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Global Pandemic: A Boon for Environment and Planet Myth or Reality?

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Abstract: ***The novel coronavirus pandemic disease (COVID-19) poses a cruel preference to the world: the society and the economy. It has discovered the vulnerabilities and strengths of every country and has taught us a sequence of lifelong lessons. It was started in Wuhan, China and now spread all over the world. Most of the countries implemented lockdown in their countries to control this pandemic and slow down its spread. Lockdown due to COVID-19 has drastic outcomes on social and economic fronts. On the other hand, lockdown also has some positive impact on the natural environment. Coronavirus is a vaccine to the environment to which we humans are the virus.***

There are very positive effects on the environment since there has been a complete shutdown of public transport, educational institutes, business centers, and all other social interaction points. The air pollution, water pollution, noise pollution, etc have reduced a lot in these few months of lockdown which took place all over the world. According to the recent data released by NASA and ESA, the pollution in some of the epicenters of COVID-19 has reduced up to 30%. The second most populated nation, India has also seen a drop in the pollution level.

While the complete shutdown of India's economy was done by our Prime Minister to stop the spread of this coronavirus, it is having an additional health benefit of clearing the air that millions of people were choking on. The Central Pollution Control Board of India's Environment Ministry has also shown a 71% decrease in the level of Nitrogen dioxide. The quality of the air will sooner be pure because of the less vehicular traffic and rise in temperature.

This research paper will compile a deep study and analysis of the situation of the environmental pollution post this coronavirus and how due to the lockdown, a measure taken by the government to control this virus helped the environment to heal itself and reduce the pollution to some extent. Along with this, we will look after the effect of this virus on other countries and how it has affected the environmental status of those countries. A comparative study of the pollution will be done with the help of graphs and charts as well. A Study on the changes occurred in the ozone layer due to this environment change will also be dealt with. The researchers will also examine how far this control of the pollution will help and sustain.

I. INTRODUCTION

The COVID-19 pandemic has affected every phase of human life and the global economy as well. This infectious disease of coronavirus family was found in WUHAN, CHINA in December 2019, and was later named as COVID-19. WHO (World Health Organization) in January 2020 stated human to human transmission of COVID-19 through respiratory droplets. After sometimes in the same month, authorities confirmed a speedy increase of COVID-19 cases in WUHAN, and it started to spread rapidly not only in surrounding areas but also spread in the whole country and this outbreak turned into an epidemic. The Chinese government announced the complete lockdown in the whole country after this. The first case of COVID-19 was confirmed on 30th January 2020 in India. By March India was confirmed with 618 cases of COVID-19 out of which 562 were active. After this Prime Minister of India announced for the complete lockdown all over the country. As of now 9th June 2020, the MoH&FW confirmed a total of 266,598 cases out of which 129,215 were recovered and 7,466 deaths were recorded in the country.

As countries went into lockdown the industrial activities were shut down globally. Among all the sectors, transport is the hardest hit sector due to lockdown. Road and air transportation came to halt as it was not allowed. According to the report, travel through airdropped by 96% due to COVID-19, lowest in 75 years. Furthermore, not only the transport sector but also the industrial and manufacturing sector is heavily affected by the pandemic. COVID-19 has shown a drastic negative impact on people's social life and world economy; however, this lockdown resulted in pollution reduction due to limited social and economic activities.

Due to this lockdown the air quality of 103 cities in India- the most polluted country in the world showed improvement in its air. NO2 (Nitrogen Dioxide) is a highly reactive pollutant and it comes from the combustion of fossil fuels. Traffic pollution is known as the main source of NO2 emission. It is considered highly toxic to human beings. Both short term and long term exposure to NO2 can increase the mortality rate. Not only air pollution but also there is a drop in the noise pollution. Due to the nationwide lockdown, air, noise, and water pollution levels have reduced and the wildlife is free.

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II. AIR POLLUTION: A BLESSING IN DISGUISE?

Covid-19 has many negative impacts on the health of the people and the world economy but it has proved to be a blessing for the environment, after a long time mother earth is taking breath and the credit goes to the lockdown.When the lockdown came into effect, nobody was really thinking about the environment as people were staring at the direct fallout of a complete lockdown.

Until this lockdown and COVID-19 the whole world was facing a similar problem with the quality of the air. Due to the increasing urbanization, industrialization, and the growing population, the quality of the air deteriorated to a large extend. Annually 4.6 people die due to diseases caused by poor air quality like asthma, lung diseases, etc.

As the globe went into lockdown the human activities have reduced to a great extend. These human activities include shut down of industries, reduction in mobility, no social gathering, and so on. Among these transportation is the hardest hit sector; we have seen a large reduction in the traffic. The road and air transportation came to halt as people are not allowed to leave their homes. Airplanes use fossil fuels which results in the emission of many harmful gases which pollute the environment like NO2, CO2, etc. but now these have reduced due to lockdown. According to the report, air travel dropped by 96% due to COVID-19, lowest in 75 years[1]. Research has shown that one of the main reasons for increasing air pollution is the gases released by the vehicles. People also tend to use vehicles of expiry date before this lockdown which contributes to air pollution and diseases. Reduced mobility has reduced air pollution to a very large extent and this also affected the global oil demand and cuts down its price worldwide, which is imposing a bad impact on the economy of the world. NO2 released by the combustion of fossil fuel and from the vehicles is considered highly lethal to human health as showed in the study for both short and long term exposure to NO2.[2] Air pollution is a global problem and its effects can be seen even across developed nations such as Europe where 193,000 people died due to air pollution in 2012[3]. Furthermore, the industries which were also responsible for the release of the deadly gases from its day to day operations are not shut down and there is no emission of the gases and pollution the air. But now as said “There is a large improvement in air quality, especially in urban areas — from alarming or poor to satisfactory or good. The main reason is reduced “human activities” [4]. So this has helped human health and the environment from air pollution.

A. Impact on the Ozone Layer

We all know that ozone layer protect the earth from the harmful UV rays of the sun which can cause a number of diseases like cataracts and retinal damage, premature aging of the skin, skin cancer. And in the recent times we also had witnessed many cases of the same, people started suffering from skin cancer and diseases due to harmful UV rays by the sun and this is all because of the degradation of this ozone layer in the stratosphere. The amount of ultraviolet radiation that hits the surface of the earth is directly proportional to the amount of ozone in the stratosphere. That is why maintaining a steady concentration of ozone in the stratosphere is important. The main reason of the degradation of this ozone layer is chlorofluorocarbon released by the industries. CFCs serve as refrigerants, blowing agents and propellants in aerosol cans. Reduction in the release of CFCs is necessary for the survival of the ozone layer. The largest hole ever observed in the ozone layer over the Arctic has closed [6]. One of the reasons for this healing of the ozone layer is reduction in the release of the CFCs in the environment because of the shutdown in the operation of various industries and reduction in the mobility of vehicles during this pandemic lockdown. So this has a positive impact on the ozone layer.

