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The impacts of COVID-19 on environmental sustainability: A brief study in world context

Laila Abubakar\textsuperscript{a}, Anuoluwa James Salemcity\textsuperscript{d}, Olusegun K. Abass\textsuperscript{c}, Ayobami Matthew Olajuyin\textsuperscript{b,}\textsuperscript{*}

\textsuperscript{a}Department of Politics and International Studies, American University of Nigeria, 98 Lamido Zubairu way Yola Bypass P.M.B.2250, Yola, Adamawa, Nigeria
\textsuperscript{b}Department of Natural and Environmental Sciences, American University of Nigeria, 98 Lamido Zubairu way Yola Bypass P.M.B.2250, Yola, Adamawa, Nigeria
\textsuperscript{c}School of Civil and Environmental Engineering, Nanyang Technological University, Singapore 639798, Singapore
\textsuperscript{d}Department of Biochemistry, University of Medical Sciences Ondo, Ondo State, Nigeria

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ABSTRACT

The novel outbreak of Coronavirus disease 19 (COVID-19) and the ensuing global pandemic in 2020, has brought with it a number of unprecedented side effects. This resulted in a number of measures, including state-mandated lockdowns, as well as restrictions to economic and social activity. The direct effects of these measures were felt in the economy, as well as in key institutions within society; however, there were also indirect results from these changes. This review article focuses on these indirect effects, towards sustainable environment. It points to the fact that the net effect has been positive; in terms of reduction in greenhouse emissions, oil exploration activities, and pollution. By extension, at-risk ecosystems have been given improved environmental quality. Taken together, the article traces the progression of the virus and ensuing pandemic, in order to better understand how the environment was sustained.

1. Introduction

The coronavirus disease 19 (COVID-19) pandemic of 2020 is one that has affected the world as a whole, bringing entire systems to a halt in key sectors of the economy, as well as posing a global health crisis which has put the entire world population at risk of infection (Clark et al., 2020; Wang et al., 2020). The virus, which originated in the Wuhan province of Hubei, China, primarily causes respiratory infection, but may also come with other complications in certain individuals with underlying health conditions (Shereen et al., 2020). Due to its highly infectious nature (Khan et al., 2020), it has been necessary for governments across the world to introduce sanctions, as a means of curbing the spread of this highly infectious disease (Lokhandwala and Gautam, 2020).

Many of these effects have stemmed from the absence of certain activities, or a reduction of them; including transportation, which contributes significantly to greenhouse gases on an ordinary basis. However, the activities in healthcare as a result of the COVID-19 pandemic, have also contributed environmental effects, and not necessarily in a positive sense (Sharma et al., 2020). The increased demand for equipment, as well as waste management challenges, can be looked at in a negative sense.

Ultimately, it is important to assess the impact of COVID-19 towards sustainable environment from all point of view; looking both at the positive and negative effects. This review will assess these indirect effects on the environment, looking at how changes to the lifestyles of individuals, as well as policies designed to curtail the spread of the virus, have contributed in one way or another to the environment. The review will trace these effects right from their root cause, especially since many of the actions taken in direct response to the pandemic have had indirect effects. Here in we traced the background of the crisis, and also look at the responses by world nations, before analyzing the indirect effects on the environmental sustainability.

2. The pandemic crisis

The first recorded case of COVID-19 was in December 2019, purportedly from a seafood market in Wuhan City, China (Shereen et al., 2020). Shortly after this, the World Health Organization declared the virus a public health emergency, leading to a cautious approach by world governments, ad this virus of unknown origin and effect began to...
spread rapidly (Pradhan et al., 2020). Despite this, steps to restrict travel in and out of China were not immediately forthcoming, and inadvertently, many carriers of the virus were allowed to travel to neighboring countries and other continents. At the time, not much was known about the virus, and as a result, many asymptomatic carriers unwittingly took it to other parts of the world, causing its spread (Shereen et al., 2020). Although different countries felt the effects at different points in time, it soon became clear to world leaders that they were dealing with a crisis of global proportions.

