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THE IMPACTS OF COVID-19 PANDEMIC ON CLIMATE CHANGE AND WASTE GENERATION

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Abstract:
For a short time, the pandemic was able to bring halt to our fast paced busy life's. A dramatic shift occurred in our normal functioning and things we took for granted were not that easily available. The lockdowns pushed humans indoors and it was felt that nature was once again taking back control. The air felt fresh, skies cleared up and weather was pleasant. Huge drop in air pollution was witnessed world over giving us a hope that everything will become stable again ecologically. But, after the lockdown phase was over and the manufacturing and other human activities started once again leading to increase in greenhouse gases emission. But on the other hand we ignored the increased medical waste we have been creating as more masks, gloves and protective gears were being discarded. Compulsion to stay indoor made us to rely more on online shopping which damaged local economy as well created more packaging related waste. So short term impacts like drop in greenhouse gases emissions along with venturing of animals closer to humans was observed. But in the long run it will become difficult to dispose off this huge medical waste that has been created. So this paper tries to analyse all the pros and cons of pandemic's impact on our global as well as local environments.

Key Words: *Pandemic, Covid-19, Greenhouse gases emission, Lockdown, Air pollution, Bio-Medical Waste generation.*

Introduction:

The pandemic of the coronavirus is having a great effect on our world. It is something beyond human imagination. None of us could have ever imagined that a viral infection will bring the world to a halt and push us into our homes for months. About 593,269,262 confirmed cases of COVID-19 including 6,446,547 deaths have been reported worldwide till August, 2022 (WHO, 2022). These were precarious times as many countries of worlds imposed numerous lockdowns to reduce the impact of second, and third waves of the pandemic. The more we try to understand this virus and how it spreads, we can focus on the information that this virus evolves and rapidly mutates to survive and it also helped in its faster spread. Scientists found that Covid virus evolved around every eleven days or so during its peak spreading time (Martin et al.,2021). Many trends were disrupted by the COVID-19 pandemic which have put immense pressure on our financial, medical, political and social networks. In fact, the changes will continue to occur in foreseeable future in ways of how we travel and will also be reflected in socially accepted standards of personal hygiene. Photos of the crystal-clear waters of the Venice Canals, and a significant decline in air pollution in countries like China and Italy, have been reported widely in news articles.

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Impact of Lock down and Social Distancing on Air Quality:

The COVID-19 crisis prompted the freezing of routine life and commercial operations. The school, colleges, Universities and other educational institutes were closed around the globe. Similarly, in many parts of world manufacturing and commercial activities were also stopped for few weeks. Online education and work from home was promoted. Other non-essential organisations were also closed down. The risk of virus spreading was reduced by limited activity from manufacturing sites, factories and construction industries, which in turn also improved air quality.

The most restrictive mass quarantine in the world was introduced by India, China, France, Italy, New Zealand, Poland, and the UK resulting in about a third of the human population being locked down by coronavirus (Kaplan et al.,2020). China's carbon emissions reduced by around 25% over a four-week period, equivalent to around 200m tonnes of carbon dioxide (Myllyvirta, 2020). Fossil fuel burning leads to emission of nitrous oxide which in atmosphere is converted into nitrous dioxide. Thus it is an indicator of human folly and as such can be used to trace human induced emissions. These two maps of India are show a difference in nitrous dioxide hot spots over India before Covid-19 spread and after it started spreading and a few days before lockdown was announced by Indian government.

