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# COVID-19: A Learning Opportunity to Improve Environmental Sustainability

*Syed Abdul Rehman Khan, Laeeq Razzak Janjua and Zhang Yu*

## Abstract

In just a few months, COVID-19 transformed from a dangerous regional health threat into a widespread global pandemic and economic disaster. Thus the world is expecting a great recession once again. The rapid spread of COVID-19 has had far-reaching consequences for people's daily lives in almost all parts of the world. Climate change and biodiversity depletion have now reached global boundaries; thus, human activity has surpassed Earth's capacities. Earth capacities can be explained in terms of extreme climate change. This chapter is intended to investigate the link between the outbreak of Covid-19 and its effect on environmental and society. The discussion reveals that environmental pollution is minimized as a result of global lockdown. Furthermore, our review also shows that in terms of environment, Covid-19 provide an opportunity to transform our polluted economy toward the green economy through adoption of renewable energy sources and green practices in our businesses.

**Keywords:** COVID-19, air pollution, climate change, carbon carpets

## 1. Introduction

The estimated age of this world is approximate (13.8 billion years). In all these years, there are some incidences experienced by a human, which reshaped the entire behavior of human. World war I, II, cold war era and more recently the incident of 9/11 all these incidences in world history suddenly changed the power centers, the world moved from unipolar to bipolar or even toward multipolar world order. Furthermore, all these event or incidence dramatically changed the over economic systems, way of governing nations and even changed our literature as well. Even all these incidences changed the lifestyle of the entire world, similarly, the ongoing pandemic crises of covid-19 will have a permanent and everlasting impact on our lives [1, 2].

It is generally believe that once pandemic crises will over; the world will be not the same as it was before. Technically, due to hyper-growth, presence of high tech inventions, innovation and more especially the extensive use to the internet already made this world liquidness thus we are unable to identify where it will be stopped or freeze. On the other hand, nowadays, this pandemic situation just created the new standard among us; it is also true; thus, it locked down the entire world in one corner. At the

Year	Pandemic crises	No. of deaths
165 AD	Antonine Plague	5,000,000
541 AD	Justinianic Plague	100,000,000
1334	Black Death Plague	25,000,000
1576	Cocoliztli Epidemics	15,000,000
1817	The first Cholera Pandemic	150,000
1855	The third Plague	15,000,000
1889	Russin Flu	360,000
1919	Spanish flu	50,000,000
1957	Asian Flu	1,100,000
2004	SARS	813
2014	EBOLA	11,315
2020	Covid-19 (until 08-01-2020)	712,126

**Table 1.**  
*Death toll in pandemic crises in history (source: Author working sheet).*

moment, due to this pandemic, the circle of growth has become stiff. Thousands of airlines are not functioning, and the majority of the tourist places are closed, furthermore there not any educational activities are going on in most effected countries of covid-19. Similarly; on the other hand, this world not facing the pandemic situation the first time. History reveals that there were numerous pandemic crises experienced by this world. Due to all these pandemic crises, millions of people lost their lives.

**Table 1**, indicates major pandemic crises experienced by the world in history.

In the recent era, especially at the beginning of the 21st century, two more pre-mature pandemic crises hit numerous countries of the world. Avian influenza, which is known as bird flow virus, infected hundreds of people from 2003 to 2011 in almost 60 countries of the world. According to the World Health Organization estimation, more than 1500 people died due to this influenza. Furthermore, in 2009 swine flu (H1N1) spread over more than 100 countries of the world, and approximately 550,000 people lost their lives due to this (Centers for Disease Control and Preventions). On the other hand, from 2013 to 2016, the Ebola virus hit western African countries, and more than 11,000 people died. Similarly, there are numerous diseases which cause millions of death worldwide every year. Due to HIV (AIDS) 32 million people died, whereas due to malaria, just in 2018, approximately 400,000 people died (World Health Organization).

**2. Climate change: why it matter?**

Before discussing actual environmental issues, it essential to describe the phenomenon of climate change. United Nations Framework Convention on Climate Change defines it as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable periods” [3]. Similarly, on the other hand, Rahman, [4] define it as ‘our climate is changing, largely due to the observed increases in human-produced greenhouse gases. Greenhouse gases absorb heat from the sun in the atmosphere and reduce the amount of heat escaping into space. This extra heat is the primary cause of observed changes in the climate system over the 20th century. However one question arises

here, why environment or typical climate change matter for us; as it represent our common future and that particular phrase of common future is defined by United Nation’s Brundtland Report 1987 as ‘sustainable development’. Leggett and Carter [5] refer definition of sustainable development, which is described by united nation conference on Sustainable development; Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. Seem like the guiding principle for long-term global development; sustainable development consists of three pillars: economic development, social development, and environmental protection.

