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Effects of Covid19 Pandemic on Environment

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ABSTRACT:*Coronavirus disease 19 pandemic caused by SARS-CoV-2 virus has gripped more than 200 countries of the world infecting more than 100 million people. The worldwide disruption caused by the COVID-19 pandemic has resulted in numerous impacts on the environment of the whole world. The Covid-19 coronavirus pandemic has resulted in global lockdowns, sharply curtailing economic activity. It is a unique experiment with substantial impacts that will form the agenda for research. This review attempts to describe the short term and the long-term effects of coronavirus pandemic on the environment. COVID 19 has not only brought new challenges for us but also exposed the lacuna in the existing systems, thus, opening up a window for change. Furthermore, the positive changes in the environment during lockdown proves that we all have a role to play in maintaining a better environment. This pandemic has emphasised the strong connections between nature, population and climate change, which calls for restructuring current systems in order to reduce the risk of future crisis and environmental decline. Therefore, it is high time for the world to check the impact of our current practices and device innovative solutions towards a greener future, thus strengthening the symbiotic relationship between nature and mankind.*

KEYWORDS:*Environment; Coronavirus; Covid19; Covid19 Pandemic; Waste management; Population; Climate.*

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I. INTRODUCTION:

Coronavirus disease 19 (COVID-19), a pandemic caused by SARS-CoV-2 virus has gripped more than 200 countries of the world infecting more than 100 million people and causing death of over 3,000,000 worldwide. While most of the infected people regain immune function from initial insult by the virus with mild symptoms, the patients with comorbid complications have developed severe clinical conditions with sustained levels of viral load and resulting in death. The fatality rate associated with COVID19 is between 2 – 10% in different regions, approximately 10 times more lethal than seasonal flu.

The virus was first reported in Wuhan, China, in the end of 2019. Since then, it has rapidly spread across the world and endangered livelihoods, communities and the environment. The impact has rippled across the socioeconomic order of the current century, and the effects are expected to be felt even after the virus has been conquered. The worldwide disruption caused by the COVID-19 pandemic has resulted in numerous impacts on the environment of the whole world. The Covid-19 coronavirus pandemic has resulted in global lockdowns, sharply curtailing economic activity. It is a unique experiment with substantial impacts that will form the agenda for research.

To conquer the coronavirus, several strategies have been adopted across countries, the most notable being the extended lockdown that is said to have helped Wuhan in conquering the virus first. So far, several countries have adopted the lockdown, and the results have been mixed to say the least. It can safely be said the effects of the lockdown will be studied immensely in the years to come. One such effect that we are exploring in this review is that on the environment. This review attempts to describe the short term and the long-term effects of coronavirus pandemic on the environment.

II. DISCUSSIONS:

The paper will try to cover all aspects of the environment that has been affected by the virus. It will also try to answer the question of whether the effect will endure - or if it will fade away once the virus is defeated. Additionally, it will study the change in human behaviour that has led to a change in the environmental conditions as known earlier. The time period being considered for short term impact is 3 months - from March 2020 to December 2020. Post this time period, we will consider the environmental effects to be attributed to long term impacts.

Short Term Impact:

The primary way to look at the short-term impact of COVID deals with 2 aspects:

1. Policy changes introduced by governments across the world
2. Behavioural change of humans in light of the pandemic

This paper will focus on the steps taken by majority governments to combat the pandemic, and then deep dive on the impact on the environment.

Two of the most talked about policy changes are nationwide or citywide lockdowns, as well as stoppage on international travel. This had a direct impact on the hospitality, tourism and travel industry, as well as the services sector. The effects of these changes have been economic, environmental and sociological, amongst others. We will primarily be focusing on the environmental changes in this paper, with a linkage to how both economic and sociological factors have influenced the environment.

Long Term Impact:

The methods adopted to tackle the COVID 19 pandemic has seen a huge deviation from the traditional practices. This paper attempts to discuss the long-term effects of these practices on the environment. With increase in sanitation and protective equipment for example, the usage of chemicals and plastic protective equipment have increased manifolds. Though practices are the need of the hour, we are yet to deal with the threats these practices pose to the environment.

Moreover,the COVID 19 pandemic has not only triggered behavioural changes but also disrupted business processes due to issues like lack of transportation, allocation of emergency funds to fight the pandemic, thus leading to several unprecedented problems and delays. This paper will also highlight these examples and explore the scope of these problems.

Effect on Air Quality:

One of the most significant and talked about immediate changes of the COVID pandemic was regarding the air quality. India, specifically, witnessed a large change in the air quality index across several major cities, erstwhile known to be hotbeds of air pollution.