Figure 1.1. Nitrogen Dioxide in the India on December 21, 2019

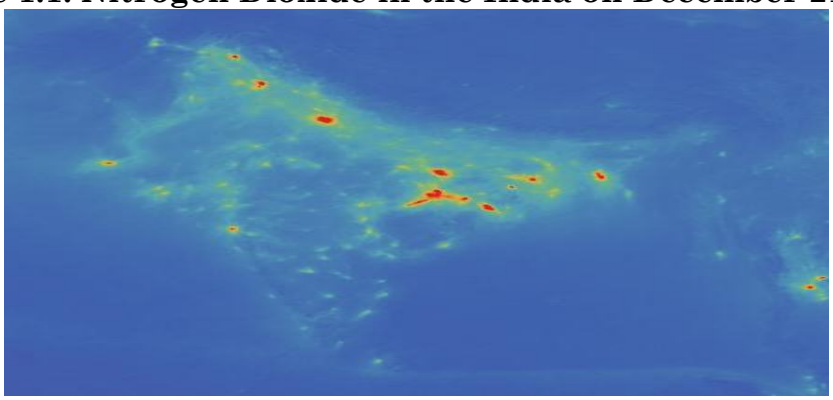
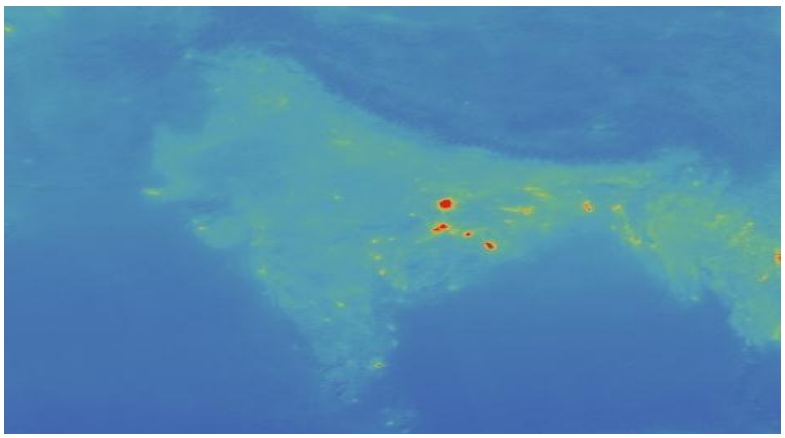


Figure 1.2. Nitrogen Dioxide in the India on March 20, 2020



Source: Images adapted from Earther and Google Earth Engine, 2020.

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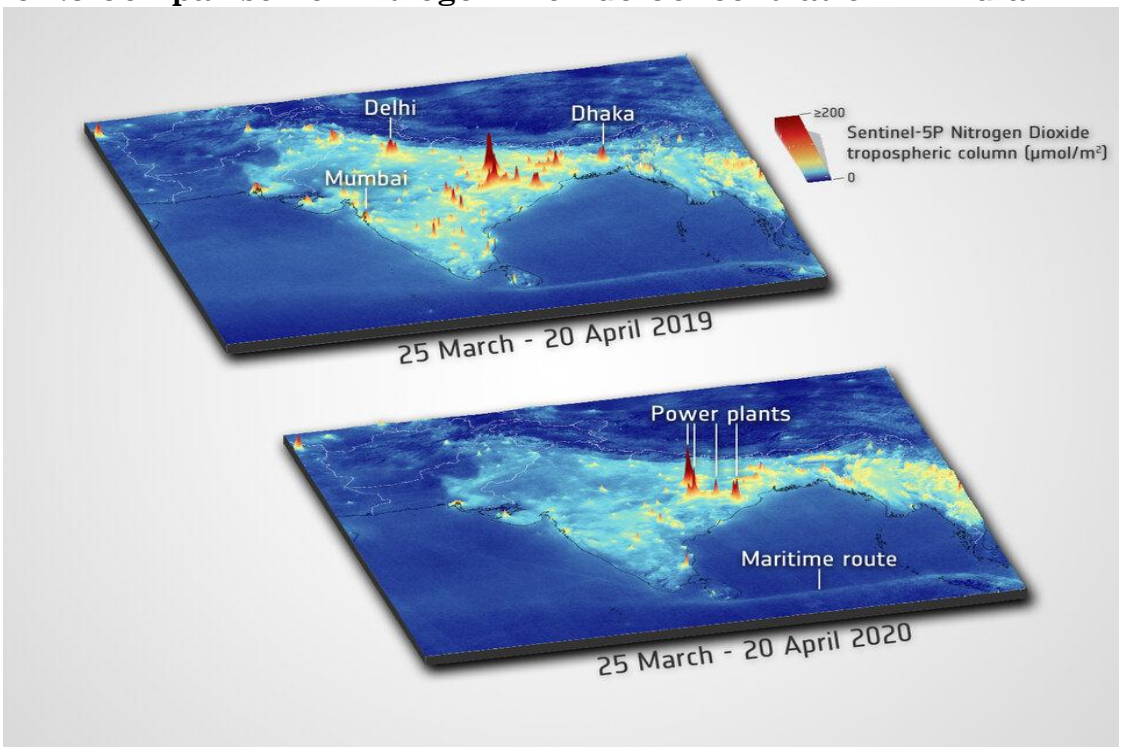
Similarly, Copernicus Sentinel-5P satellite imageries showed that many cities across India saw drop of around 40–50% in nitrous dioxide levels owing to its nationwide quarantine from 25 March (the first day of the lockdown) to 20 April 2020 as compared to same time period the last year (European Space Agency, 2020).

Figure 1.3 Comparison of Nitrogen Dioxide Concentration in India



Source: European Space Agency, 2020

This occurred mainly because power demand by industries declined due to lock down and India depends on coal as main source of energy generation. Indian consumers used 100.2 billion kilowatt hours (kWh) in March, 2020 as compared with 110.33 billion units in March 2019 (Varadhan, 2020).