By early 2020, a number of countries had begun to introduce nationwide lockdowns, including Italy, which was hard hit by the virus, and Saudi Arabia. China as well, had taken steps to restrict sections of its country, particularly the Hubei province, where the virus is thought to have originated (Fig. 1). By 11 March 2020, the World Health Organization took the decision to declare the 2019 outbreak of this new coronavirus as a pandemic (Team, 2020). This incidentally, is the novel outbreak of this disease, and as a result, the world was forced to deal with a crisis it knew very little about at the time it first started. Some of the most affected nations by the virus, include the world's leading economies: The United States, United Kingdom, France and Germany as well as nations with huge human capital, like India (Fig. 2). The WHO declaration of coronavirus in March 2020 became the catalyst for the widespread and significant changes, which ultimately impacted on the environment in one way or another over time (Jebril, 2020).

3. National responses to COVID-19

The steps taken by nations in the wake of the pandemic declaration, consist mainly of lockdown measures, but other steps were also taken in addition to this; including the quarantine of suspected cases and mandatory testing of parts of the population (Behar et al., 2020). This was the general response, but as it relates to individual nations, they were adopted to different degrees; some using a combination of all three, and others adopting their own unique strategies to attempt to curb the spread of the disease (Aslam and Hussain, 2020; Tran et al., 2020).

The introduction of lockdown as a preventive measure did not really take off until after the declaration of the pandemic by WHO. Prior to then however, a number of nations had begun to use this method; including Italy, which saw an unprecedented spike in COVID-19 cases and resultant deaths in February 2020 (Livingston and Bucher, 2020). Italy's initial response, after its first confirmed cases in January, was to take off until after the declaration of the pandemic by WHO. Prior to then however, a number of nations had begun to use this method; including Italy, which saw an unprecedented spike in COVID-19 cases and resultant deaths in February 2020 (Livingston and Bucher, 2020). It was the general response, but as it relates to individual nations, they were adopted to different degrees; some using a combination of all three, and others adopting their own unique strategies to attempt to curb the spread of the disease (Aslam and Hussain, 2020; Tran et al., 2020).

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Fig. 1. International travel controls during COVID-19 pandemic, April 23, 2021. (Adopted from https://ourworldindata.org).
more than usual, and more often than not, shortages of essential items have occurred (Rizou et al., 2020).

Other essential services, such as healthcare, have strained beyond normal levels. In part, this can be attributed to the sudden rise in COVID-19 infections, which has meant that medical personnel have had to dedicate time and resources to treating rising cases of this dangerous virus, with many having to work overtime in order to cope with the rising infections (Armocida et al., 2020). On the flip side, those with chronic conditions, and individuals with other medical issues, have had to be sidelined in some cases, delayed or even deprived of medical treatment; while in other cases, they have had to receive insufficient treatment or care (Søreide et al., 2020; Zaniboni et al., 2020). A knock-on effect of this, has been a rise in demand for medical equipment; specifically, those needed in the treatment of patients with COVID-19 (Emanuel et al., 2020). Protective wear, drugs needed for patient management, as well as medical grade PPE masks, have been in demand. This connects back to the global supply chain, and the general strain it has felt as a result of the pandemic.

On a macro scale, the pandemic has also triggered a fall in the demand for commodities needed to generate energy; such as oil, which accounts for the energy used in major forms of transportation and international travel (Laverty et al., 2020). Other macro effects relate to the global economy, as general levels of production have declined dramatically as a result of the pandemic. Each of these effects has triggered other side effects, which do not necessarily relate to the areas they impact directly. The decline in production for instance, has meant less use of energy, and by extension, lower levels of pollution. The next section will analyze these indirect effects in the area of the environment.
4. Environmental impact as a result of COVID-19 measures