B. Pollution Assessment During Covid-19

The lockdown enforced due to the pandemic has shown a great improvement in the air quality. Many researchers have also suggested that these interventions can be taken as an emergency measure to combat the episodes witnessed in Delhi-NCR during the winter month. Researcher have hypothesis that the drop in air pollution levels may currently be saving a considerable amount of lives, not only by reducing individuals’ susceptibility to Covid-19, but also by preventing some of the world’s seven million annual deaths caused by air pollution. Still, the dangerously high levels of NO2 in various urban regions prior to Covid-19 has likely resulted in far more virus deaths compared to the lives saved by this current drop in emissions. The pandemic and the subsequent decreases in air pollution levels due to the quarantine have explain a severe issue regarding ongoing high levels of air pollution.

NASA (National Aeronautics and Space Administration) and ESA (European Space Agency) released new evidence which tells that environmental quality has improved and the emission of NO_2 has been decreased up to 30%. NASA collects the data using OMI (Ozone Monitoring Instruments) on its AURA satellite. While, ESA collect the data through Sentinel-5P satellite using TROPOMI (TROPOspheric Monitoring Instrument). NASA and ESA releases satellite images of many countries before and after lockdown.

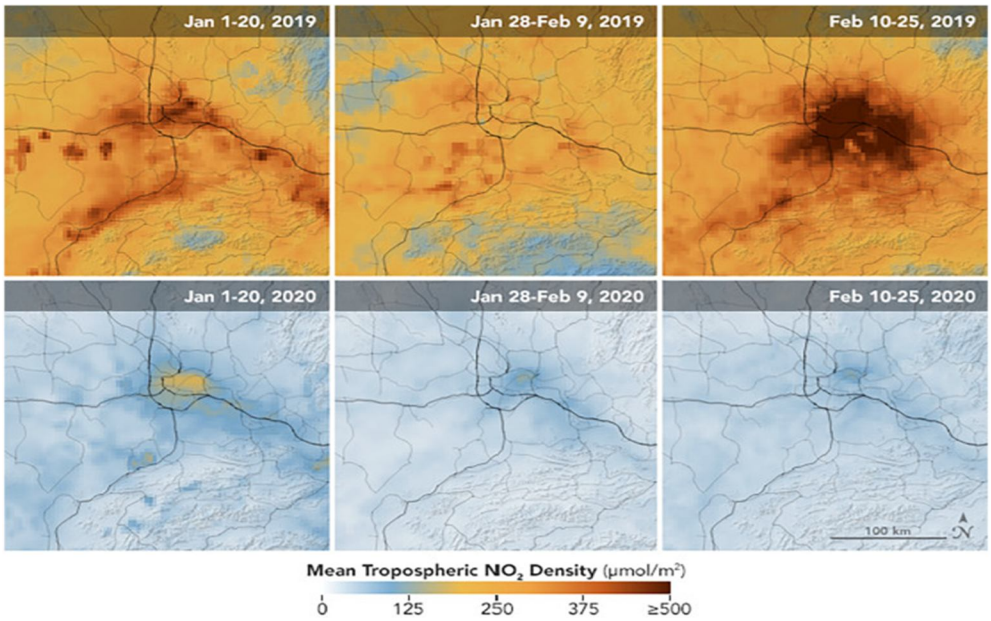
We will be talking about Wuhan, China, USA, France, Italy, Spain, and India.

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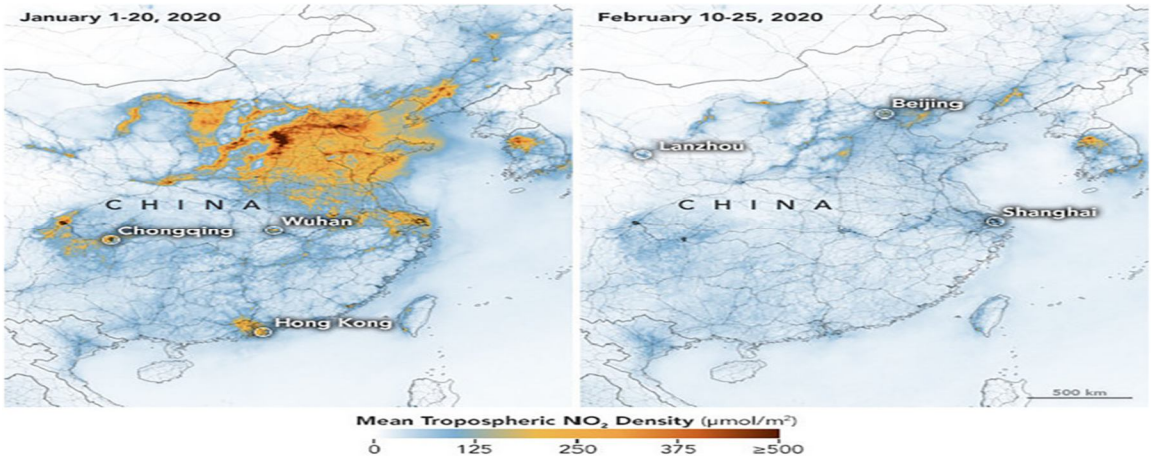
TABLE 1: NO2 emission data

Location	Agency	Satellite	Time	Reduced %
WUHAN	NASA and ESA	AURA&SENTINEL-5P	JAN 19 - FEB 20	30%
CHINA	ESA	SENTINEL-5P	JAN 19 - FEB20	20%-30%
USA	NASA	AURA	MAR 19 -MAR20	30%
SPAIN	ESA	SENTINEL-5P	MAR 19 -MAR20	20%-30%
ITALY	ESA	SENTINEL-5P	MAR19 - MAR20	20%-30%
FRANCE	ESA	SENTINEL-5P	MAR19 - MAR20	20%-30%
INDIA	ESA	SENTINEL-5P	MAR19 - MAR20	40%-50%

1) *Wuhan:* Fig 1. Shows the NO_2 concentration in Wuhan during 2019 and 2020. Where NO_2 emissions is reduced up to 30%.[7] NO_2 emissions are measured using TROPOMI instruments through Sentinel-5P satellite. The image provide comparison between Wuhan 2019 (Jan and Feb) and 2020 (Jan and Feb), NO_2 emissions. Where it clearly indicates that NO_2 emissions reduced significantly due to COVID-19.

