Environmental Impact of COVID19 Lockdowns in Delhi-NCR / Northern India

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Abstract: Around the globe outbreak of COVID-19 has changed the way humans live. To cope up with this worldwide disruption lockdowns were implemented worldwide, which bought some major changes in the environment too. Due to lockdown there was significant decrease in the human activities which led to a slowdown in economic growth but it acted as a boon to the environment. Less transportation, less industrial activity had poses positive impact on the environment but on the other hand there was increase in medical waste like gloves, masks, and disinfectants disposal. This paper shows how lockdown helped nature to blossom once again. In our study we have found that during lockdown PM2.5 and PM10 has shown around 70% reduction, NO2 was significantly reduced to 80 % and CO was reduced to around 20% in comparison to the situation when there was no lockdown. Thus it helped in improving the overall AQI to almost 65%.

Keywords: Covid19, Air Quality Index (AQI), Lockdown, Environment

I. Introduction

As per World Health Organization, pandemic was originated by a new corona virus (CoV) named Severe Acute Respiratory Syndrome (SARS-CoV-2) and was first reported in Wuhan, China[1]. Soon WHO learned about this virus on December31,2019 as the number of cases were increasing rapidly and declared this as a pandemic on March11,2020 [2]. The COVID-19 (coronavirus disease 2019) can pose from mild to serious health issues in human. The foremost cause of concern for CoV is its global scale human to human transmission other causes are recurring emergence, considerable death count, infection and mortality to frontline health workers and numerous vulnerable effects on susceptible groups[8]. From minor cold to as the name suggested it can also cause some serious and fatal respiratory diseases. Till 12 February 2021, there were 107,423,526 confirmed cases of COVID-19 around the world, out of which 2,360,280 deaths, reported to WHO.[10]

The spread of COVID was increasing exponentially all over the world and India was also not spared. The first positive case of COVID-19 was observed in India on 30th January by a student from Thrissur (a district located in Kerala) who had returned back home for a break from China's Wuhan University[3], followed by two more cases on February 2 and 3 again in Kerala. Initially India ignored upcoming cases and didn't test the international passengers for COVID. By seeing an exponential raise of COVID-19 patients soon government started testing travelers, tracking their travel history and started implementing Social Distancing. By March22 there were 360 cases reported in India[4]. Considering all the factors about the virus just like other countries the Indian government declared nationwide complete lockdown for 21 days on March22, followed by another phase of lockdown up to 3rd May 2020[5].

Although the lockdown due to COVID had badly affected the economy of India but with the slowdown of social and economic activities, air quality has visibly improved in many cities with a reduction in water pollution [6]. This nationwide drop in human activity such as no industrial or office work, no planned travel as mostly people were working from home has caused significant drop in air as well as water pollution all over India.

II.   Impact of Lockdown on Environment

Due to lockdown the whole Indian nation was inside their homes, factories were close and daily-wage labourers were had to migrate back to rural areas. For the first time in the history around the country supply chains were weaken [7], Indian railways stopped operations, flights stopped. The only departments working were health care, police, CISF, cleaning and a few online delivery services just for essentials. After so many years people have experienced such a huge change in their lifestyle and have witnessed a pandemic. Everything in this world comes with its own pros and cons. Shutting industries and putting other economic activities on hold, IT group and other offices working from home, had certainly put an adverse effect on the economy but this exceptional change led to a beautiful clean environment.

The people have never witnessed such clear blue sky, fresh clean air and rivers shinning bright in so many years. In such a silent conditions it was seen that marine life had increased activities, animals as well as birds were roaming around on their own accord [8]. Almost no traffic, negligible industrial and commercial activity caused significant drop in air pollution even in the metro cities.

On the other hand COVID has raised some new challenges as shown in Figure 1 [6]. The mass use of mask, gloves, PPE kits, sanitizers etc which were saving us from COVID but as well raising another problem of their disposal as the recycling activities were also slowdown. The medical waste was increasing on higher rates leading towards more soil and plastic waste.