The most discernable, and arguably positive impact on the environment as a result of COVID-19, has been a reduction in greenhouse emissions from sources of transportation; most notably, air and road transport (Baldassano, 2020; Lian et al., 2020), which account for a substantial portion of pollution. This was triggered by a number of factors, which have been briefly discussed beforehand. State enforced lockdowns have meant that normal transportation activities and networks have been disrupted; both personal transportation and commercial (Gray, 2020). With fewer people commuting to work, there has been less demand for public transport, as well as fewer people using personal cars to move to and from work. Other non-work or social activities were also restricted (Fig. 5), which generally meant that the average individual — whether car-owner or public transportation user — has had to adjust accordingly. This has also meant less use of natural resources such as oil and coal, which contribute largely to the greenhouse effect. For example, China’s coal consumption in 2020 was drastically lower than in previous years, particularly during its lockdown period, where consumption dropped below 40 thousand tonnes (Wang and Su, 2020). The Organization of Petroleum Exporting Countries, OPEC, was also forced to make adjustments during the peak lockdown periods, as a drop-in oil demand translated into a drop-in oil prices (Devpura and Narayan, 2020; Lenzen et al., 2020). A related effect of this drop-in energy demand, was a reduction in air pollution in urban areas, as well as centers of business and commerce. This again, was seen in the likes of China, Brazil, New York, Canada, Italy and India (Rume and Islam, 2020). This resulted in better air quality in areas notorious for...
poor air quality, as well as improved visibility in such regions. In all, this was a positive side-effect of the reduction in energy consumption, which came from transportation primarily. With restrictions on international travel, there was also less air traffic during periods of peak lockdown. This not only reduced greenhouse emissions from aviation, but also the noise pollution that comes with it and improved the environmental quality. With airports also operating at lower capacity than normal, there was also less use of power, translating into benefits for the environment.

Beyond transportation however, other sources that would normally have contributed to pollution were also curtailed. With many businesses forced to shut down, offices and facilities could afford to run on lower power, rather than being fully operational during business hours. In developing nations such as Nigeria, where electricity supply remains a challenge, many businesses are forced to run on alternative sources, including generators, which make use of diesel, petrol and other related products. With businesses shut down, these alternative power sources were used less frequently, ultimately contributing to the lower emissions witnessed during peak lockdown periods of the pandemic. Other facilities, such as warehouses, and even factories responsible for the production of goods, produced less during the lockdown period; not only because of the closure of businesses, but moreover, due to the drop-in demand for certain products (Rizou et al., 2020). As a result, these additional sources of pollution were also reduced, leading to a positive net effect on the environmental quality; felt in the area of air quality and greenhouse emission. Aside from air pollution, industrial waste also affects sources of water, as well as land. This has also been reduced, as a result of the pandemic, especially in regions where there is less regulation and control over indiscriminate dumping of waste material.

Certain ecological hotspots have also been given breathing space as a result of the lockdowns and other restrictions imposed in response to COVID-19. On the most basic level, this includes national parks and wildlife conservation centers, which would usually be filled with tourists year-round. The likes of Yosemite National Park in the United States, have been without human visitors for several months, with phased reopening only being introduced in the latter part of 2020 (Stinson and Lunstrum, 2020). Tourism naturally brings with it the tendency for human pollution: in the form of trash and garbage, as well as the costs of waste management and control over indiscriminate dumping of waste material.

The COVID-19 pandemic has inadvertently caused effects towards sustainable environment. The restrictions in social and economic movement have had a largely positive effect, with reductions in transportation and commerce, which contribute significantly to reduction in greenhouse gas emission. At the same time, ecological hotspots, where human activity is usually rife, have enjoyed an improved environmental quality, enabling wildlife and other lifeforms to thrive efficiently. For this reason, we can conclude that the COVID-19 outbreak and ensuing pandemic have been beneficial to the environment management.

5. Conclusions

The authors declare that they have no competing interests.

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Authors’ contributions

All the authors contributed in the preparation of this paper. LA was responsible for drafting of the article. AJS, OKA and AMO made substantial contributions to manuscript data analysis, conception and design and participated in its critical review and final editing. All authors read and approved the final manuscript.

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