved dramatically following the lockdown (Arora et al., 2020). Information examination from various nations shows decrease in NO₂ contamination level (30% underneath the typical level toward the finish of June) notwithstanding traffic and business activities being back to

ordinary. Besides, considers propose that more created nations could be all the more generously affected by lockdown, as modern exercises remain generally suspended (Ghosal et al., 2020). Essentially, the positive effects of lockdown are greatest in rich and cold regions, and urban communities with higher traffic volumes experience a greater reduction in air pollution, owing to the fact that more affluent countries have higher power requests and colder regions have higher coal requests, respectively (Arora et al., 2020; Basner and McGuire, 2018; Saadat et al., 2020). All these studies recommend that COVID-19 pandemic have a positive impact on the earth.

3 COVID-19 lockdown results in the reduction of carbon emission

CO₂ emissions are a result of natural processes. Transportation, industry, and power have all reduced their greenhouse gases emissions considerably. Due to the corona virus's incarceration, CO₂ emissions have dropped globally (Figure 6) which is the most significant reduction since World War II (NASA, 2020). During the period of imprisonment, foreign travel was curtailed by an hour, resulting in a brief drop in CO₂ emissions from pre-crisis levels. Following the COVID-19 standard operating procedure, China's CO₂ emissions have been decreased by about 200 million metric tonnes. A minimum of 77 deaths may have been saved if researchers had calculated this reduction (CAT, 2020). Researchers in Europe identified a similar effect in northern Italy, while a researcher at Columbia University in New York reported a 5–10% decrease in CO₂ emissions over the week of 14–20 March 2020 (Kumar et al., 2020).

Figure 6 Reduction in carbon emissions during COVID-19 pandemic (see online version for colours)



Source: NASA (2020)

Impact of COVID-19 lockdown on the recovery of ozone, the ozone layer is found in the upper atmosphere called the stratosphere between 10 and 50 km from the earth. As per the scientific data of 2018, the stratosphere recovered at the rate of 1–3% per decade since 2000. According to NASA researchers, ozone concentrations on the tops of the world's arctic areas decreased by around 240 Dobson units on 12 March 2020, compared to 12 March 2019. This extremely small unit of measurement is extremely rare, occurring just once every ten years. After the lockdown began on 23 January, the particulate matter pollution decreased by an average of 35% and NO₂ decreased by an average of 60%. At the same period, scientists found the average surface ozone concentration increased by a factor of 1.5–2. Emission of ozone-depleting substances is also natural or manmade. All man-made emission is controlled because of lockdown during COVID-19. Production

and consumption of Ozone-depleting substances are also reduced. The World Meteorological Organization states that economic activity has been limited during COVID-19 which results in a decline in CO₂ emission.

NASA discovered a much higher quantity of ozone gas over arctic regions on 12 March 2019 (Kumar et al., 2020) [Figure 7(a)] in comparison to a low gas concentration on 12 March 2020 [Figure 7(b)]. The bright and dark blue colours of the sun indicate low levels of gas, while the yellow and red colours represent the greatest levels of gas (NASA, 2020). As per NASA and NOAA reported that the south pole region of Antarctica has warm temperature in the upper atmosphere which caused a small ozone hole since it was first seen in 1982. CAMS and Hashim et al. (2021) revealed a remarkable recovery of ozone hole during the locked down period of March and April 2020 and announced that the largest hole was ever seen in the ozone layer over the arctic has been closed.

Table 1 Comparison of different environmental variables before and after COVID-19 pandemic lockdown