It was observed that just one day after the nationwide lockdown, Delhi (one of the cities with the worst air pollution across the world) witnessed significant improvement in the air quality. 51% of the NAQI reduction was witnessed by the fourth day, compared to the 3rd preceding day. The reduction in NAQI can be attributed to changing levels of pollutants within the air, primarily PM10, PM2.5, NO2 and CO.[1]

Not just in India, but also worldwide statistics also indicate that particulate matter emissions dropped by 0.6 Mt (3.8 percent). Sulphur dioxide emissions (from burning fossil fuels) and nitrogen oxide (from fuel combustion) also fell by 5.1 Mt (2.9 percent).[2] (The data considered for this study was from Jan 2020 to 22 May 2020*).

Effect on Greenhouse Gas Emissions:

Prior to the COVID-19 pandemic, global greenhouse gas emission levels were rising at around 1% per year over the previous decade, with no changes in 2019. Despite significant gains in renewable energy technology, the primary source of energy was restricted to fossil fuel usage.

A study of the energy, activity and policy data available up to April 2020 was utilized to identify daily emission changes due to COVID 19 pandemic. It was found that across 69 countries, daily carbon dioxide emissions declined by 17%, from January to April 2020, compared to the mean 2019 levels. At the peak, emissions in individual countries decreased by 26% on average. Of this, the largest reduction was found in China, followed by the US, Europe and India, respectively.[3]For India, specifically, COVID-19 led to the first year on year drop in GHG emissions in 4 decades. Emissions fell by 1% in the fiscal year ending March 2020, due to reduction in coal & oil consumption demands.[3]

Effect on Plastic Usage:

Single use plastic usage has been paramount in the fight against COVID 19. It has helped in social distancing by enabling home delivery of food, and by potentially stopping the chain of transmission by replacing reusable cups and plates in restaurants. Nevertheless, the circulated images of plastic sacks of medical wastes outside hospitals, as well as masks and other plastic items washing up on beach shores has once again brought the plastic usage debate to the forefront.

In China, it was estimated that hospitals in Wuhan produced 240 tons of waste daily, as opposed to the 40 tons prior to the pandemic. Daily production of masks rose to 116 million in Feb, 12 times higher than January.[4]

A comparable increase could be seen in individual use as well, with face masks production increasing to 116 million in February 2020, 12 times higher than the previous month.In United Kingdom, it was observed that illegal waste disposal increased by 300% during the coronavirus pandemic for the initial months.[5]

While similar data could not be found for India, it can be assumed that the 3-month lockdown drastically increased the usage of single use plastic, especially for hospitals and the food delivery industry. The impact could potentially also be felt across essentials delivery. Given that single use plastic recycling is not possible, this can impact the long-term consequences of the COVID 19 pandemic.

Effect on Wildlife Protection:

There are both positives and negatives in the area of wildlife protection with regards to Coronavirus. On one hand, the pandemic has put a spotlight on global wildlife trade, especially with regards to China. This has led to increased focus on a worldwide call to ban "wet" markets, which sell live and dead animals for human consumption.

However, decreased human activity has also led to an increase in poaching, as tourism stops and park rangers lose their jobs. In anecdotal evidence, it was found that in Botswana, six black rhinos were killed in March. Additionally, zoo animals are facing problems due to lack of human attention. There have also been cases of animals getting coronavirus from humans, the most notable one being that of a tiger at the Bronx Zoo.Conversely, reduction in human movements has increased wildlife movement across cities. In India, a herd of deer was observed moving freely in the city of Haridwar. Baby Olive Ridley turtles are being increasingly sighted at beaches, now bereft of humans. Zoo animals, too, are benefiting from privacy. Ying Yang, one of the pandas in Ocean Park in Hong Kong, was found to be pregnant after 10 years of attempts of natural mating.[6]

Effect of Chemical Reagents:

The COVID 19 pandemic has led to a surge in the usage of cleaning chemicals. While extensive guidelines have been issued by several governments about usage protocols of these chemicals, the increased usage poses a risk of secondary disaster to human health and ecosystem.