The adverse effect of climate change is exceptionally massive; somehow, it matters of survival of humankind on earth. Sustainability can be achieved in a balanced way only if we care about the world. Among three pillars of sustainable development, which are environment, economic and social; environment considers as one of the most significant pillar of sustainable development. According to the UN estimations, for human survival till now 1.6 planet resources we already used and while observing the acceleration by which we (humans) utilize natural resources two piles of the earth will be required by 2030 (Global Footprint Network). As Foley et al. [6] mentions, in his ecological overshoot, he is concerned about the conversion of resources into waste faster and vice versa. The most noticeable effects of overshooting or overutilization of natural resources can be observed through diminishing forest covers, collapsing fisheries, rapid fall in water level under the earth crust, carbon dioxide emissions which all are creating global climate change. Global warming affects all species which are living on the earth. According to living planet report 2014, the population of living species has declined by 52% from 1970 (World Wildlife Fund). The idea of Sustainable Development Goals become more critical among intellectual, economist, and scientist due to the growing urgency of sustainable development for the entire world, as climate change and medical issues are those common challenges.

**Table 2** illustrates some of the adverse features of climate change are massively noticed in recent decades. Due to industrialization and foreign direct investment outflow from developed countries to developing countries where environmental laws are not so much strict bad affect atmosphere. As massive harmful gases in the shape of Carbon dioxide, Sulfur dioxide and nitrogen dioxide are added in the atmosphere, which eventually decreases oxygen and harms our environment which

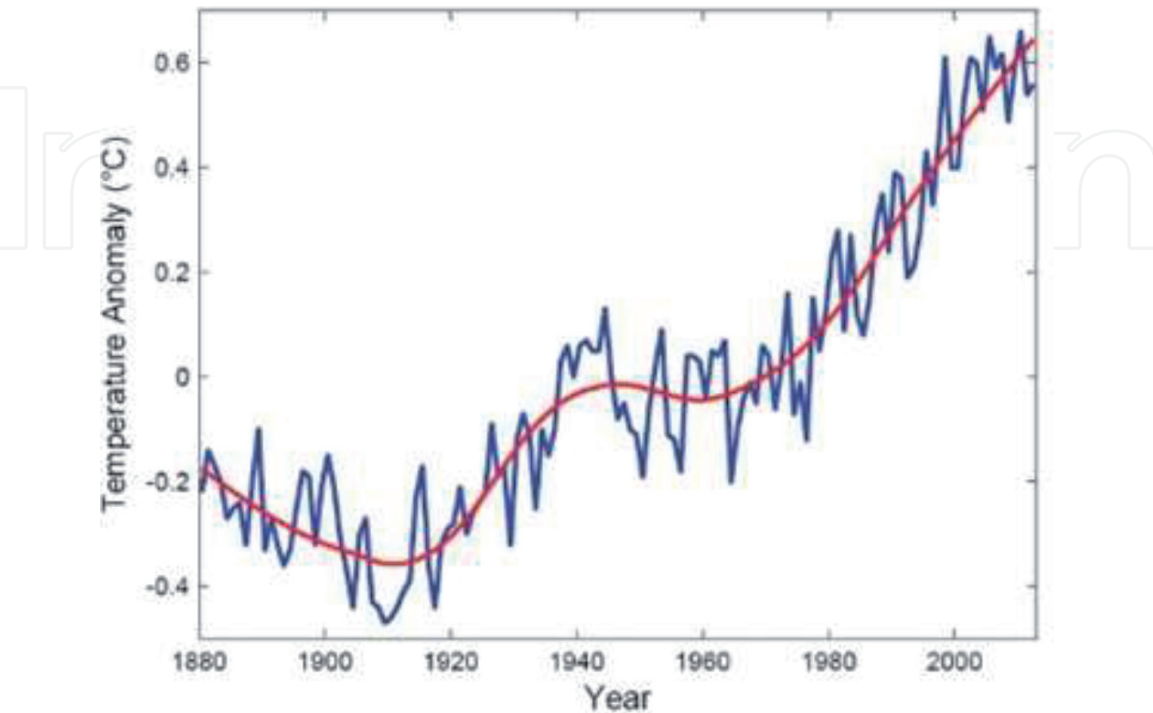
Climate changer features	Why it matters?
Green House Gases Concentration	Emission of Green House Gases thorough industrialization, traveling etc. is increasing the GHG concentration in the atmosphere.
Ozone Layer depletion	A slow, steady decline of about 4% per decade in the total volume of ozone in Earth’s stratosphere (the ozone layer) since the late 1970s
Melting of Ice	Greenland lost 150 km <sup>3</sup> to 250 km <sup>3</sup> (36 mi <sup>3</sup> to 60 mi <sup>3</sup> ) of ice per year between 2002 and 2006 and Antarctica lost about 152 km <sup>3</sup> (36 mi <sup>3</sup> ) of ice between 2002 and 2005
Rise in Sea level	Global sea level rose about 17 cm (6,7 in) in the last century
Temperature rise in sea water	With the top 700 m (about 2300 ft) of ocean showing warming of 0,16□□C since 1969 due to absorbed increased heat of the Earth
Unwelcome rains and storms	World is experience every year unwell come rains and floods and thousands of people lost their life’s.