			Pre-COVID-19	Post-COVID-19	
Air components	СО		1.03%	0.72%	Arora et al. (2020)
	NH ₃		33.93%	29.75%	
	NO_2		42.59%	20.16%	
	O_3		34.05%	34.32%	
	PM _{2.5}		80.51 g/m^3	37.75 g/m^3	
	PM_{10}		176.07 g/m^3	84.79 g/m^3	
	SO_2		16.08%	13.19%	
	Carbon emission drop	UK	-	48%	NASA (2020)
		Italy	-	27%	
		China	-	18%	
		Pakistan	-	17%	
		USA	-	7.5%	
Water components	Dissolved oxygen concentration		3.8 mg/l	6.8 mg/l	Mandal and Pal (2020)
	Biological oxygen demand		>2 mg/l	<2 mg/l	
	TDS concentration		2,457 mg/l	987 mg/l	
	pН		7.9	6.5-8.5	
Noise level	India		45–120.4 db	30–35 db	Mahato et al. (2020)
	Brussels		-	Decrease 1/3	Mandal and Pal (2020)
	Dublin, Ireland		4.93–11.52%	1–11%	Basu et al. (2021)

Effect of the COVID-19 lockdown on sound level Environmental sound is defined as a disagreeable sound created by numerous partisanships, transportation industries, and industrial operations, and it is the primary source of environmental and human health discomfort (Zambrano-Monserrate et al., 2020; Corlett et al., 2020). According to WHO (2009) guidelines, any noise above a threshold value of 55 dB is considered to be harmful

for the human population. Long term exposure to sound levels above the threshold value leads to frequent occurrence of negative health outcomes for a large part of the exposed population. The level of noise pollution was decreased drastically in a different part of globe during the COVID-19 lockdown (Table 1) (Mandal and Pal, 2020). Similarly, a large rise was achieved in the level of sound pollution by the decreased usage of different means for mobility in association with alternative industrial activities. Despite the fact that the current decline appears to be a short-term trend, a long-term approach is required to determine and sustain the ecological context within WHO acceptable limits. As Eulalie Paris, an expert on noise and a number one EEA author, says, the most common causes of sound pollution are transport sources and alternative industries. Only a long-term programme for quantity and transportation networks will reduce substantially sound pollution (Basner and McGuire, 2018).

0 100 200 300 400 500 600 700 Total Ozone (Dobson units)

(a)

(b)

Figure 7 Comparison of ozone concentration (see online version for colours)

4 Marine wildlife and water quality

Water quality in rivers and water systems improved during the COVID-19 epidemic. The ban on the discharge to semi-conducting diodes of industrial effluents and other impurities has a noticeable progressive effect on water quality. India's holy Ganga Stream was one of the world's largest unclean rivers. On the banks of this river bank, the government cost millions of dollars with little returns from household and industrial settings. The water quality of the Ganga Stream has improved by 40–50%, according to the Central Pollution Control Board (CPCB) of India's period water research and reports from Dr. Mishra, an IIT professor at Banaras Hindu University (CPCB, 2020). On-line tests were performed on dissolved oxygen (DO) (more than 6 mg/L), biochemical oxygen demand (less than 2 mg/L), total coli form levels (5,000 per 100 ml), and pH (range between 6.5 and 8.5). The water of the Ganga River has become safe to drink after eras, according to the Indian Institute of Science, Roorkee. Both the Ganga and its sister stream, the Yamuna, have improved. Yamuna has DO values of 2.3–4.8 mg/L, which

were previously thought to be nil in 2019. For many years, incarceration has been ready to provide what governments have been unable to do. The biological oxygen demand (BOD) of the rivers Ganga and Yamuna has remittent in their most polluted parts, according to data from the CPCB and the Provincial Pollution Control Board (UPPCB) of India (CPCB, 2020; UPPCB, 2020). When COVID-19 is imprisoned for two months, the water in cities becomes cleaner, and aquatic life is now observable that has not been seen in several years within the metropolises (Zuev and Hannam, 2020).

Hygienic streams and other bodies of water have a substantial positive impact on marine life. Some animals have returned to their natural habitats since the enclosure was installed. Due to the shutdown of factories and corporate entities, worldwide pollution levels have dropped. Not only do land animals return, but even aquatic creatures seem to appreciate the break from the noise and pollution (Kalita and Talukdar, 2021). Tourism has slowed, and all other maritime operations have been ceased, as a result of the suspension of many cruise ships. Aquatic species have assumed control of the situation. Aquatic specialists have already looked on the effects of incarceration on marine life. The industrial fishing business has been devastated by the closure of big buyers, restaurants, and hotels. Fishing vessels have been moored at ports due to the perplexing cultural isolation. COVID – according to Carlos Duarte, a research head at the Red Sea Research Center (RSRC) in Saudi Arabia, a 19-month lockout between February and June or July can speed up the development of fish stocks and other marine creatures, as it did after the first and second world wars, and this unintentional lockout may help us understand ecological sustainability (Simon et al., 2021).