Most of the approved cleaning elements comprise of sodium hypochlorite, hydrogen peroxide, alcohol, and glutaraldehyde in varying combinations[7]. All of these were chemicals are proven to be linked with an increased risk of chronic obstructive pulmonary disease (COPD) and asthma when used in abnormal proportions. The chemical residues left behind by these chemicals can cause trigger cancer, reproductive disorders, respiratory ailments (including occupational asthma), central nervous system (CNS) impairment, oxidative damage and other human health effects.[8]Misinformation and improper usage of these chemicals can be equally dangerous. Knowledge gaps about the usage of cleaning products and the circulation of fake products might lead to improper usage thereby causing serious health issues like permanent blindness, seizures, coma, and serious damage to the nervous system or death. Few cleaning products contain caustic materials, and their accidental ingestion causes severe gastrointestinal toxicity.[9]

Although these chemicals are essential tools in fighting COVID infection, these chemicals have not been proven to reduce the risk of COVID. These chemicals eventually end up in the lakes and rivers via the sewage system, posing a threat to the aquatic ecosystems. Increased chlorine concentrations interfere with their life cycle.[10] Secondly, the chemicals in the disinfectants can bond with other materials to form harmful secondary by-products, such as trihalomethanes or halo acetic acids which pose serious health threats.[11]

Effect on Waste Management:

The global increase in medical waste generation has become a matter of concern in the present COVID times. Extensive testing and treatment require protective medical gear in the midst of a pandemic. As a result, countries across the globe have experienced an incessant rise in the amount of medical waste generation.[12]

The lack of decent waste disposal systems in India has created a significant challenge for the local waste management authorities. Further complicating situations is the viable time of virus which makes it more critical to manage medical wastesefficiently and thus reduce, further infection and environmental pollution, which is now a matter of concern globally.[13]Polypropylene the major component in N-95 masks, and Tyvek the major part of protective suits, gloves, and medical face shields, release dioxin and toxic elements which persists for a long time in the environment[14]. Improper disposal of these protective equipment enables mixing of wastes thus, increasing the risk of disease spread through contaminated water or air.[15]

The worldwide lockdown has increased the demand for packaging and recycling. But the failure of the recycling industry to cope up with the amount of waste generation has led to enormous amounts of plastic and paper wastes in landfills which finally end up being burnt due to lack of advanced disposal systems.[16]
This activity contributes to huge production of GHG. The waste sector accounts for nearly 5 percent of global greenhouse gas (GHG) emissions (primarily methane from inadequately disposed waste). In 2016, the waste sector accounted for 1.6 billion metric tons of carbon dioxide (CO2) equivalent. The World Bank estimates that these figures will increase to 2.6 billion metric tons by 2050.[17]

Effect of Food Wastage:

The global lockdown has affected food supply across thew globe. Where some countries are enduring hunger, others are experiencing problem due to surplus production and less demand. The pandemic has shut restaurants, restricted transport and thereby disrupted the supply chain.[18]Not only is this waste of food tragic when many are hungry, it is also an environmental hazard and a critical contributor to global warming. Decomposition of organic material generates methane and carbon dioxide as its natural by products. Methane is a potent greenhouse gas, 28 to 36 times more effective than CO_2 at trapping heat in the atmosphere over a 100-year period, according to the Intergovernmental Panel on Climate Change.[19]

Effect on Policies & Renewable Investments:

With the outbreak of COVID 19, international effort has shifted from other vital topics like climate change to containing the pandemic. The delay of several international conferences on environmental policies were delayed due to the global lockdown.[20]Some countries and private companies may delay or cancel investments in renewable energy or climate action policies if their finances have been impacted by the pandemic. The need for more emergency services coupled with a reduction in tax revenue has taken an economic toll on cities and states.[21]

As a result, funding is likely to be diverted away from climate resilience projects and renewable energy in developing nations leading to delays in implementation of environment friendly policies.

III. CONCLUSION:

COVID 19 pandemic has not only brought new challenges for us but also exposed the lacuna in the existing systems, thus, opening up a window for change. Furthermore, the positive changes in the environment during lockdown proves that we all have a role to play in maintaining a better environment.

Even though we have advanced technology, we are still dependent on healthy ecosystems for our health, water, food, air and many more. COVID-19 has emphasised the strong connections between nature, population and climate change, which calls for restructuring current systems in order to reduce the risk of future crisis and environmental decline.Moreover, the crisis has generated new problems and made us aware that the world is still not responsible enough about the usage of resources and wastage generated. Therefore, it is high time for the world to check the impact of our current practices and device innovative solutions towards a greener future, thus strengthening the symbiotic relationship between nature and mankind.