This exceptional situation gives us an opportunity for us to take a closer look at how air pollution levels have responded to this situation and what we can learn for the future.
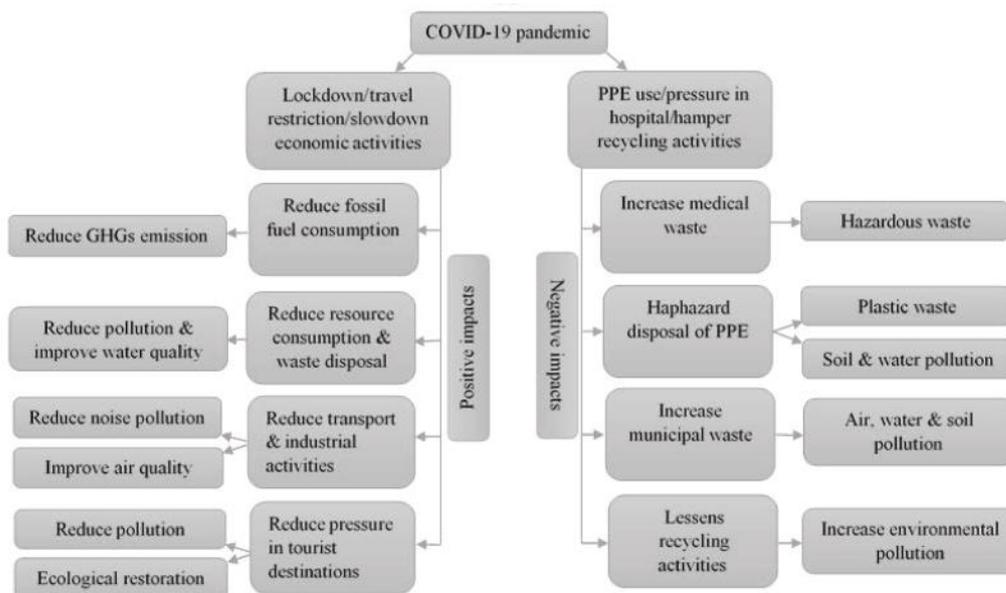

Figure 1: Positive and Negative impact of Lockdown on Environment [6]

III. *Study and Data collection*

To deeply study impact of lockdown on environment we have taken NCR region. NCR consists of megacity Delhi and various other districts from surroundings states of Rajasthan, Haryana, and Uttar Pradesh. Some of the major cities in NCR include New Delhi, Ghaziabad, Faridabad, Noida and Gurgaon[11].

The regular air pollution prominently consists of PM2.5, PM10, CO, NO2, SO2, and others toluene, benzene etc [14]. The data of the prominent pollutants presented here is collected from Central Pollution Control Board –CPCB, India (ministry of environment, forest and climate change) online portal. Our study present a comparison based on Air Quality Index (AQI). It is an index which uses concentration of major pollutants $PM10$, $PM_{2.5}$, SO_2, NO_2, O_3, NH_3, and CO on hourly basis [14].

A. *Delhi-NCR Environment Before lockdown:*

Before lockdown when activities were running at their unprecedented rates, huge traffic, industry activities were flourishing, travel was blooming, commercial activities were running at their normal pace. But our all these day to day activities were having an adverse impact on environment as the AQI(AIR Quality Index) was generally observed on an average range of about 250 to 350 and sometimes even gone maximum touched 500 which is considered as hazardous. The minimum AQI observed was around 50.

The observations presented above are from January1, 2020 to March21, 2020 before the lockdown. This pollution observed was majorly caused by PM2.5. The PM2.5 was found to have an average of approximately 250-350. Also the PM10 was not too far away and its average found was around 200-300. There were days when even PM10 touched the maximum value of 500. The next important factor in environment is NO2, whose average value observed is ranging around 80-90. Another crucial parameter is CO and its average is found to be 90-100.
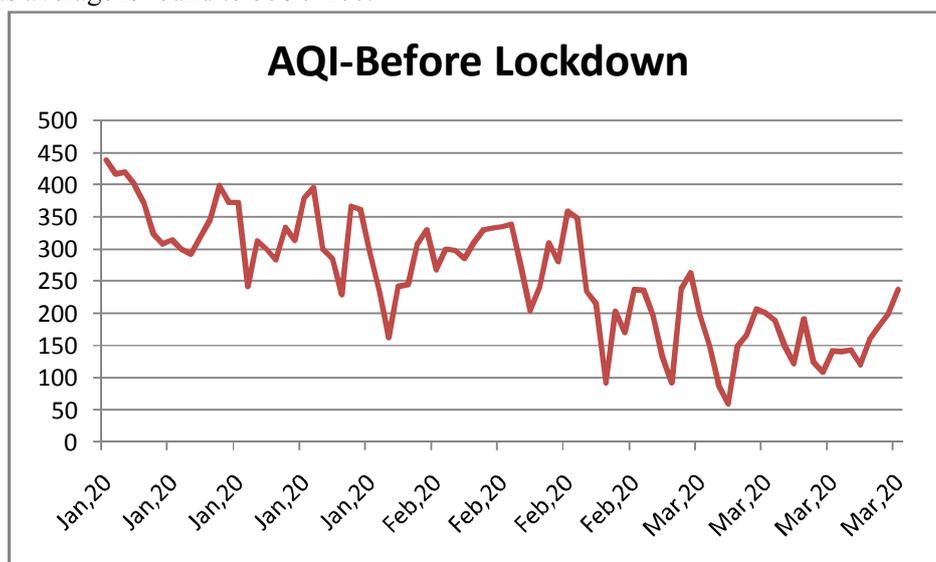