In water, sound goes far and faster than one might think, posing a significant hazard to aquatic life (Zhou et al., 2020). Noise pollution from ships and loud blasts from seismic air cannon tests designed to find gas and oil deposits in deep seas must be traumatising to marine life. Maritime traffic noise levels vary from 20 to 200 Hz, affecting aquatic life. Below 150 Hz, noise levels drop by six dB (GeoNoise, 2020). Michelle Fournette, a marine life specialist at Cornell, investigated humpback whales and other marine organisms and came to the conclusion that just eliminating cruise ships would result in a considerable reduction in ocean noise. As per the exploration, close to nearness to sea traffic brings pressure chemical step up in marine organic entities, which affect their conceptive achievement (Rolland et al., 2012) Restricted versatility inside the water was straightforwardly connected to the abatement of stress chemicals in these species, as per an investigation of the legitimate's stool.

Besides, the closure is guaranteeing ideal conditions for Olive Ridley turtle on the shores. During the closure, sightseers are more averse to hurt turtles. The current year's less human obstruction would give these turtles sufficient opportunity to brood and incubate in isolation. Since the sea shores are sans singular, there was no inadvertent egg squashing, just as less waste and garbage were disposed of into the ocean climate. During the COVID-19 lockdown, the agitated stomach and web brought about by plastic and marine garbage, which are the significant reasons for injury to sea-going species, will be exhausted. The oceans, yet additionally waterways and other water bodies are clearing out, recommending that less risky and hazardous things are entering the water.

5 Beaches that are immaculate

Beaches fill in as basic regular capital resources (Zambrano-Monserrate et al., 2020; Kraemer et al., 2020) in waterfront areas, offering crucial types of assistance, for example, business undertaking the travel industry, sandy, terrains, and backing to beach front towns (Saadat et al., 2020). The sandy sea shores and ridges are sentinels, shielding harvests, houses, and other ethereal warm blooded creatures from the generous impacts of waves and holding the furious breezes back from harming yields, homes, and distinctive ethereal vertebrates. People's flighty and inaccurate use, then again, has brought about contamination worries on a portion of the world's sea shores. These total human waste outcomes are presently disturbing and hurting the sea shores' and other marine environments' capacity to give fundamental environment administrations like waterfront support and monetary dependability, global climatic strength, and natural honesty.

The United Nations organisation WHO has pronounced a crisis and forced social removing measures to battle the interesting COVID episode, sea shores all through the world have been affected by trade due to the overall detainment. Besides, the total closure of much mechanical movement has for all intents and purposes disposed of contamination from these sources. These futile strategies have brought about an invigorating change in the presence of a few sea shores all through the world. The sea shores of Salinas (Ecuador) and Barcelona are astounding models (Spain), these sea shores, just as those in Acapulco (Mexico), give off an impression of being cleaner and have more clear oceans right now (WHO, 2020). In addition, when Mandal (2020) and Saadat et al. (2020) examined the impact of COVID-19 lockdown on surface water quality and found that the water nature of Vembanad Lake in Kerala improved essentially. They additionally found a critical drop (34%) in the suspended particulate matter substance of the lake water during the closure time frame in their examination. As per these researches, the viral pestilence has carried with it an inconsequential advantage for the climate and human wellbeing.

6 On the street animals

The effects of the corona virus on the environment were first seen from the house (Cameletti, 2020). Then, as the disease and confinement advance, they may be detected in the sky above us, the air we breathe, and even the earth beneath our feet. As a result of global confinement, humans are limited to their homes. Wild creatures from all over the world seem to be returning to the region to reclaim it. Media merchants are tweeting and uploading a lot of photos and videos of animals on the streets (Zambrano-Monserrate et al., 2020). The presence of wild animals in cities is usually owing to a sense of calm and tranquilly that attracts these animals to residential areas.