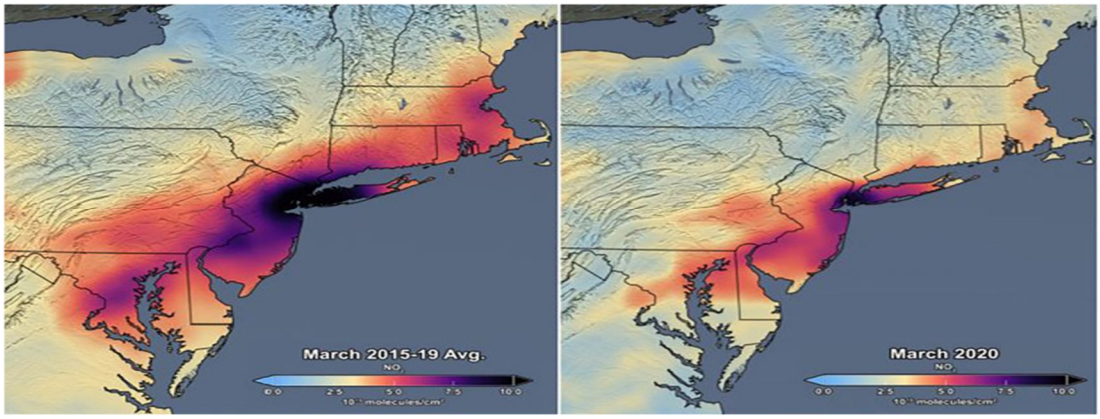


2) *China:* Fig 2. Represents NO_2 emissions sequence of China before and after lockdown. Where NO_2 emissions are reduced up to 20–30% from February 10 to 25 after lockdown was implemented [8]. The satellite image was captured by ESA satellite Sentinel-5P using TROPOMI Instrument.

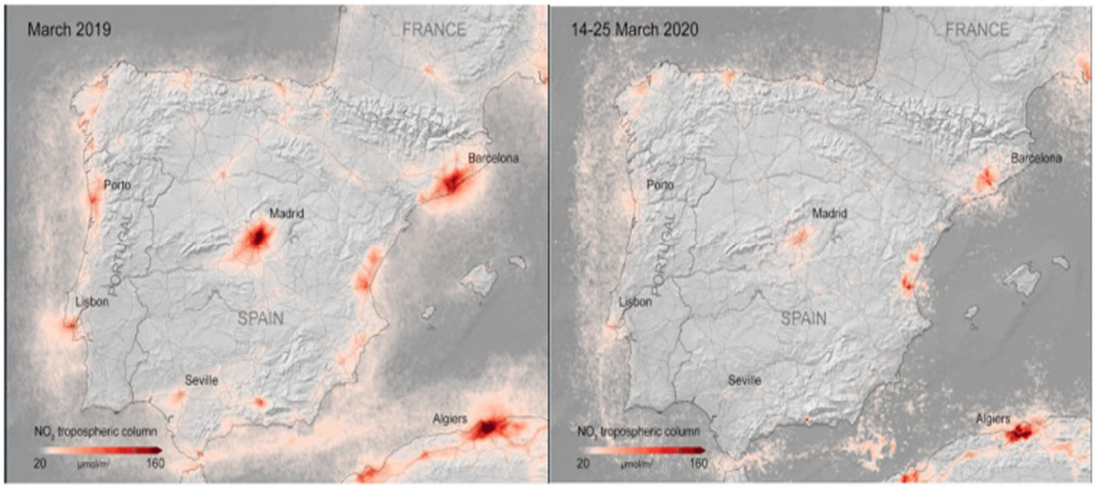


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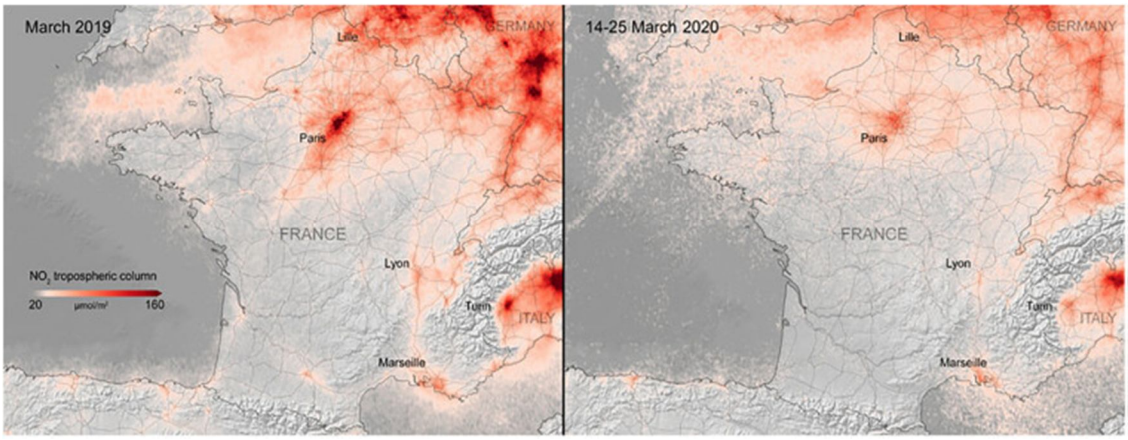
3) *USA:* Fig 3. Represents NO_2 emissions concentration in northeastern part of United States during March 2015 to 2019 and March 2020. Satellite image was captured by NASA through AURA satellite using OMI instrument. Where NO_2 emissions is reduced up to 30% due to lockdown in northeastern part of USA. [9]



4) *Spain:* Fig 4. Represents NO_2 emissions concentration in Spain during March 2019 and March 2020. The NO_2 emissions reduced up to 20 to 30% in Spain [10] due to lockdown, especially across the major cities such as Madrid, Barcelona and Seville. The satellite image was captured by ESA satellite Sentinel-5P using TROPOMI Instrument.