Figure 2: AQI before Lockdown

B. *Delhi-NCR Environment during lockdown:*

To prevent COVID from spreading only implementing social distancing was not enough to strictly stop it government has to put the country under complete lockdown. Lockdown in India was in two phases. Phase 1 was from March25 to April14 [9], Phase2 from April 15 to May3, Phase3 from May4 to May17 and Phase4 from May 18 to May31. During lockdown there was no activity what so ever. No commercial activity, all industrial activities were suspended, no tourism, negligible human traffic. Majority of people were working from home, but for some all ways to income was ceased.

Less human activity gave environment chance to flourish as the average AQI observed during this lockdown period was ranging around 60-150 which is a significant decrease from the time when there was no lockdown. During lockdown all the major pollutant were having almost values. Here the major pollution constitute was PM10 having average value ranging 60-110. The PM2.5 ranges same 55-105. CO was also not too far from PM2.5 and PM10 as its average value lies in the same range of 60-100. Initial Surprisingly during the initial days of lockdown the major pollutant was CO. Ozone also lies in the almost same zone having value 50-100. There were days when Ozone was the major pollutant too. Between the lockdown periods NO2 was just about negligibly present in the atmosphere having average range 20-30.
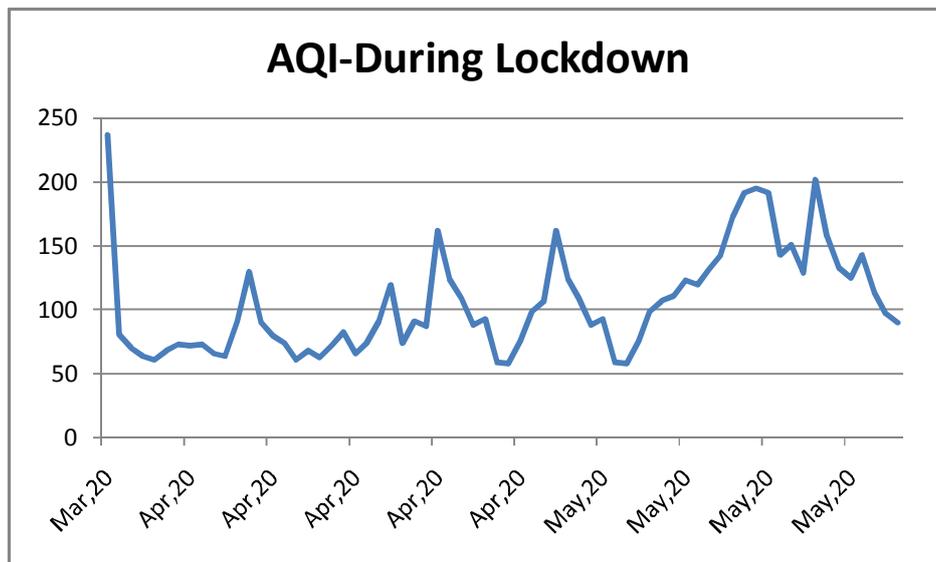

Figure 3: AQI during Lockdown

C. *Delhi-NCR Environment After lockdown:*

To revive economic sector, unlock was a necessity. Government implemented unlock in different phases. Unlock1.0 was from 1June to 30June, unlock2.0 from July1 to July31 and so on. During unlocking activities were banned in the containment zones but in other areas activities were permitted as per the unlocking protocols. Soon all the industries, parks, malls, theaters etc. and in the end educational institutions were opened.

All these activities started impacting the environment. To study the impact of Unlocking on environment we have considered the window of three months after lockdown starting from June1 to November31. As the unlocking was in phases, The AQI was observed during the initial period was same as of during lockdown period. But after September when most of industries when open, all other restrictions were