The interest in tourism and related activities declined due to fear in masses and governmental guidelines which lead to cancellation of conferences, carnivals, concerts and many other public activities. By April 6, 2020, in reaction to the pandemic, 96 percent of all global destinations had implemented travel restrictions. About 90 destinations had closed their borders entirely or partly to visitors, while a further 44, depending on the country of origin, were closed to most tourists (UNWTO, 2020).

Many of the activities people have avoided such as commuting to work every day or taking international flights are significant greenhouse gases emitting activities and as such lead to lesser emission of greenhouse gases and clear sky.

Long Term Effects on Climate Change

International Energy Agency (IEA) analysis suggests the pandemic could cause emissions cuts in the region of 2,600m tonnes of CO_2 (MtCO2) in 2020.In other words the reduction in CO_2 emissions is equivalent to around 8

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per cent of the global total in 2019. In order to reduce global warming to less than 1.5^{o}C over pre-industrial levels, global emissions will have to decline at similar rates as in 2020 for about a decade (Gabbatiss, 2020). This is possible only if we move towards sustainable economic growth and focus on green sources of energy generation.

Thus, the lasting effects of the present reduction in greenhouse gas emissions are, regrettably, extremely unlikely. With the wide scale COVID-19 vaccination drives and booster shots, we are moving away from the peak impact of Covid-19. People are again flying for holidays and keeping their engines on while waiting in traffic jams and greenhouse gases emissions will continue to occur. Many scholars believe that if the work from home trend is encouraged in future too than it can have some impact in reducing greenhouse gases. But as Helen Mountford, from the World Resources Institute pointed out that a spike in emission can be seen in the post-recession economies as in the case of the global financial crisis of 2008. The global CO2 emissions from fossil fuel combustion and cement manufacturing increased by 5.9% in 2010, more than offsetting the 1.4% decline in 2009 (Heath, 2020). World over as lockdowns have been eased and manufacturing sector is running again, slowly the air quality is again deteriorating and greenhouse gases emission are occurring as usual.

Also, COVID-19 provided cover for deforestation of Amazon forest and according to Brazil's National Institute for Space Research, deforestation in the Brazilian Amazon grew by 55 percent in the first four months of the year relative to the same time last year (Roberton and Bodo, 2020). Less forest cover means less absorption of carbon dioxide by trees and more being released into atmosphere leading to global warming. Also, rising illicit deforestation makes the risk of fires in the Brazilian rainforest much more devastating than last year's forest fires (Londoño, Andreoni and Casado, 2020). The only way the long term positive impact on global greenhouse gases emissions can occur is if now governments invest in sustainable technologies and infrastructure. COVID-19 pandemic cannot alone lead to positive change in global climate in the long run.

Bio-Medical Waste Generation due to COVID-19 Pandemic: Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals is termed as Bio-Medical Waste (Biomedical Waste Management and Handling Rules, 1998 of India). Biomedical waste from COVID-19 may include masks, Personal Protection Equipment kits (PPE), gloves, shoe covers, human tissues, blood infected products, body fluids such as dressings, plaster casts, cotton swabs, blood or body fluid contaminated bedding, needles, and syringes.

The COVID-19 pandemic lead to sudden rise in bio-medical waste being generated world over and many nations had to face the challenge of safely disposing this additional waste. For instance, Zhao Qunying, the Head of Emergency Office, Ministry of Ecology and Environment, China, pointed out that the China's biomedical waste load

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rose by 600 percent during the pandemic, reaching 240 tonnes per day from 40 tonnes per day in the coronavirus epicentre, Hubei Province (Health Analytics, 2020).

In India the COVID-19 generated bio-medical waste is being managed and disposed off mostly according to government guidelines but we do not have any record of such hazardous waste being generated at household levels especially where asymptomatic and less severely affected COVID-19 patients are quarantined. The Central Pollution Control Board (CPCB) has issued guidelines for households, malls and offices to cut disposed masks and gloves and store them in paper bags for a minimum of 72 hours before discarding them. These guidelines deal with the contamination issues being faced by the cleaning workers but what about the environmental impact of all this one-time usable plastic items being dumped into natures lap?

This pandemic has led to a drastic rise in the use of plastic. One time use plastic has become the key component of our locked-down mandatory hygienic way of life. We at some time during this pandemic have used disposable mask, gloves, hand sanitizers, and takeout and grocery packages and many amongst us are still continuing the trends. The data released by CPCB for COVID19 Biomedical Waste Generation for the months of June, July, August and September 2020.