**Table 2.**  
*Adverse affect of climate change (source: Author working sheet).*

surrounds us. Similarly, one of the most destructive effects of all these harmful gases in our environment and atmosphere is depletion of the ozone layer which protect humans and surface of the earth from the adverse impact of sun rays. The concentration of harmful gases in the atmosphere increases the average temperature of the world, which negatively affect the glaciers and phenomenon of melting ice increases very rapidly. Melting of ice in summer season induces floods in our river, which causes loss of human life and another material loses as well. However, massive waves in the sea and similarly melting ice slabs directly increase sea level, which influences the life of people living on the seashores. The **Figure 1** indicates the average increase in world temperature recorded in the last 40 year. Thus we can see that average temperature indicating an upward trend, which is an indeed alarming situation for everyone.

The world-renowned, global climate change activist, Greta Thunberg Said, “And Yes I know that we need a system change rather than individual change, but you cannot have one without the other. If we explore the history, all the big changes in society have been started by the people at the grassroots level. No system change can come without pressure from the large group of individual’. Thus, it is right the entire world needs collective efforts to face all the challenges to arise by climate change. Moreover, the highest responsibility is on the shoulder of the business community, policy markers, world leaders and politicians. The business community employs by using the labor from the factor of production; moreover, they also put capital along with the utilization of land resources which are also the factor of production. However, unsustainable utilization of land resources creates massive climate change threats. Every year tons of plastic waste is buried without recycling under the surface of the earth and dump in oceans as well.

Similarly, in order to fight against hunger and our food necessities, our farmer’s working day and night on land resources and grow crops and planted fruits trees. However, by using heavy pesticides and fertilizer we can double the quantity of wheat in less time but on the other hand, one of the significant adverse effects of pesticides are the death of eco-friendly insects. Similarly, extensive use of fertilizer is finishing the natural tendency of soil to grow crops.



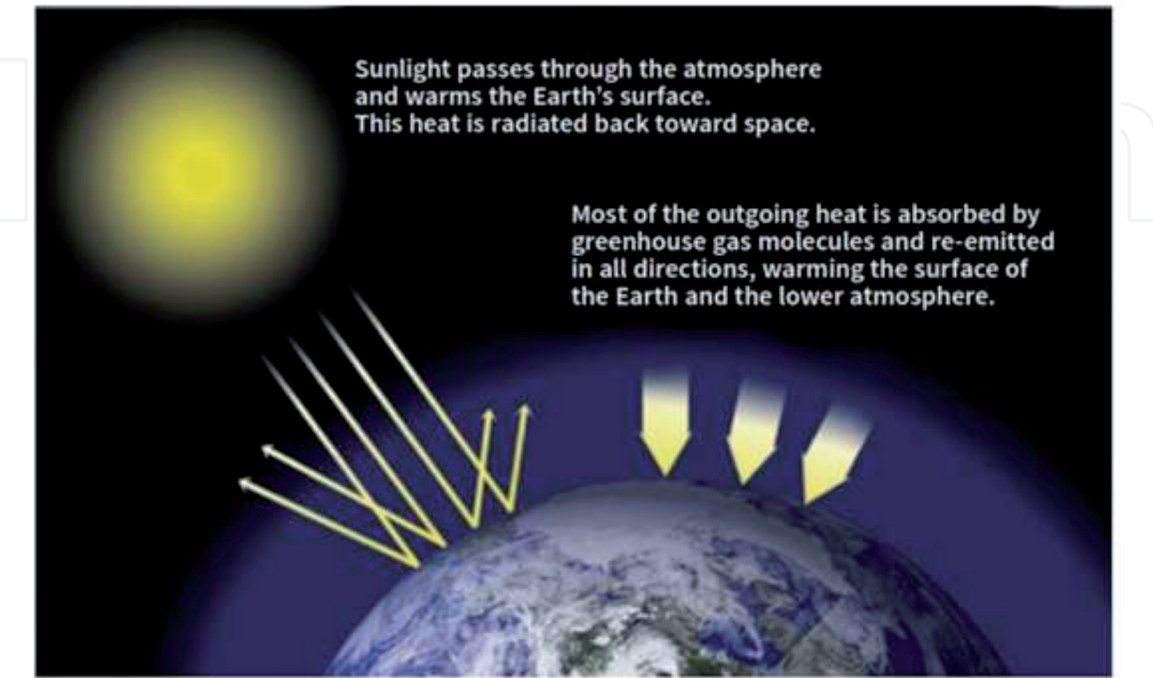
**Figure 1.**  
Average temperature trend observed by NASA since 1980. Source: Rahmstorf et al. [7].