reverted, the AQI again started increasing as shown in Figure4. Till September AQI majorly lays range below 200. Afterwards AQI falls in 200-400 range. Again the major pollutant were PM2.5 AND PM10 having the same value of 200-400. CO and NO2 value lies in 100-150. Ozone average range was observed to 20-30.
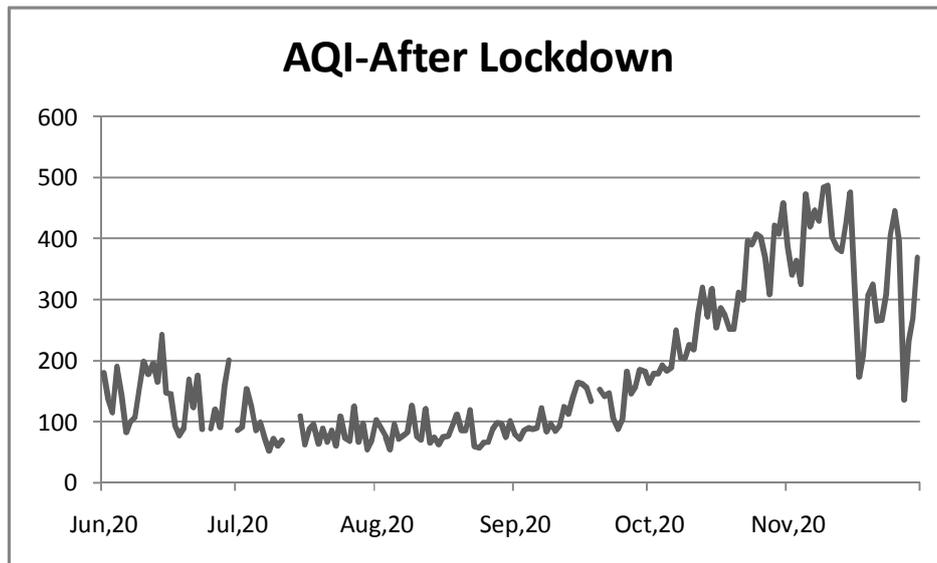

Figure 4: AQI after Lockdown

IV.   *Comparison*

Human activities have a great impact on environment. Due to lockdown there were almost no commercial and industrial activities. The mad traffic, the bad industries air and water waste had stopped for a while
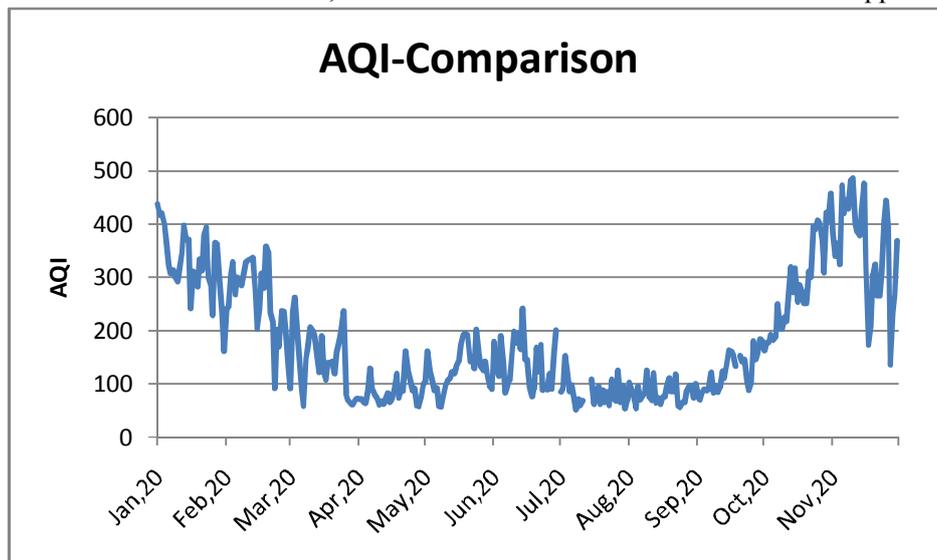

Figure 5: AQI comparison before lockdown (Jan-Mar), during (Mar-May), after lockdown (June-Nov)

giving us the favor to have insight on their long term effect on environment. It is clearly visible in the figure5 that during lockdown there was subsequently low AQI. It was observed that during lockdown there was around 65% AQI in the NCR region. The other parameters has also show great reduction during lockdown like PM2.5 and PM10 has shown around 70% reduction, NO2 was significantly reduced to 80 % and CO was reduced to around 20%. Afterwards in the unlocking phase slowly again the environment comes to the same stage as it was before COVID. We can clearly see that human interference has largely adverse impact on environment.

V.   *Conclusion and Future Works*

It is well known that lockdown all over the world had bad impact on economy and also we all knew that human actions are having adverse impact on environment. But this time because of COVID it's been proven that upto what extent humans are damaging the environment. With all the restrictions and the danger COVID was imposing on our lives, the lockdown has come up as blessing in disguise. After a long time for a while humans got chance to breathe in clean fresh air and got a chance to think what have we done to nature. The tremendous reduction in air and water pollution during lockdown has shown how we are all damaging our nature with our own actions. This is the time we should realize and take right actions to save the environment for own good. We should adopt more sustainable methods, recycle every waste, ban plastic and focus on the use of renewable resources.

In this paper we have compared the overall AQI to before and during lockdown, but during and after lockdown is still remaining. As future work we may study how long this lockdown effect stayed in the environment, at what speed we will again pollute the earth on the same level or more and ways to prevent the deterioration of the environment.

VI.   *References*

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