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Indirect effects of COVID-19 on environment with special reference to India.

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ABSTRACT:

The outbreak of the 2019 novel coronavirus disease (COVID-19) has raised questions about changes in subsequent effects on the environment.This research aims to show the positive and negative indirect effects of COVID-19 on the environment, particularly in the most affected cities such as Mumbai , New Delhi and Agra. Our research shows that there is a significant association between contingency measures and improvement in air quality, cleaning of water resources, reduction of Non Renewable resources and environmental noise reduction.On the other hand, there are also negative secondary aspects such as Increased medical waste, Poaching Increases, reduction in waste recycling, intense use of sanitizers and disinfectants, further endangering the contamination of physical spaces (water and land), in addition to air.

Keywords: SARS-CoV2, COVID-19 Pandemic, Environmental impact

Introduction:

The outbreak of COVID-19 has caused concerns globally. On late December 2019 in a hospital in Wuhan city, in China an unusual pneumonia was noticed with a link to an animal market that sells poultry,fish and other animals to the public (Xu et al., 2020) [1]. This event was soon reported to the World Health Organization (WHO). In a month (26 January), the causal microorganism had been identified as a novel coronavirus that was named COVID-19. On 30 January WHO has declared it as a global health emergency. The average incubation period is ranging from 0 to 24 days (Li et al., 2020 [2]; Zhou et al., 2020) [3]. The easy spread of this virus made people to wear a mask as precautionary route, use gloves and hand sanitizer and disinfectants on a daily basis that resulted in generation of a massive amount of medical wastes in the environment. Millions of people have been put on lockdown in order to reduce the transmission of the virus. All over the world,flights have been cancelled and transport system have been closed resulted in falling carbon emission. However, the lock down of the COVID-19 pandemic caused the air quality in many cities across the globe to improve and drop in water pollution in some parts of the world.

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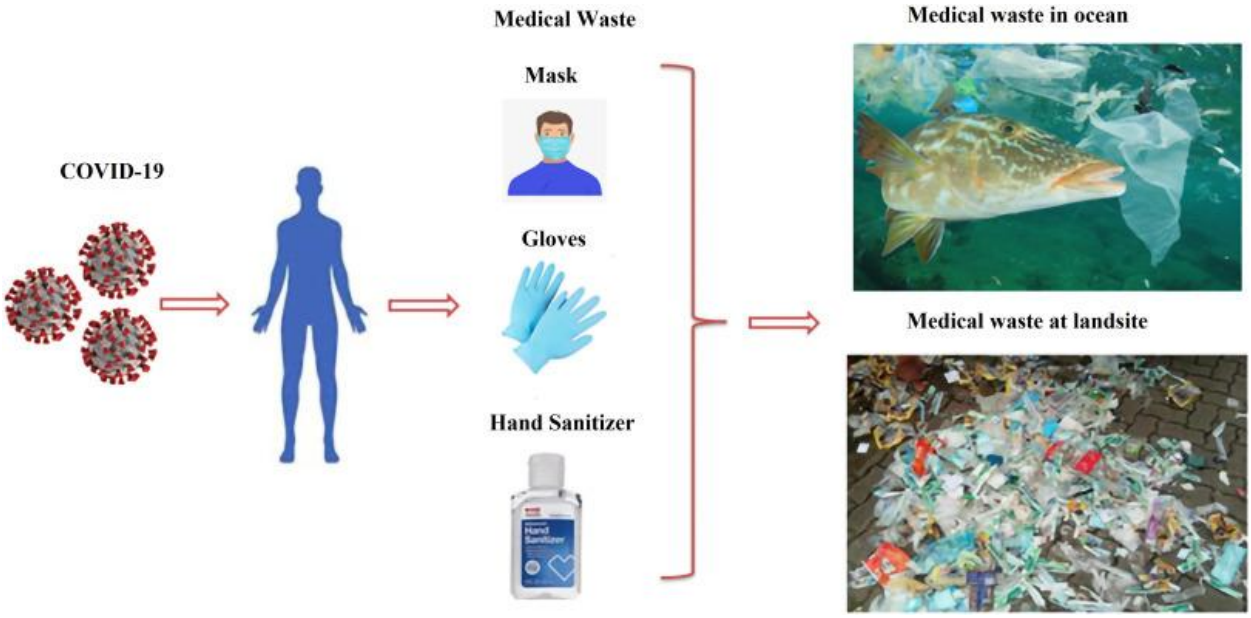

Fig. 1.Medical wastes generated during COVID-19 pandemic in the environment.

Saeida Saadat, DeepakRawtani, Chaudhery Mustansar Hussain,2020 [4]

REVIEW OF LITERATURE:

McCloskey and Heymann 2020 [5], examined that when the epidemic finally subside carbon and pollutant emissions get back then it would be as if this clear skied interlude never happened and the changes we see today will not have lasting impact.

Lau et al., 2020 [6], examined that this pandemic would ultimately save energy and also might have an effect on reducing the consumption of polluting fuels in power stations as the demand has been dropped.

Guo et al., 2017 [7]; Guo et al., 2019 [8],Examined that the particulate matter(PM), the most dominant pollutant, in major parts of India has major contributions from vehicles, residential, energy, industrial and dust.

Wang et al., 2020 [9], A simulation done in China showed that metrology played very important role in air pollution formation and severe air pollution was not avoided during the lockdown in January and February 2020.