7 Feathers collaborate

Limited human activities due to COVID-19 outbreak has permitted birds and untamed life to prosper and appreciate the entirety of nature's opportunities, e.g., on the Adriatic Coast, several flamingos with black and pink-lined wings have been spotted sprinkling

over the sparkling water of Nartan Lake (Mandal and Pal, 2020). As indicated by park authorities, the quantity of such birds has expanded threefold since January 2020, to more than 3,000. Essentially, organisms are hoping to reclaim their own existence and are taking advantage of nature's opportunity. Comparative events might be seen on Indian sea shores, when runs of flamingo multitude to the sea shores, with the quantity of flamingos up to 25% more than in earlier years.

8 COVID-19 induced confinement has taught us a few things

The COVID-19 pandemic was first and probably most important a global health crisis with significant health and economic repercussions, but it also had beneficial environmental impacts which might serve as a lesson and inspiration for future behavioural changes that could help to bring about positive environmental changes. The current worldwide pandemic has forced us to think about and envisage an alternative future. Quarantines show that a cleaner world is attainable. The worldwide epidemic continues to show a clear correlation between pollution levels and increased economic activity, such as manufacturing, transportation and energy production, as well as municipal disruptions on a minor scale. Because the corona is dissipating, a solution based on clean energy is necessary. If pollution is not handled, waste products from consumption, heating, agriculture, mining, manufacturing, transportation, and other human activities can wreak havoc on the environment. As a result, effective techniques for controlling environmental degradation must be implemented. We are hopeful that the lockout would allow us to limit the amount of needless human interventions in the region. The following guided tactics should be used by governments and international organisations to achieve beneficial improvements to the environment.

- automobile examination and repair
- system of efficient transportation
- streamlining transport infrastructure
- using environmentally friendly goods
- using as little chlorofluorocarbons as feasible (CFCs)
- energy sources are being adopted
- encouraging the reuse of trash and the creation of jobs
- pesticides are used hardly ever
- using the least quantity of water feasible is a must.
- the act of tree plantation
- reducing deforestation to a minimal level
- solid, suspended, and inorganic materials are removed from trash before it enters the
 environment
- ecological sanitation bogs are used anywhere there is no need for water and human excrement is recycled into organic fertiliser.

9 Conclusions

Climate change and global warming is the most significant issue of the 21st century. Despite continued efforts by governmental and non-governmental organisations to control it, enormous challenges remain left. Beside these issues, history provides a record of epidemics such as plague, smallpox, measles, cholera, influenza, Ebola, AIDS, severe acute respiratory syndrome (SARS) and now COVID-19 outbreak. COVID-19 is a new dangerous infectious disease that causes illness in animals or humans. On the other hand, the outbreak is a blessing for earth. Since there was no effective vaccine, social lockdown was imposed globally to control COVID-19 which has been proved an incidental boon to the environment. It is concluded that the temporary lockdown has a positive impact on the global environment including reduction of various types of emission, reduction of water, industrial and noise pollution, restoring ozone layer and supporting wildlife.

Acknowledgements

Author of the manuscript acknowledge and thank his family members and institutions.