Every next coming day increases the world population in such manner that, every consecutive day noted as the highest population ever recorded in the world. Similarly, our rural areas are finishing very rapidly. On the other hand, urban concentration is increasing, which cause a heavy abnormal burden on cities. One of the most major adverse effects can be observed in developing countries and more specifically in unplanned cities as the majority of unplanned cities in the world are expanding in such manner that majority of the people living there without basic human needs such as access of freshwater, sewerage system and some of the places even with the access of electricity. The UN Framework Convention on Climate Change [8] in their report predicted that billions of people in developing countries would face shortages of water, food and more significant risks to health. Thus it requires immediate action in a sustainable way along with effective planning and then assessments. The issue which arises due to climate change will not be solved suddenly; in fact, it is a long term process which requires proper planning and contribution of every stakeholder and individual. As we already discussed earlier, it is not an issue of one individual, single community or a country's problem. Thus its global matter, therefore; requires worldwide attention and contribution.

Similarly, as **Figure 2** indicates the sunlight rays pass through the ozone layer, which eventually increases the temperature. Achieving sustainability requires collective action by the entire stakeholder of society; in fact, it requires action from the farmer working in the farm and earning for his family as well as a high corporate executive. One of the significant issues now a day's faced by our society is income inequalities or unequal distribution of wealth, which divide our societies into different classes. One of the most destructive factors which arise in our society is that the rich become richer and the poor become poorer. Similarly, income inequalities can be observed in developed countries and as well as in developing countries. In developing countries usually, rich people have access toward the higher political level.

One of the most challenging situations can be observed in developing countries in which wealthy class, provide access to the foreigner investor in their country and due to weak local legal system and absence of environmental laws and regulations, heavily polluting industries is formed in host countries which adversely affect the



**Figure 2.**  
*Ozone layer and our world. Source: Global Climate Change, [9].*

atmosphere. However, recently it had also been noticed that polluted industries also induce health issue for the local communities, including lungs cancer and asthma. The more adverse effect can be observed in developing countries in the shape of massive life losses where medical facilities are not so much advance and widely available. Apparently, in such situation, it is the responsibility of all the stakeholders to identify such industries which create an environmental hazard as well as, higher leadership should also take strict action to fight against global warming issues [10]. On the other hand, it has also been observed that in developing countries the industrial waste is directly dumped into the rivers and sea without any further recycling [11]. Therefore life undersea and river profoundly affected as well. Similarly, the extensive use of plastics also harms our surroundings.

### 3. Nexus between Covid-19 and environment

Air pollution is one of the most considerable catalyst factors which is harming our environment. Air Pollution defined as release of poisonous gases, which are emitted by factories and transportation. As due to the pandemic crises, from beginning of the year most of the countries of the world were in lockdown situation. Due to the fact, lock down situation ultimately affects every sector of the world. The overall world output dramatically decreased due to the lockdown and millions of the people lost their jobs. **Figure 3**, indicate impact of Covid-19 on different economic activities around the world.

Similarly an empirical study conducted by Barro et al. [12] reveal due pandemic crises on average 2.1% death rate could cause decline of averagely 6% of world GDP and 8% decline in private consumption. Furthermore, in terms of macroeconomic impact, Coibion et al. [13] empirically analysis pandemic impact using survey on household in the US. They conclude that, due to pandemic crises consumption and employment decreased where as inflation and economic uncertainty increased.