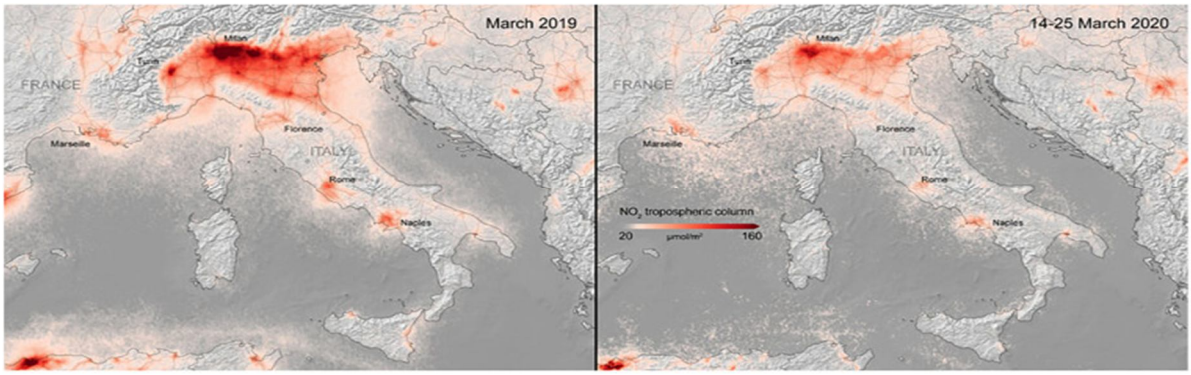


5) *France:* Fig 5. Represents NO_2 emissions concentration in France during March 2019 and March 2020. NO_2 emissions are reduced up to 20 to 30% in France. [11] The satellite image was captured by ESA satellite Sentinel-5P using TROPOMI Instrument. NO_2 emissions reduced significantly during lockdown across Paris and other major cities due to transportation shutdown.

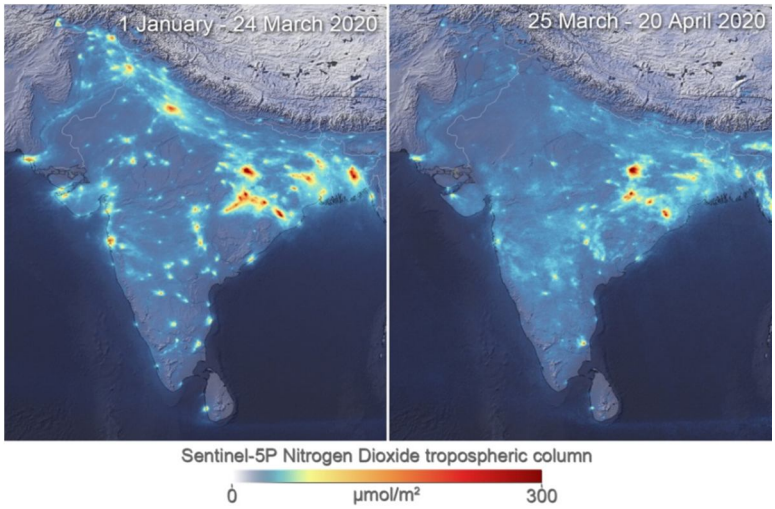


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6) *Itlay:* Fig 6. Represents NO_2 emissions concentration in France during March 2019 and March 2020. The image indicates that NO_2 concentration reduced significantly during lockdown due to transport shutdown and low mobility. The satellite image was captured by ESA satellite Sentinel-5P using TROPOMI Instrument. NO_2 emissions across Italy are reduced up to 20 to 30%.[12]



7) *India:* Lockdowns imposed to halt the spread of the corona virus have been recently linked with cleaner air quality over Europe and China. New images (fig 7), from the Copernicus Sentinel-5P satellite, from the European Union Copernicus programme, now show some cities across India seeing levels drop by around 40–50% owing to its nationwide quarantine.[13]



III. NOISE POLLUTION

Though this lockdown had negative impact on many things but on the other hand there are many positive sides. And one of them is the improvement in the environment. Not only air pollution but also there is a drop in the noise pollution. People living in the urban areas reported that birdsong, for instance, seems louder than before. The reduction in everyone's movement has reduced the traffic on our roads and a reduced public transport service. And because of this the birds which have low pitch sound there voice can be heard clearly since there is no noise of car horns, air planes etc to compete and challenge there sound. The wildlife is benefitted beyond better communication. The reduction in noise level is connected with higher reproductive success, less migration, and finally low mortality rates.

The noise reduction goes deep-literally. Seismologists have reported less seismic noise, or vibrations in the earth's crust. Seismic noise which is caused by human activity in large number just like in Brussels, for instance, is reported to be less by 1/3 in comparison to pre-lockdown level. Along with animals in humans as well, exposure to chronic noise pollution is ordinarily connected to high stress and a number of physical ailments, from the obvious (disrupted sleep and hearing loss) to the less direct (excessive blood pressure, heart disease and cognitive impairment in children). These harms include economic costs as well; housing cost. These harms include economic costs as well; housing costs can decline by up to 2% in line with decibel.

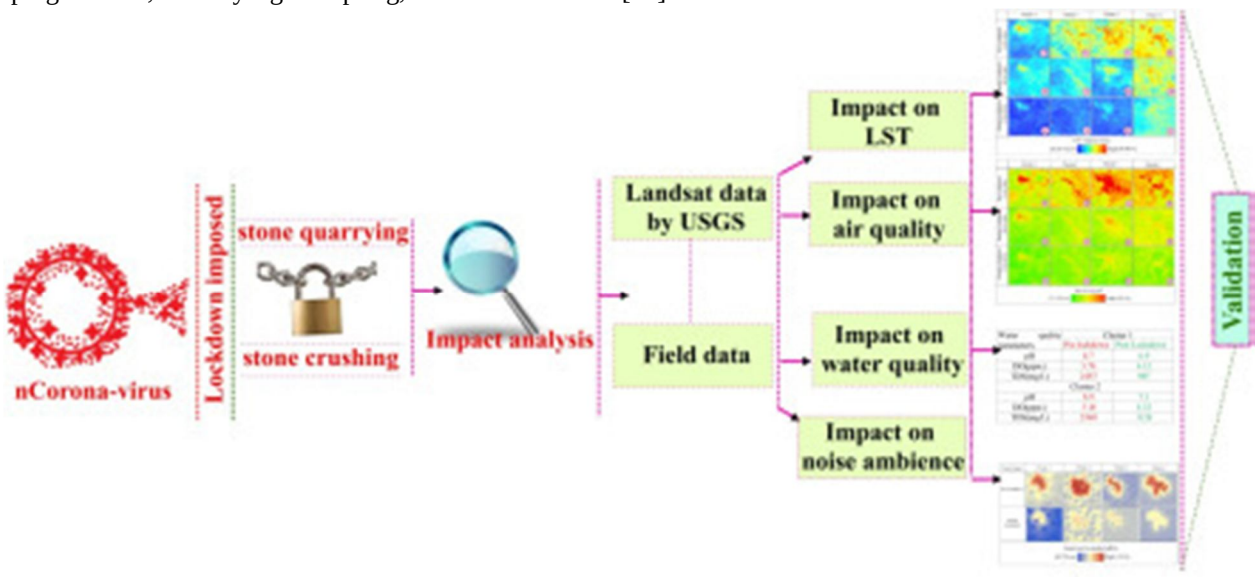
There is a noise pollution analysis of the pre-lockdown month of February and March and also for the month of April. According to the update, the standard of noise (day time) for residential is 55 decibels, commercial is 65 decibels, silent is 50 and industrial zone