References

- Arora, S., Bhaukhandi, K.D. and Mishra, P.K. (2020) 'Coronavirus lockdown helped the environment to bounce back', *Science of the Total Environment*, Vol. 140573, DOI: 10.1016/j.scitotenv.2020.140573.
- Basner, M. and McGuire, S. (2018) 'WHO environmental noise guidelines for the European region: a systematic review on environmental noise and effects on sleep', *Int. J. Environ. Res. Public Health*, Vol. 15, p.285, DOI: 10.3390/ijerph15030519.
- Basu, B., Murphy, E., Molter, A., Basu, A.S., Sannigrahi, S., Belmonte, M. and Pilla, F. (2021) 'Investigating changes in noise pollution due to the COVID-19 lockdown: the case of Dublin, Ireland', Sustainable Cities and Society, Vol. 65, p.102597, https://doi.org/10.1016/j.scs.2020.102597.
- Cameletti, M. (2020) 'The effect of corona virus lockdown on air pollution: evidence from the City of Brescia in Lombardia Region (Italy)', *Atmospheric Environment*, (Oxford, England: 1994), Vol. 239, p.117794, https://doi.org/10.1016/j.atmosenv.2020.117794/
- Central Pollution Control Board (CPCB) (2020) Water Quality [online] https://cpcb.nic.in/water-pollution/ (accessed 6 July 2020).
- Centre for Research on Energy and Clean Air (CREA) (2020) Air Quality Before and After National Lockdown during Coronavirus Disease (COVID-19) Outbreak Across Pakistan [online] https://energyandcleanair.org/air-quality-before-and-after-national-lockdown-duringcoronavirus-disease-COVID-19-outbreak-across-pakistan (accessed 9 May 2020).
- Chakraborty, I. and Maity, P. (2020) 'COVID-19 outbreak: migration, effects on society, global environment and prevention', *Science of the Total Environment*, Vol. 728, p.138882, DOI: 10. 1016/j.scitotenv.2020.138882.
- Chen, Y., Liu, Q. and Guo, D. (2020) 'Emerging coronaviruses: genome structure, replication, and pathogenesis', *Journal of Medical Virology*, Vol. 92, No. 4, pp.418–423, DOI: 10.1002/jmv.26234.
- Climate Action Tracker (CAT) (2020) *Climate of China* [online] https://climateactiontracker.org/countries/china/ (accessed 3 May 2020).

- Coleman, C.M., Liu, Y.V., Mu, H., Taylor, J.K., Massare, M., Flyer, D.C., Smith, G.E. and Frieman, M.B. (2014) 'Purified coronavirus spike protein nanoparticles induce coronavirus neutralizing antibodies in mice', *Vaccine*, Vol. 32, No. 26, pp.3169–3174, https://doi.org/10.1016/j.vaccine.2014.04.016.
- Corlett, R.T., Primack, R.B., Devictor, V., Maas, B., Goswami, V.R., Bates, A.E. and Roth, R. (2020) 'Impacts of the coronavirus pandemic on biodiversity conservation', *Biological Conservation*, Vol. 246, p.108571, DOI: 10.1016/j.biocon.2020.1 08571.
- Di, Q., Wang, Y., Zanobetti, A., Wang, Y., Koutrakis, P., Choirat, C. and Schwartz, J.D. (2017) 'Air pollution and mortality in the Medicare population', *New England Journal of Medicine*, Vol. 376, No. 26, pp.2513–2522, DOI: 10.1056/NEJMoa1702747.