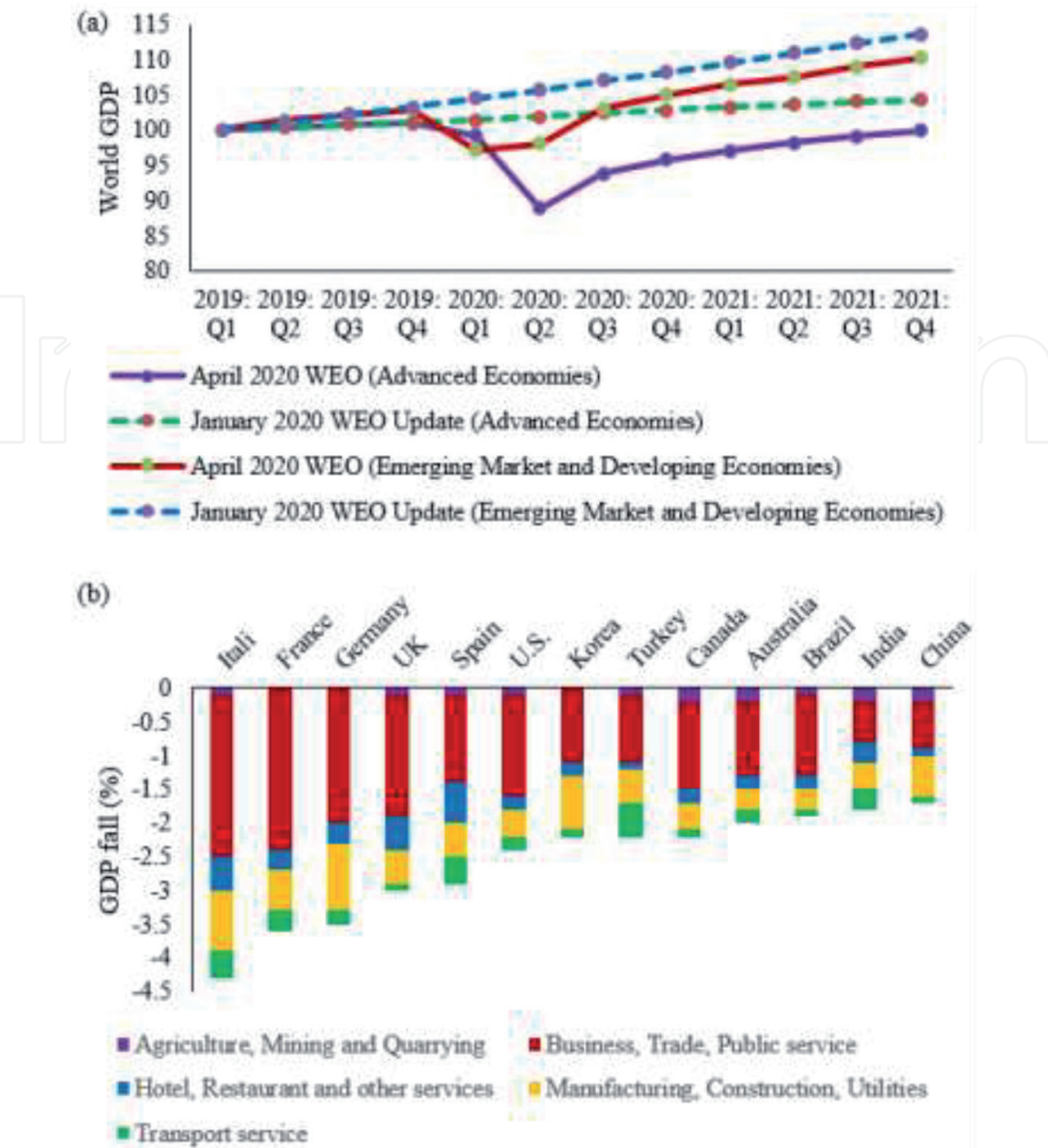
It is true to argue that, due to the massive lockdown in the world overall production and consumption decreased. Lockdown indicate downward trend of industrial output and due to 'stay safe stay health' less transportation vehicles were used by people which directly impact on the overall air pollution of the world [14].

In terms of empirical studies, Brodeur et al. [15] mention in their work 'safer-at-home' policies indicatively decreased air pollution across US counties. Therefore we can argue that one the key factor which contribute downward trend of air pollution is transportation vehicles thus consumption of gasoline as fuel. Similarly, Cicala et al. [16] identified in USA the average sales of gasoline from 2007 to 2019 average recorded as 8000 to 9000 barrels per day, however due to the lockdown and less mobility, the average sales drop at 5000 barrels per day until 12th week of 2020 (**Figure 4**).

On the hand, it is also true beside industrial sector and road transportation the large consumption sector of fuel is airline industry, although due the lockdown situation massive airlines of the world grounded there air craft's and international mobility stopped as well. Indeed, that particular factor also decreases overall air pollution.

It has be also observed that, air travel thus airline industry account for about 2.5% of global CO<sub>2</sub> emission; furthermore it is predicted that until 2050 airline industry could take up a quarter of the world's carbon budget and it will cause for 1.5 degree Celsius world temperature [17]. **Figure 5**; indicate first quarter international flights and transportation activity around the world.

In terms of china, Almond et al. [19] investigate nexus between air pollution and gases emission during covid-19 crises. They conclude that during the crises NO<sub>2</sub>