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REFERENCES:

[1]. James P. The Decrease in India's Air Pollution During COVID-19 | Center for the Advanced Study of India (CASI). *CASI, University of Pennsylvania*. https://casi.sas.upenn.edu/iit/jamespoetzscher. Published May 11, 2020.
[2]. Socio-economic, environmental impacts of COVID-19 quantified: Holistic study charts effects of the coronavirus on sectors and regions globally -- ScienceDaily. *University of Sydney*. https://www.sciencedaily.com/releases/2020/07/200709141538.htm. Published 2020.
[3]. Le Quéré C, Jackson RB, Jones MW, et al. Temporary reduction in daily global CO2 emissions during the COVID-19 forced confinement. Nature Climate Change. doi:10.1038/s41558-020-0797-x
[4]. Kristin H. *Plastic in the Time of a Pandemic: Protector or Polluter? | World Economic Forum*.; 2020. https://www.weforum.org/agenda/2020/05/plastic-pollution-waste-pandemic-covid19-coronavirus-recycling-sustainability/
[5]. Duer J. Single use plastics are on the rise due to COVID-19 | World Economic Forum. Word Economic Forum. https://www.weforum.org/agenda/2020/07/plastic-waste-management-covid19-ppe/
[6]. Josephine M. *5 Ways the Coronavirus Is Affecting Animals | World Economic Forum*.; 2020. https://www.weforum.org/agenda/2020/04/coronavirus-animals-wildlife-biodiversity-tiger-boar-pandas-zoos/
[7]. WHO. *Cleaning and Disinfection of Environmental Surfaces in the Context of COVID-19*.; 2020.
[8]. David F. Issues Of The Environment: Living With Increased Levels Of Disinfectants Through COVID-19 Crisis |

WEMU.https://www.wemu.org/post/issues-environment-living-increased-levels-disinfectants-through-covid-19-crisis. Published May 2020.

[9]. Arévalo-Silva C, Eliashar R, Wohlgelernter J, Elidan J, Gross M. Ingestion of caustic substances: A 15-year experience. *Laryngoscope*. 2006;116(8):1422-1426. doi:10.1097/01.mlg.0000225376.83670.4d

[10]. Zhang H, Tang W, Chen Y, Yin W. Disinfection threatens aquatic ecosystems. *Zhang, H, Tang, W, Chen, Y, Yin, W (2020) Disinfect Threat Aquat Ecosyst Sci (Vol 368, Issue 6487, pp 146–147) Am Assoc Adv Sci https//doi.org/101126/science.abb8905Science*. 2020;368(6487):146-147. doi:10.1126/science.abb8905

[11]. Sedlak DL, Von Gunten U. The chlorine dilemma. *Science (80-).* 2011;331(6013):42-43. doi:10.1126/science.1196397

[12]. Ilyas S, Srivastava RR, Kim H. Disinfection technology and strategies for COVID-19 hospital and bio-medical waste management. *Sci Total Environ*. 2020;749:141652. doi:10.1016/j.scitotenv.2020.141652

[13]. Sharma HB, Vanapalli KR, Cheela VS, et al. Challenges, opportunities, and innovations for effective solid waste management during and post COVID-19 pandemic. *Resour Conserv Recycl*. 2020;162:105052. doi:10.1016/j.resconrec.2020.105052

[14]. Singh N, Tang Y, Ogunseitan OA. Environmentally Sustainable Management of Used Personal Protective Equipment. *Environ Sci Technol*. 2020;54(14):8500-8502. doi:10.1021/acs.est.0c03022

[15]. Brock J. The Plastic Pandemic: COVID-19 trashed the recycling dream. Reuters Investigates. Published 2020. https://www.reuters.com/investigates/special-report/health-coronavirus-plastic-recycling/

[16]. Sarkodie SA, Owusu PA. Impact of COVID-19 pandemic on waste management. *Environ Dev Sustain*. Published online August 26, 2020:1-10. doi:10.1007/s10668-020-00956-y

[17]. Rajesh Sinha; James D. Michelsen; Elcin Akcura & Lamin Njie. COVID-19 ' s Impact on the Waste Sector. *Int Financ Corp*. Published online June 2020:1-5. www.ifc.org/infrastructure.

[18]. OECD. *Food Supply Chains and COVID-19: Impacts and Policy Lessons*.; 2020. https://read.oecd-ilibrary.org/view/?ref=134_134305-ybqvdf0kg9&title=Food-Supply-Chains-and-COVID-19-Impacts-and-policy-lessons

[19]. World Economic Forum. *The Coronavirus Is Creating Food Waste Mountains That Increase Global Warming*.; 2020. https://www.weforum.org/agenda/2020/06/covid-19-food-waste-mountains-environment/

[20]. Klenert D, Funke F, Mattauch L, O'Callaghan B. Five Lessons from COVID-19 for Advancing Climate Change Mitigation. *Environ Resour Econ*. 2020;76(4):751-778. doi:10.1007/s10640-020-00453-w

[21]. OECD. COVID – 19 and the low-carbon transition Impacts and possible policy responses. 2020;(June). http://www.oecd.org/coronavirus/policy-responses/covid-19-and-the-low-carbon-transition-impacts-and-possible-policy-responses-749738fc/