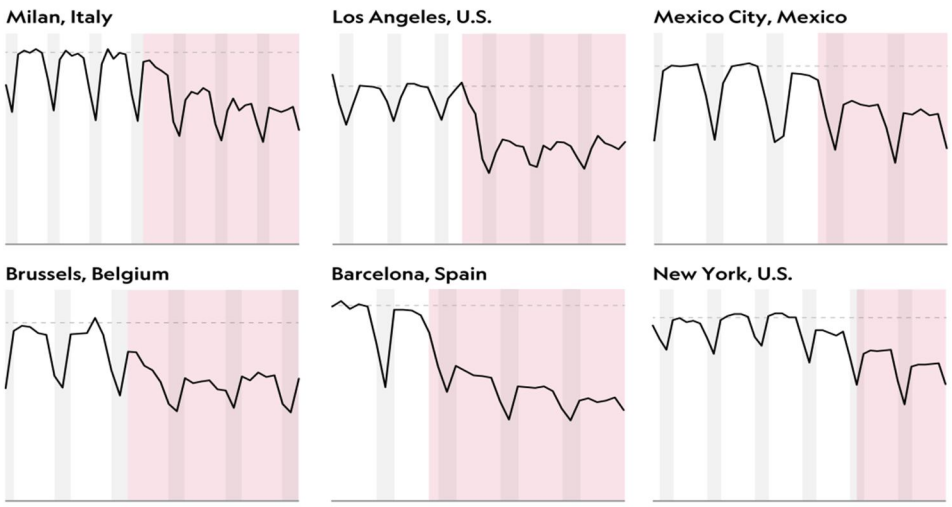
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is 75 decibels. In the month of March there was a quite decrease in average noise pollution level which ranged between 0.38 decibels and a maximum of 6.8 decibels as compared to February.

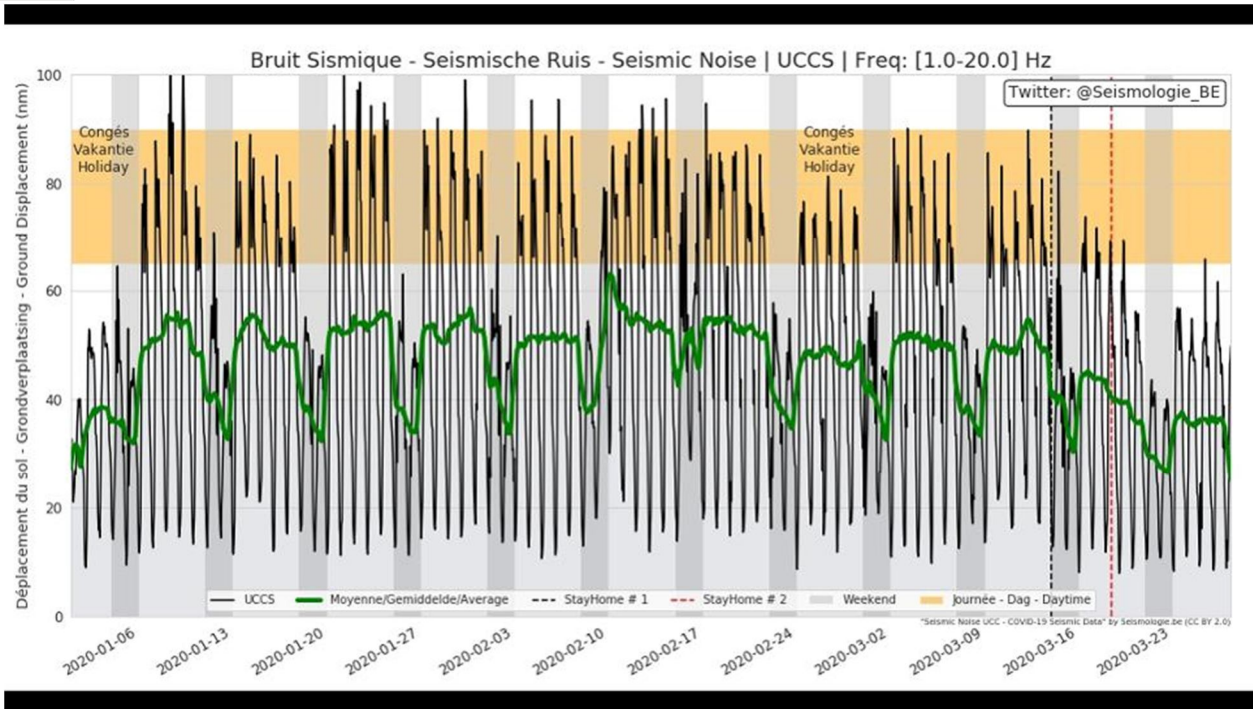
There was huge reduction in the month of April, due to complete lockdown. According to figures it is revealed that the noise pollution is reduced mostly in the industrial areas followed by commercial areas. There was a major reduction in noise in industrial areas as they were mostly closed due to lockdown and only few units were operational in order to deliver essential items. The closure led to a high reduction in movement of heavy vehicles through the narrow roads which are found in industrial areas. Further, since many units were shutdown, the dependency on diesel generator sets was also minimized. So, the industrial area witnessed major reduction in noise pollution.