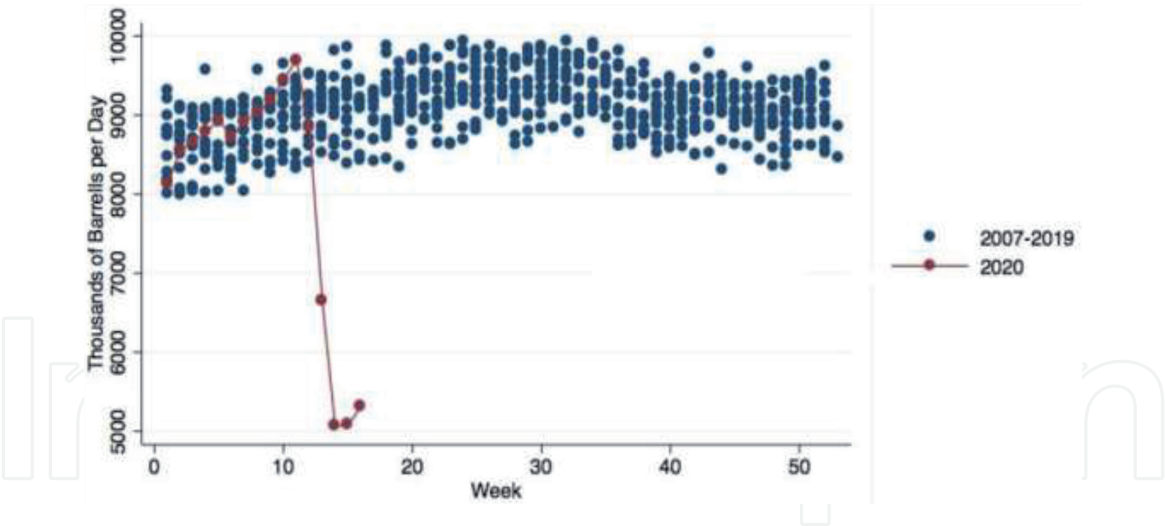


**Figure 3.**  
Quarterly world GDP.

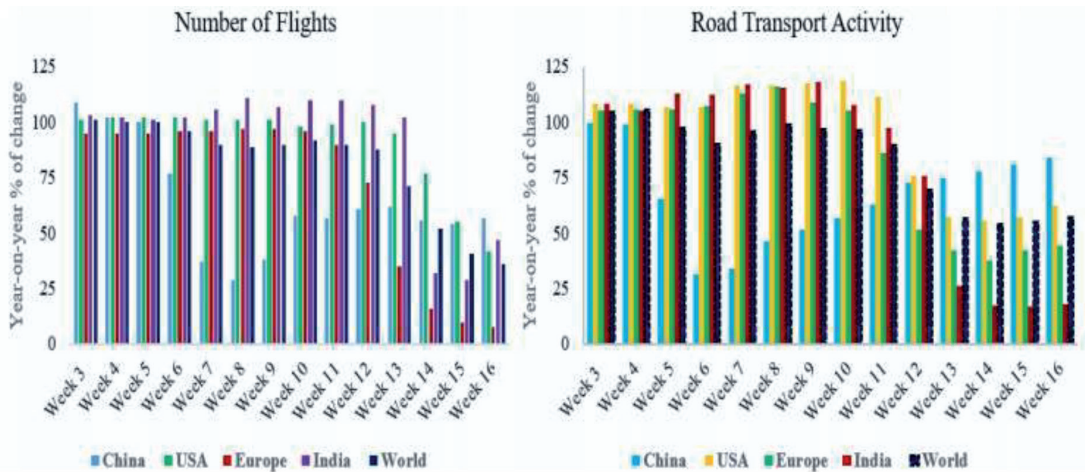
emission decline whereas SO<sub>2</sub> did not fall. Furthermore they also mention that, in overall China (PM<sub>2.5</sub>) emission decreased by 22%. The major cause of reduction in air pollution is due to less personal vehicle usage which is heavily responsible for NO<sub>2</sub> emission. Similarly, in case of china another study conducted by He et al. [20] also concluded same results, due to the lockdown in china PM<sub>2.5</sub> concentration decline by 25%. That particular phenomenon were recorded in more industrialized cities, therefore it is true to argue that the fall in industrial production is positively associated with reduction in air pollution. One more study conducted by Yao et al. [21], mention that higher humidity causing spread of the Covid-19, and they further illustrate that high level of NO<sub>2</sub> emission, playing role as catalyst agent and causing more Covid-19 spread with in the china.

After the lockdown, the clean environment has been observed all around the world, not only in high industrialized countries, more specifically in European countries due to the lockdown situation, and the concentration of NO<sub>2</sub> emission in the air rapidly decreased. **Figure 6**, illustrate the decline of NO<sub>2</sub> emission in most of the European countries.