During this time period, all over in India 18007.32 tons of COVID-19 related bio medical waste has been generated. So on an average 147.60 tons per day bio medical waste being generated in India could be directly attributed to this pandemic. The trend from June to September corresponds to the increasing number of COVID-19 cases in India as the COVID-19 related bio medical waste generation was 3025.41 tons in June which increased to 4253.46 tons in July and further increased to 5238.45 tons in August and peaked to around 5490 tons by September 2020 end.

The state wise distribution shows that state of Maharashtra which has been under a severe stress due to heavy infection load from COVID-19 generated the highest COVID-19 related bio medical waste of 29.42 Tons Per Day (TPD) for the period under analysis.

Maharashtra is followed by Tamil Nadu (14.25 TPD), Gujarat (13.44 TPD) and Kerala (12.43 TPD). The other states with significant bio-medical waste generation related to this pandemic for the same time period are Uttar Pradesh (11.75 TPD), Delhi (11.49 TPD), Karnataka (11.31 TPD), West Bengal (8.21 TPD), Haryana (6.14 TPD), and Madhya Pradesh (5.96 TPD).

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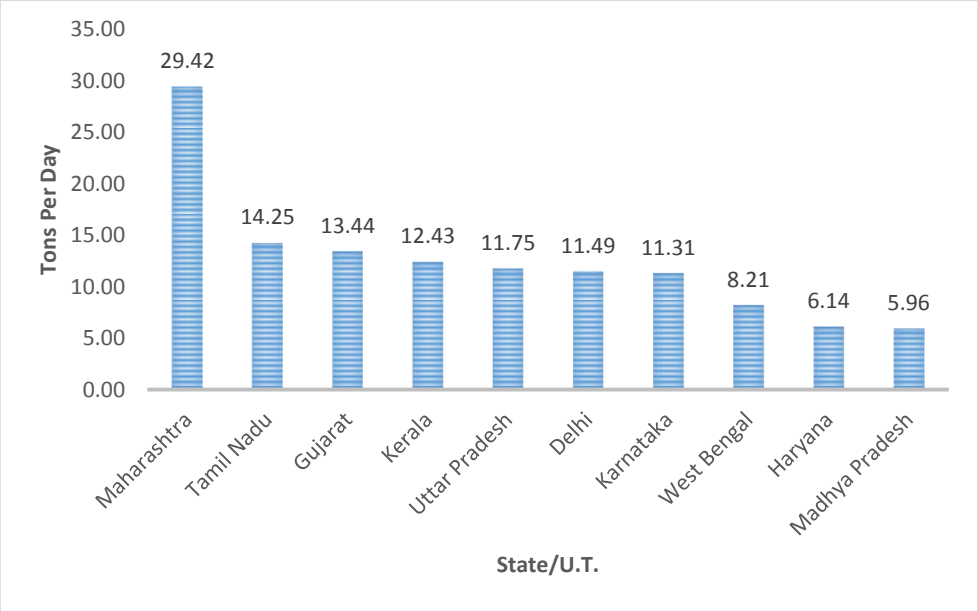
Fig 1.4 COVID19 Biomedical Waste Generation in Indian States/U.T.'s from June to September, 2020

(In Tons Per Day)



Source: CPCB, 2020 a and b.

Environment Pollution (Prevention and Control) Authority (EPCA) has pointed out that Delhi has a capacity to treat 2,220 tonnes of biomedical waste in a month, Uttar Pradesh has a capacity to treat 1,656 tonnes per month, and Haryana has a capacity to treat 288 tonnes per month (Thomas, 2020). The pandemic has tested this capacity as COVID-19 generated bio-medical waste along with the regular bio-medical waste generation safe disposal has been an issue of worry especially for Delhi.

Also, the lockdown promoted online shopping trends which has created more packaging waste and loss of business to local economy.

Conclusions: COVID-19 pandemic has been a major challenge which has caused not only loss of life but also created many environmental issues and the following conclusions can be drawn from the above discussion.

1. The coronavirus pandemic has had catastrophic effects for people's livelihoods worldwide, while reducing air pollution significantly during lockdown period.
2. The positive impacts on air quality around world are mostly short termed and with the return of normalcy the greenhouse gases emissions will increase again.
3. In large numbers, people are using single-use protective masks and gloves and this is a serious setback to discourage the single use plastic items. This has undone all the good work being done earlier to discourage people from using single use packaging.
4. The bio-medical waste generated by COVID-19 has highlighted the challenge of safe disposal of this hazardous waste.
5. Post COVID-19 low-carbon and sustainable technology should be a priority of nations and world level financial aid providing institutes to

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stop an increase in pollution as economies rebound.

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