Rebecca Franks, an American who lives in Wuhan, the epicenter of the corona virus outbreak in China, made this observation 48 days into the city's quarantine last month: "I used to think there weren't really birds in Wuhan, because you rarely saw them and never heard them. I now know they were just muted and crowded out by the traffic and people," Franks wrote on Face book. "All day long now I hear birds singing. It stops me in my tracks to hear the sound of their wings."[14] Sylvia Poggioli, an NPR correspondent in Italy, reported that the streets of Rome are so empty, "you can actually hear the squeak of rusty door hinges," and "the chirping of birds, an early sign of spring, is almost too loud."[15]





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IV. LOCKDOWN: A VENTILATOR FOR RIVERS

The novel coronavirus disease (COVID-19) lockdown has put millions in the throes of adversity but then too there is a reason to celebrate. Due to the nationwide lockdown, air, noise, and water pollution levels have reduced and the wildlife is free. We have unintentionally been cruel to nature but the lockdown induced a change of course. We can say that "coronavirus is a vaccine for the earth and us human beings we're the virus". Perhaps it's true.

A. Status of a river in India

Water bodies in India are not having a good condition. In the name of economic growth, most of the rivers and streams have been turned into sewer canals and are getting too difficult to be treated. On an average estimation of everyday data analysis, almost 40 million liters of wastewater enter rivers and other water bodies; and only 37% is treated adequately. According to a report, it is shown that the stretch of polluted rivers in the country has increased from 302 stretches in 2016 to 351 stretches in 2018. [16] The finding was based on Biological Oxygen Demand (BOD).according to the figure presented by CPCB [17] to the National Green Tribunal in august 2018 only five of 70- odd monitoring stations had water fit for drinking, and seven had water fit for bathing.

Stone quarrying and crushing spits huge stone dust to the environment and becomes a hazard to the ecosystem components as well as human health. The Middle catchment of the Dwarka river basin of eastern India is well known for stone quarrying and crushing and therefore that part of the region is highly polluted. After the analysis, the result exhibits that maximum PM_{10} concentration was 189 to 278 ug/m^3 after 18 days of the commencement of lockdown in selected four stone crushing clusters. The river water adjacent to it is qualitatively improved due to the stoppage of dust release in the river.

B. The Ganga

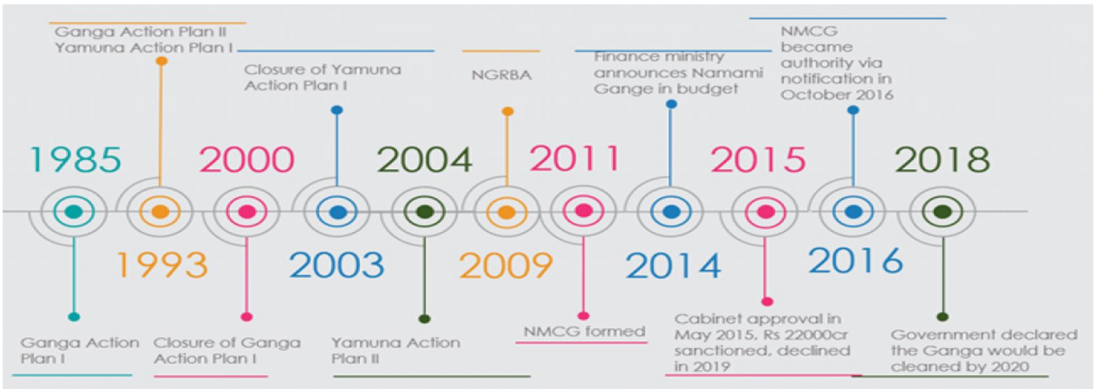
The water quality of Ganga improved remarkably during the lockdown period. The river is in an area of 2,500 kilometers and has been an important part of India's history, identity, religious belief and economy for thousand years. But the river was made a dump yard for untreated sewage, and industrial waste. More than half of wastewater treatment plants in the basin do not comply with the discharge norms. [18] The Ganga enters Uttar Pradesh in Bijnor district and passes through major districts such as Meerut, Bulandshahar, Aligarh, Kanpur, Allahabad, Varanasi, among others.

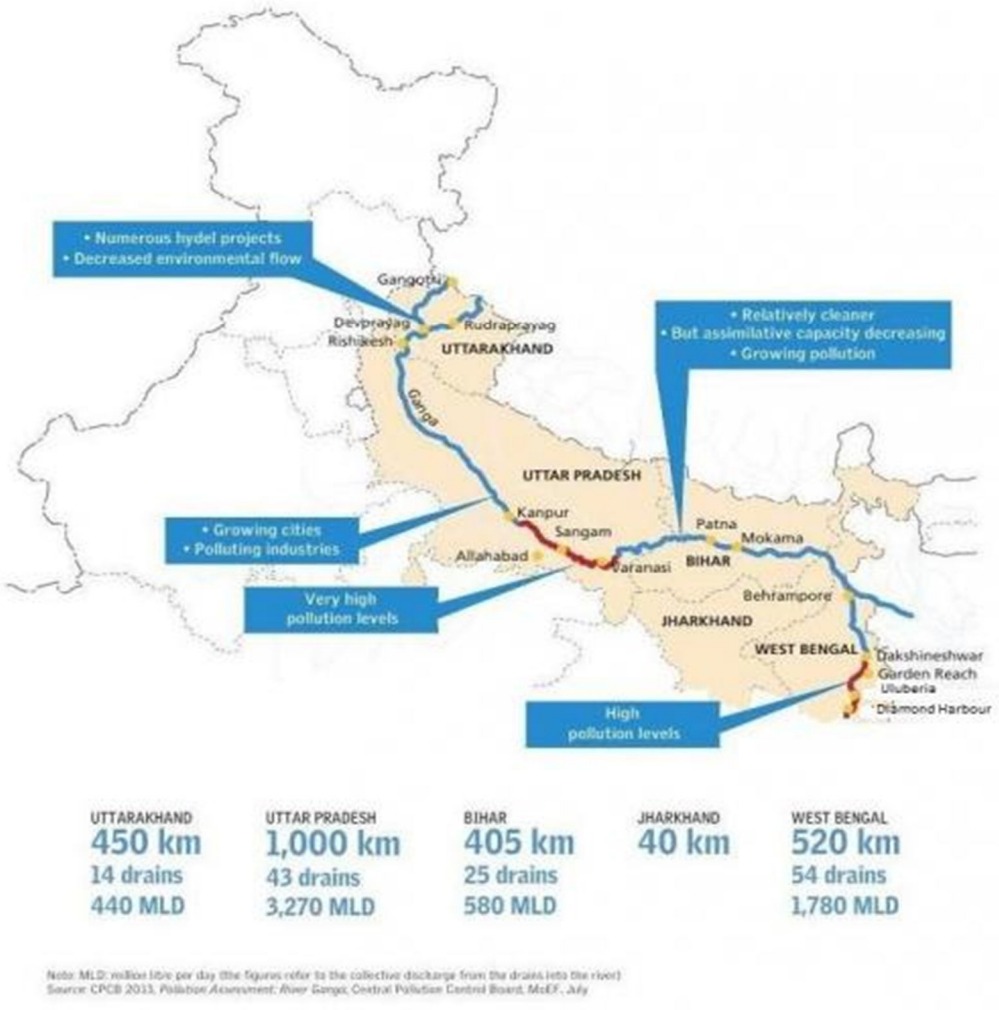
Since 1985, several programs and schemes have been launched to clean Ganga but the nationwide lockdown which was imposed on March 25, 2020, within 10 days showed the sign of improvement in the water quality. On April 4, at Varanasi Nagwa Nala, the Dissolved Oxygen (DO) values were noticed to be increased to 6.8 milligram/liters which were on 6th March 3.8 mg/l, this showed an extraordinary improvement of 79 percent in DO values.

