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Positive Effects of COVID-19 Lockdown on Air Quality in India

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Editorial

The novel coronavirus, dubbed COVID-19 by the World Health Organization (WHO), first appeared in Wuhan, China, in late December 2019. COVID-19 was declared a pandemic by the WHO in early March 2020, owing to its rapid spread. It had spread to over 210 countries by July 8, 2020, infecting over 11 million people and killing 539,026 people. Since COVID-19 is extremely contagious and has a high mortality rate, countries across the world have implemented a variety of precautionary steps, including large-scale COVID-19 screening tests, quarantine, social distancing, mask use, hand sanitization, and so on. This resulted in 2–4 weeks of regional lockdowns to contain the virus's spread, both of which have hampered economic activity around the world, resulting in a variety of regional ramifications.

The first COVID-19 positive case in India was recorded on January 30 in Kerala by a student who had returned from Wuhan, China. India took extraordinary steps to keep the virus from spreading across its borders and within its borders. On March 13, 2020, all international travel and non-essential travel visas were revoked. For the first time in the country's 167-year history, Indian railways ceased operations on March 23, 2020. From March 25 to April 14, a 21-day nationwide lockdown phase-1 was imposed, which was later extended until May 31, 2020. The lockdown was divided into stages, with increasing relaxations in socio-economic activities in less infected areas. The various COVID-19 lockdown phases in India are portrayed on a timeline.

Lockdowns in numerous countries, including France, Germany, Italy, Spain, and China, culminated in the shutdown of power plants, transportation, and other industries, resulting in dramatic reductions in GHGs, NO_2, PM-2.5, PM-10, and CO concentrations while simultaneously spiking ozone levels, mainly in Europe and major Chinese cities. The improvements in air quality over the Yangtze River Delta Region during COVID-19 lockdown indicate that decreased human activity and industrial activities result in substantial reductions in PM-2.5, NO_2, and SO_2.

During the COVID-19 lockdown time, the Hangzhou megacity saw a significant improvement in air quality, as evidenced by lower Particulate Matter, NO_x, SO_2, and CO levels. During the lockdown in the United States, lower NO_2 (49%) and CO (37%) concentrations were positively associated with higher population density. The effect of the steps on air quality in Rio de Janeiro, Brazil, is addressed by contrasting particulate matter, carbon monoxide, nitrogen dioxide, and ozone concentrations during the partial lockdown with those in the same timeframe of 2019 and also with those in the weeks leading up to the virus outbreak.

The concentrations of the three major primary air pollutants (PM-10, NO_2, and CO) in So Paulo and Rio de Janeiro, the two most populated cities, showed a positive effect of the social distancing steps, with the CO levels showing the most important reductions (up to 100 percent), which was attributed to light-duty vehicular emissions. Changes in the levels of certain air contaminants as a result of a series of fast and strict countermeasures restricting population mobility and banning almost all avoidable activities were assessed in Sale (North-Western Morocco).

To assess differences in air quality during the lockdown and one month before the lockdown, researchers used a remote sensing dataset provided by ESA's Tropospheric monitoring instrument (TROPOMI) along with local air quality monitoring results. Lockdown resulted in decreases of 31 percent and 51 percent in NO_2 and PM-2.5, respectively. The National Aeronautics and Space Administration (NASA) observed a drop of 10–30 percent in Nitrogen Dioxide (NO_2) in central and eastern China in early 2020 using the TROPOMI sensor. In the California basin area, there was a 27 percent reduction in nitrogen oxides concentrations compared to the previous five years, as well as non-uniform trends in O_3 concentrations during the lockdown. In Hangzhou, China, black carbon reduction has been observed as a result of the lockdown put on anthropogenic activities. PM-10 and PM-2.5 concentrations were reduced by 43% and 31%, respectively, while O_3 concentrations increased by 17% during the lockdown period and compared to previous 4-year values in different parts of India.

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