- ESA (2020a) [online] https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/Coronavirus_lockdown_leading_to_drop_in_pollution_across_Europe (accessed 14 July 2020).
- ESA (2020b) [online] https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/COVID-19 nitrogen dioxide over China (accessed 14 July 2020).
- GeoNoise (2020) Coronavirus Lockdown Gives Animals A Rare Break from Noise Pollution [online] https://www.geonoise.com/coronavirus-lockdown-gives-animals-a-rare-break-fromnoise-pollution/ (accessed 30 March 2020).
- Ghosal, S., Sinha, B., Majumder, M. and Misra, A. (2020) 'Estimation of effects of nationwide lockdown for containing coronavirus infection on worsening of glycosylated haemoglobin and increase in diabetes-related complications: a simulation model using multivariate regression analysis', *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, Vol. 14, No. 4, pp.319–323, DOI: 10.1016/j.dsx.2020.03.014.
- Gross, M. (2020) 'Finding comfort in nature', *Curr. Biol.*, Vol. 30 p.R329–R331, DOI: 10.1016/j.cub.2020.03.073.
- Hashim, B.M., Al-Naseri, S.K., Al-Maliki, A. and Al-Ansari, N. (2021) 'Impact of COVID-19 lockdown on NO₂, O₃, PM_{2.5} and PM₁₀ concentrations and assessing air quality changes in Baghdad, Iraq', *Sci. Total Environ.*, 1 February, Vol. 754, p.141978, https://doi.org/10.1016/j.scitotenv.2020.141978.
- Ibn-Mohammed, T., Mustapha, K.B., Godsell, J., Adamu, Z., Babatunde, K.A., Akintade, D.D., Acquaye, A., Fujii, H., Ndiaye, M.M., Yamoah, F.A. and Koh, S. (2021) 'A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies', *Resources, Conservation, and Recycling*, Vol. 164, p.105169, https://doi.org/10.1016/j.resconrec.2020.105169.
- Jegede, O.S. and Olarewaju, S. (2021) 'The impact of COVID-19 lockdown on global warming: a call for policy review', *International Journal of Travel Medicine and Global Health*, Vol. 9, No. 2, pp.70–72 [online] http://www.ijtmgh.com/article_120338_a1f78206265c91f709be69bed4847597.pdf.
- Kalita, S. and Talukdar, H. (2021) 'COVID-19 pandemic: an unprecedented blessing for nature', The Impact of the COVID-19 Pandemic on Green Societies, Vol. 64, No. 1, pp.47–51 [online] https://www.springerprofessional.de/en/covid-19-pandemic-an-unprecedented-blessing-for-nature/18991730.
- Kraemer, M.U.G., Yang, C.H., Gutierrez, B., Wu, C.H., Klein, B., Pigott, D.M. et al. (2020) 'The effect of human mobility and control measures on the COVID-19 epidemic in China', *Science*, Vol. 368, pp.493–497, DOI: 10.1126/science.abb4218.
- Kumar, A., Malla, M.A. and Dubey, A. (2020) 'With corona outbreak: nature started hitting the reset button globally', *Frontiers in Public Health*, Vol. 8, No. 569353, DOI: https://doi.org/10.3389/fpubh.2020.569353.
- Landrigan, P.J., Fuller, R., Acosta, N.J.R., Adeyi, O., Arnold, R., Basu, N. et al. (2018) 'The Lancet commission on pollution and health', *Lancet*, Vol. 391, pp.462–512, DOI: 10.1016/S01406736(17)32345-0.