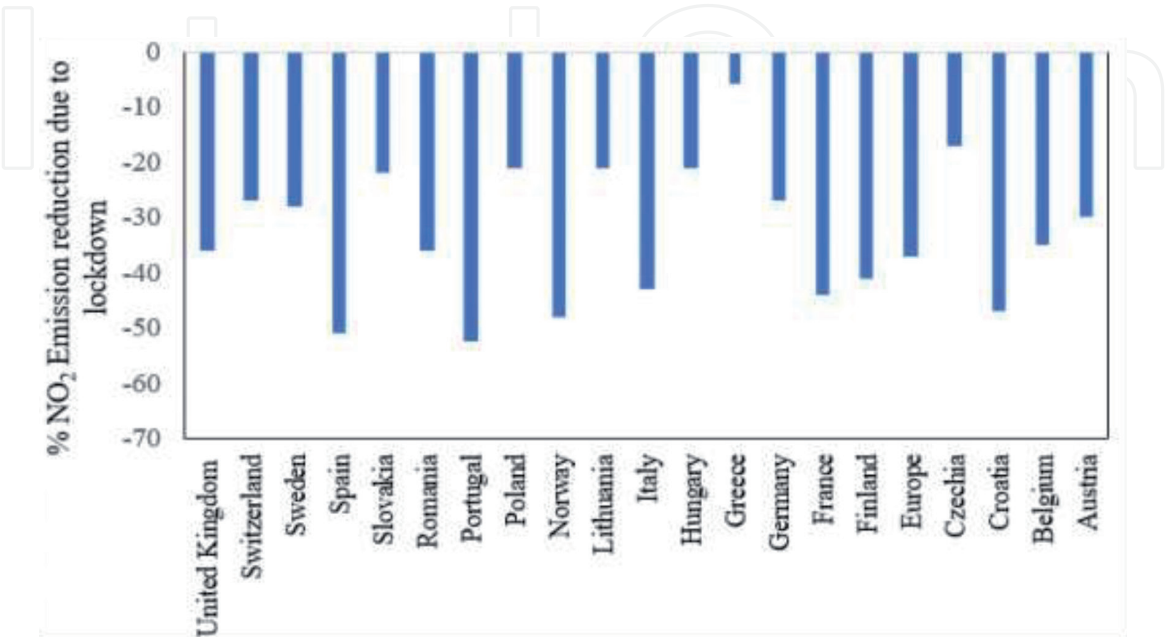




**Figure 4.**  
Sales of gasoline in USA from 2007 to 2020 (until 12th week). Source: Cicala et al. [16].



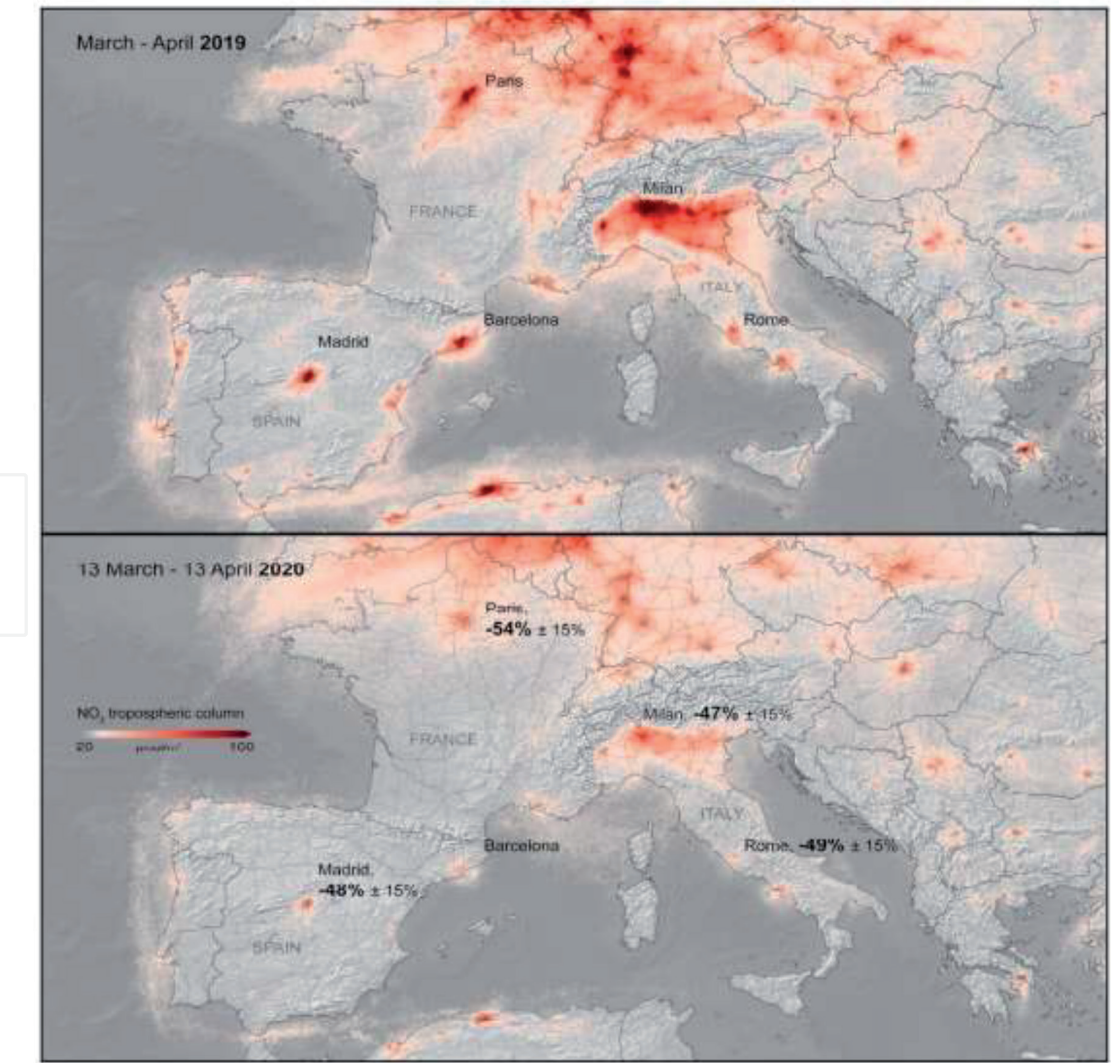
**Figure 5.**  
International flight and transportation activity around the world. Source: International Energy Agency [18].