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C. The Causes

Ganga is polluted more than 80%just because of the domestic sewage from the nearby town and villages. The rest is contributed by industrial waste. During the lockdown, domestic sewage would have increased demand for the water to maintain hand-washing hygiene. Industrial waste however stopped entering the Ganga. Other activities such as tourism, fairs, bathing, and cloth washing near the Ghats were reduced. Zero industrial pollution increased the quality of water in the Ganga. "When sewage is mixed with industrial effluents, it gets difficult for the river to assimilate pollution. One more reason was the high number of western disturbances which brought rains and improved the flow in the river leading to dilution". [18] The improvement which is seen in Ganga water is a function of quality and quantity. Industries are not lifting water; so there was more flow in the river and pollutants are getting diluted. At the same time, effluents are not being discharged.





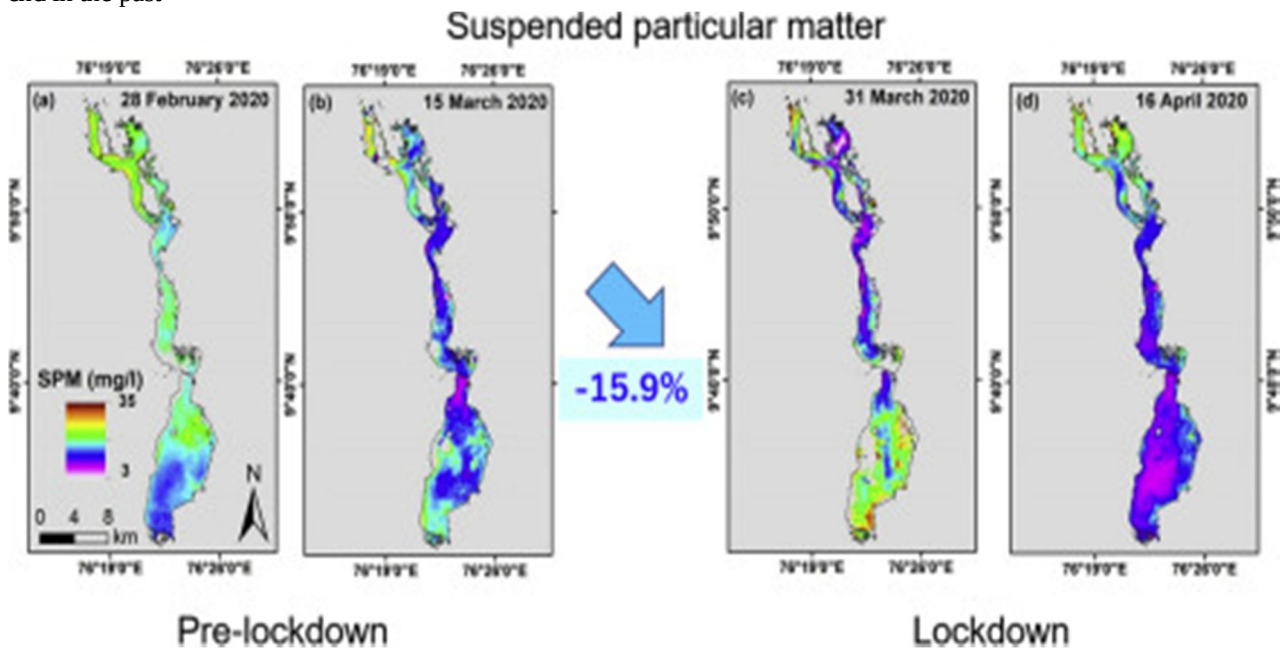
Note: MLD: million litre per day (the figures refer to the collective discharge from the drains into the river)
Source: CPCB 2013, *Pollution Assessment: River Ganga*, Central Pollution Control Board, MoEF, July

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D. The Narmada River

The lifeline of Madhya Pradesh considered the ongoing lockdown to have emerged as silver lining in the dark cloud for the health of the Narmada River. Due to the reduced flow of industrial effluents and domestic sewage in the river has made a positive impact on the quality of water in the river which travels more than 900 km through 14 districts of MP, before flowing into Gujarat. The river water showed a value ranging between 7.2 and 7.8 on the pH scale and was neither acidic nor alkaline, which was actually very safe for human and animal consumption. Before the lockdown was imposed the pH value of the river water was either acidic or alkaline. Against the pre-lockdown period when the Dissolved Oxygen level in the river water ranged between 6.5 and 6.8, which meant the Narmada water quality presently was A grade.

Further the presence of suspended solids in the river water ranges between 350 milligram per liters, which was before the lockdown period ranged between 800-900 milligram per liters. The positive sea change in the river water quality has been reflected by the growth in the activity of plants and animal species. There is a remarkable growth in the plants in the river banks, riparian zone, spawning activity of indigenous fish varieties and the stay of migrant birds also was stretched up to May first week in contrast to march end in the past



V. SUSTAINABILITY (GOING FORWARD)

Nature is healing itself, but the question arises here is "whether does this healing will continue in the future also or it will end with the end of this lockdown?" This is a question we all have to think about.