- Lau, H., Khosrawipour, V., Kocbach, P., Mikolajczyk, A., Schubert, J., Bania, J. and Khosrawipour, T. (2020) 'The positive impact of lockdown in Wuhan on containing the COVID-19 outbreak in China', *Journal of Travel Medicine*, Vol. 27, No. 3, p.taaa037, DOI: 10.1093/jtm/taaa037.
- Ma, Y., Zhao, Y., Liu, J., He, X., Wang, B., Fu, S., Yan, J., Niu, J., Zhou, J. and Luo, B. (2020) 'Effects of temperature variation and humidity on the death of COVID-19 in Wuhan, China', *The Science of the Total Environment*, Vol. 724, p.138226, https://doi.org/10.1016/j.scitotenv.2020.138226.
- Mahato, S., Pal, S. and Ghosh, K.G. (2020) 'Effect of lockdown amid COVID-19 pandemic on air quality of the megacity Delhi, India', *Sci. Total Environ.*, Vol. 730, https://doi.org/10.1016/j.scitotenv.2020.139086.
- Mandal, I. and Pal, S. (2020) 'COVID-19 pandemic persuaded lockdown effects on environment over stone quarrying and crushing areas', *Science of the Total Environment*, Vol. 732, p.139281, DOI: 10.1016/j.scitotenv.2020.139281.
- Mandal, S. (2020) 'COVID-19 imposed lockdown might be a boom for aquatic ecosystem', *Curr. Sci.*, Vol. 118, No. 11, p.1641.
- NASA (2020) [online] https://earthobservatory.nasa.gov/images/146596/airborne-particle-levels-plummetin-northern-india, https://earthobservatory.nasa.gov/ (accessed 13 May 2020).
- Ogen, Y. (2020) 'Assessing nitrogen dioxide (NO₂) levels as a contributing factor to coronavirus (COVID-19) fatality', *Science of the Total Environment*, Vol. 726, p.138605, DOI: 10.1016/j.scitotenv.2020.138605.
- Pansini, R. and Fornacca, D. (2020) COVID-19 Higher Induced Mortality in Chinese Regions with Lower Air Quality, medRxiv, DOI: 10.1101/2020.05.28.20115832.
- Rasheed, A., Usman, T., Niaz, S., Khattak, I., Gul, S., Ali, N., Khan, N., Ali, H. and Sarwar, M. (2021) 'A review on severe acute respiratory syndrome 2 (SARS COV-2)', *Pakistan Journal of Zoology*, Vol. 53, No. 4, pp.1537–1545, DOI: 10.17582/journal.pjz/20210107160135.
- Rolland, C., Lazarus, C., Giese, C., Monate, B., Travert, A.S. and Salomon, J. (2020) 'Early detection of public health emergencies of international concern through undiagnosed disease reports in ProMED-mail', *Emerging Infectious Diseases*, Vol. 26, No. 2, p.336.
- Saadat, S., Rawtani, D. and Hussain, C.M. (2020) 'Environmental perspective of COVID-19', *Sci. Total Environ.*, Vol. 728, p.138870, DOI: 10.1016/j.scitotenv.2020.138870.
- Schwartz, S.A. (2020) 'Climate change, COVID-19, preparedness, and consciousness', *Explore*, Vol. 16, pp.141–144, DOI: 10.1016/j.explore.2020.02.022.
- Siddiqui, A., Halder, S., Chauhan, P. and Kumar, P. (2020) 'COVID-19 pandemic and city-level nitrogen dioxide (NO₂) reduction for urban centres of India', *Journal of the Indian Society of Remote Sensing*, Vol. 48, No. 7, pp.999–1006.
- Simon, M.D., Meshkat, S.D. and Raja, N. (2021) 'An ecological analysis of quality ratings and inspections associated with COVID-19 outbreaks in skilled nursing homes', *Jour. Nursing Home Res.*, Vol. 7, No. 4, pp.17–22, DOI: http://dx.doi.org/10.14283/jnhrs.2021.4.
- Steffen, B., Egli, F., Pahle, M. and Schmidt, T.S. (2020) 'Navigating the clean energy transition in the COVID-19 crisis', *Joule*, Vol. 4, No. 6, pp.1137–1141, DOI: 10.1016/j.joule.2020.04.011.
- Subramaniam, B. (2020) 'Earth day reflections: hope amid the pandemic', DOI: 10.1021/acssuschemeng.0c02596.
- Uttar Pradesh Pollution Control Board (UPPCB) (2020) River Water Quality [online] https://www.uppcb.com/river_quality.htm (accessed 6 July 2020).
- World Health Organization (WHO) (2016) *WHO's Urban Ambient Air Pollution Database Update 2016*, pp.1–7 [online] https://www.who.int/entity/phe/health_topics/outdoorair/databases/cities/en/index.html.
- World Health Organization (WHO) (2020) Rolling Updates on Coronavirus Disease (COVID-19). Events as They Happen [online] https://www.who.int/emergencies/diseases/novel-coronavirus 2019/events-as-they-happen (accessed 31 July 2020).

- Zambrano-Monserrate, M.A., Ruano, M.A. and Sanchez-Alcalde, L. (2020) 'Indirect effects of COVID-19 on the environment', *Science of the Total Environment*, Vol. 728, p.138813, DOI: 10.1016/j.scitotenv.2020.138813.
- Zhou, X., Cheng, L. and Li, M. (2020) 'Assessing and mapping maritime transportation risk based on spatial fuzzy multi-criteria decision making: a case study in the South China Sea', *Ocean Engineering*, Vol. 208, No. 2, p.107403, DOI: https://ma.x-mol.com/paperRedirect/1259931515006156800.
- Zuev, D. and Hannam, K. (2020) 'Anxious immobilities: an ethnography of coping with contagion (COVID-19) in Macau', *Mobilities*, Vol. 16, No. 1, pp.35–50, DOI: 10.1080/17450101.2020. 1827361