**Figure 6.**  
Percentage change of NO2 emission in European countries. Source: Myllyvirta and Thieriot [22].

Similarly not only European countries have to experience clean air, on the other hand, a country like India, which is the second-highest populated country of the world, due to the lockdown situation the trend of air pollution also declined in India [23]. It is also true that, due to lockdown in massive countries of the world, the overall pollution decreases rapidly; thus, environment restores as it was 50 year ago. Not only, lockdown reduce air pollution; eventually, it also impacts on water pollution. In Europe, the death toll of covid-19 record massively high in Italy, therefore during the lockdown in Italy tourist arrival become zero almost, which impact on water quality in the canals of Venice. After couples of decades, the resident of Venice city has noticed clean water and marine life in the channels again [2]. The significant declines which has also been observed in the pattern of the overall consumption of electricity. As many of the people working from home, this directly decreases electricity consumption. Furthermore, the countries which heavily depend on electricity production via coal have experienced a decline in CO2 emission as well. It is right to argue that covid-19 ultimately reduced the consumption of electricity and fuel consumption for producing electricity as well [24]. Below **Figure 7** indicate, the overall pattern of NO2 emission in Europe during 2019 and 2020, thus after the lockdown situation.

The positive change and transformation in environment is generally due to the lockdown situation in terms of clean air and clean water channels, will not be



**Figure 7.**  
*NO2 emission in Europe comparative analysis between March April 2019–2020. Source: European Space Agency, [25].*

long-lasting and it is expected that our environment once again will harm as the world will experience normal cycle of life; thus we will again experience massive air and other pollution [26]. Massive corporate allow remote work for their employees. Remote work will enable people less mobility, thus, which decrease the usability of the vehicle. However at the moment it is not responsibility of single person or a country to maintain that transformation, thus we should promote a green ideology, which will ultimately reduce air pollution and on the other hand green concept will improve countries' social, economic and environmental performance. Furthermore, we should also focus on renewable energy in overall logistics operations, as it ultimately improves environmental performance by reducing emission whereas environmental performance is negatively correlated with public health expenditure as explained in literature [27].

#### **4. Conclusion and recommendations**

The aim of this chapter is to discuss the association between Covid-19's outbreak and its environmental effects on society. The debate indicates that the global lockdown eliminates environmental emissions. As a result of the global shutdown, we have induced economic downturn across the world, but on the other hand, in a better climate, we are gaining a transformed world. There is no doubt that once the world engine start-up after Covid-19, pollution and waste will started to piling-up in our surrounding, which will not damaging to the health but also environmental sustainability. The implementation of different step-by-step strategies demonstrates that the environment will gradually shift from polluted world to a green one. In order to maintain environmental sustainability, policymakers and governmental bodies should develop a road-map to protect environmental sustainability.

Following are some suggestions, which may help in the initial phase of planning.

- Corporate sector should adopt green and eco-friendly practices in their businesses to improve environmental sustainability.
- Governmental bodies should formulate strict eco-friendly policies and provide awareness to the corporate leaders through different workshops.
- Regulatory bodies may encourage renewable energy and green projects through providing subsidies and tax-exemptions to the enterprises.
- Governmental bodies embossed heavy penalties on the polluted firms, which will not only create pressure on firms to adopt sustainable practices but also motivate to the eco-friendly firms.
- Regulatory authorities may increase the fossil fuel and non-green energy prices, which will ultimately create pressure on firms to adopt renewable energy in their operations.

Furthermore, In order to achieve industrial productivity for green growth, the reliance upon energy use of fossil fuels should be replaced with renewable energy sources. As for the sustainable development of the country, the efficient use of natural resources, including oil rentals, ores and metal exports is imperative. On the other hand, Green finance will offer an incentive to fund sustainable items that lead to the digital mobilization of renewable energy and industrial growth initiatives.



Furthermore, economic policies will help to achieve a smooth growth agenda through capital market promotion, technological advances, and the provision of environmental subsidies, to reduce the environmental adverse externalities of the production and consumption sectors. In the last, Public-private cooperation on the resource market is necessary in order to support sustainable economic development, which makes it incredibly necessary to provide insurance and business services such that green development is encouraged.

## Acknowledgements

This work supported by the China Postdoctoral Science Foundation (No. 2019 M660700), and the Beijing Key Laboratory of Megaregions Sustainable Development Modeling, Capital University of Economics and Business (No. MCR2019QN09).

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