According to a study, despite human activity which is somewhat in a complete standstill during the lockdown the carbon dioxide level will only decrease by roughly 5.5% in 2020 as compared to 2019. To put this in perspective, to attain the goal of limiting the global increase in the climate temperature to 1.5 degrees Celsius, which various experts agreed that this would stave off the worst effects of climate change, global CO2 emissions would need to reduce by 7.6 percent per year. Similarly, air pollution and NO2 levels are expected to rise to their normal unhealthy levels when this quarantine is lifted and everything comes on track. People will again indulge themselves in activities which lead to air pollution. Industrialization, heavy traffics, act which will again hit the quality of the air and will reduce the good effects of this lockdown to the environment.

It is crucial that when the lockdown of India inevitably ends and people return to their normal routines, they will not be forced to return to their old behaviors. Serious policy changes need to be enacted to make the current drops in air pollution levels permanent. The reduction in road transport and the related decrease in air pollution have highlighted that gas-powered vehicles are key drivers of air pollution.

Sadly this respiratory epidemic has illuminated another respiratory crisis due to air pollution. May India make permanent the recent declines in air pollution which have given a glimmer of hope during these difficult times, rather than a temporary glimpse of what is possible

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According to the researcher, we believe that as people citizens of a country and a good human being we all should follow some measures that would help to continue this reduction in air pollution. Electrifying transportation, expanding public transportation, building more bike lanes, and finding other ways to encourage people to ditch their cars would dramatically reduce India's emissions from its primary human air pollution source. It's also important that these electric vehicles, and more generally India's cities, are powered by renewable energy sources rather than fossil fuels. This will help to maintain the quality of the air and reduce the chances of disease from air pollution.

VI. CONCLUSION

COVID-19 is a global pandemic and a significant threat to human health that hinders economic development, but it is often viewed as a 'Blessing in Disguise' where pollution is minimized and biodiversity is restored.

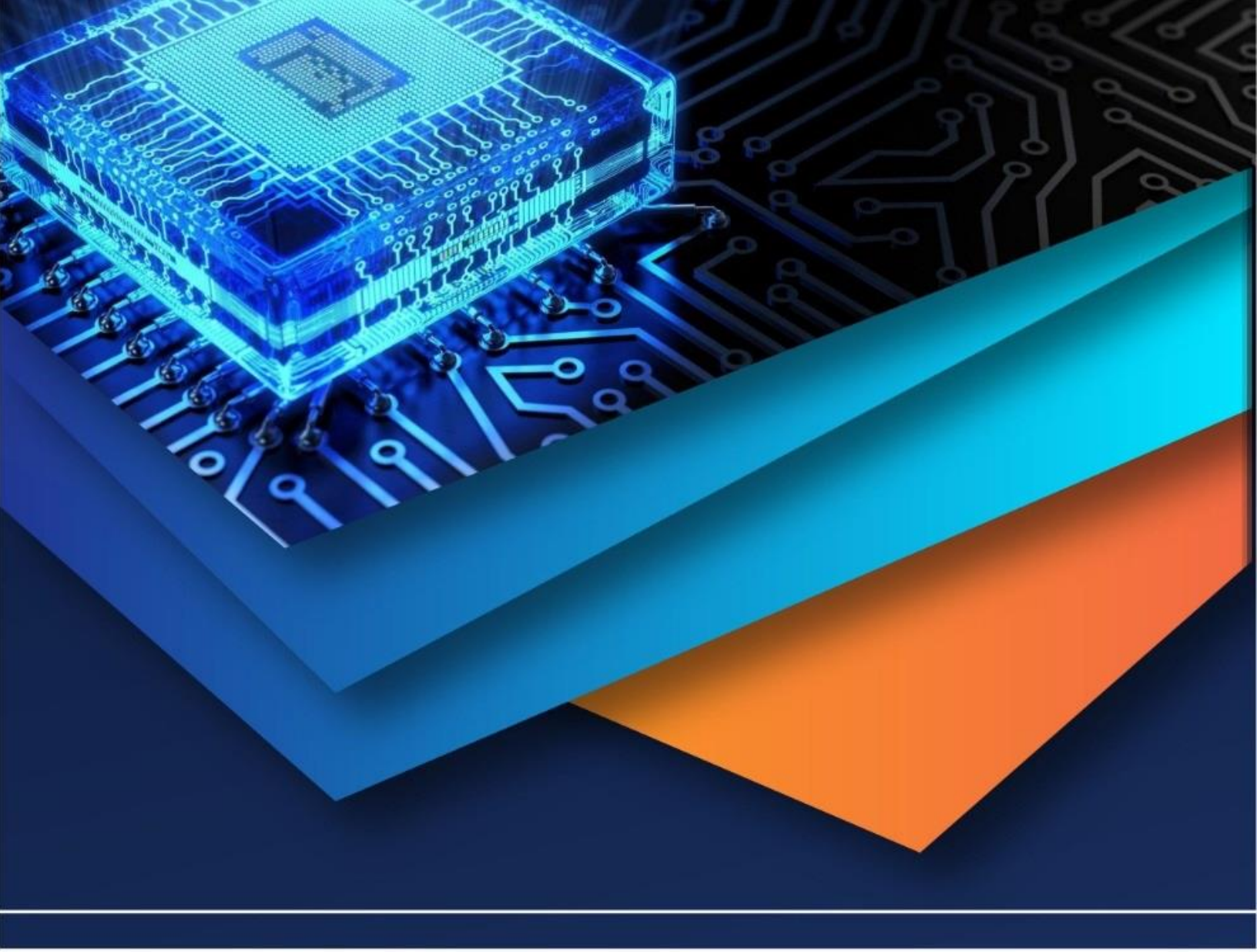
So the researchers can conclude through their research on the effect of the lockdown on the environment that, it has proved to be a boon for the environment during this epidemic lockdown and has improved the quality of the elements of the environment like air, water, noise. But this is expected to continue till the time of lockdown only. But we all should encourage each other to continue with good habits to reduce the degradation of the environment by following the rules lead down by the government.

This positive effect could be temporary on the environment, but from this lockdown, governments, and individuals can learn how to reduce long-term emissions.

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[10] ESA 2020.
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[12] ESA 2020.
[13] Citizen of America
[14] Citizen of Italy
[15] Central pollution control board
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[18] Manoj Mishra, convenor, Yamuna jiye Abhiyan

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