Bedford et al., 2015 [10];Sooryanarain and Elankumaran, 2015 [11]; Lemaitre et al., 2019 [12], examined that Environmental factors can affect the epidemiological dynamics of many infectious

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diseases. In particular, several studies of climate and weather conditions found that these environmental factors affected the spatial distribution and timing of infections.

Kumar, 2020 [13],on the other side WHO declared that"the measures taken by India to break the communities spread of COVID-19 by the lockdown was very early, scientific and timely decision"

Sharma, 2020 [14], "The lockdown in India was quite early on, when there was relatively a small number of cases detected. This was really a far-sighted decision because it gave the whole country the opportunity to come to terms with the reality of this enemy. People understood that there is a virus in our midst. It gave time to develop capacities at the local level for interrupting transmission and sorting out hospitals. Of course, there is a lot of debate and criticism, and inevitably with a lot of frustration and anger that life is being disturbed in this way. It is very, very upsetting. I think it is courageous of the government, honestly, to take this step and provoke this enormous public debate and let the frustration come out, to accept that there will be hundreds of millions of people whose lives are being disrupted. For poor people on daily wages, this is a massive sacrifice they are making. And to do it now at an early stage as opposed to waiting three or four weeks later when the virus is much more widespread was very courageous."

Wright, 2020 [15], said the decision of 21 days national lockdown followed by another phase of lockdown up to 3rd May 2020 had also other scientific effects especially on protection of environment in the country. India currently is also experiencing the drastic reduction of pollution in many of its metro cities. As a result of lockdown and in some places complete shutdown in India (where the disease COVID-19 hit to make hot spots), air pollution was reduced to multi-folds. The reason was attributed to reduction in NO2 and CO2emission from fossil fuels from different sectors. The average nitrogen dioxide level in major cities such as Mumbai, Pune and Ahmedabad was reduced by 40–50% by March 2020 as compared to March 2019.

AIMS AND OBJECTIVES:

- **To find out the various Indirect effects (Positive and Negative) of COVID-19 on environment**

Positive Indirect Effects of COVID-19 on the environment:

➢ Decreased concentrations of NO_2 andAQI

Air quality is essential for people's health; however, 91% of the world population lives in places where poor air quality exceeds the permissible limits (WHO, 2016) [16]. In Greater Mumbai and Navi Mumbai, a trend has been observed as NO_2 levels from March 25 to May 2 averaged 77 µmol/m^2 compared to 117 µmol/m^2 from March 1 to March 24. In 2019, NO_2 levels from March 25 to May 2 averaged 122 µmol/m^2.(The System Of Air Quality Weather Forecasting and Research(SAFAR) under the Indian Institute of Tropical Meteorology, pune).In Delhi's metropolitan area, pollution levels have dropped most

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dramatically; NO_2 levels from March 25 (the day quarantine began) to May 2 have averaged 90 µmol/m^2 compared to 162 µmol/m^2 from March 1 to March 24. In 2019, NO_2 levels from March 25 to May 2 were also far above this year's levels, averaging 158 µmol/m^2 [17]. Delhi and NCR's air has become so much clean that people can behold stars at night due to the clean atmosphere. The current AQI (Air Quality Index) in Delhi is 60 for now, which is a remarkable achievement for the city that sees an AQI of about 600 in smoggy winter months.(The data from the Central Pollution Control Board (CPCB), part of India's Environment Ministry, was collated by the Centre for Research on Clean Air and Energy (CREA)).On the other side Agra, a trend has been observed as NO_2 levels from March 25 to May 2 averaged 41 µmol/m^2 compared to 20 µmol/m^2 from March 1 to March 24.

- **Cleaning of Water Resources: Sea Beaches and Sacred Rivers (The Ganga and The Yamuna)**

Beaches are one of the most important natural capital assets found in coastal areas (Zambrano-Monserrate et al., 2018) [18]. They provide services (land, sand, recreation, and tourism) that are critical to the survival of coastal communities and possess intrinsic values that must be protected from overexploitation (Lucrezi et al., 2016) [19]. However, non-responsible use by people has caused many beaches in the world to present pollution problems (Partelow et al., 2015) [20]. In India many beaches has been cleaned during the lockdown.On the other side, The Ganga and Yamuna rivers, the level of biochemical oxygen demand (BOD) sunk to 2.1 due to which the water of the rivers is looking clean and brighter. Industrial pollutants, that have been a major factor in polluting the river, are not being discarded into the water body these days due to the temporary closure of chemical industries.

Gandhiok, 2020 [21]**,** said that the sky of New Delhi was clearly visible than four months ago. Also the effects of lockdown were very clear on water bodies. Some of the river water bodies are found to exhibit never seen glittering scenery. The Yamuna River and its sky in New Delhi can be considered as an active example. Locals claimed that they have never seen such sparkling Yamuna river water and the blue sky canopy over it. It may be due to the shutdown of industries in New Delhi and lack of release of their effluents into it.

- **Non Renewable resources:**

One of the other effect of corona virus on environment is the noticeable drop in coal consumption. Coal is the primary source of power generation in the country (~71% in March 2020). During the lockdown period, the coal stock with coal power plants has seen an increase. As of April 19, total coal-stock with the power plants in the country (in days) has risen to 29 days as compared to 24 days on March 24. This indicates that the supply of coal has not been constrained during the lockdown, at least to the extent of meeting the requirements of power plants [22]. Diesel is the largest consumed liquid fuel in India and is primarily used in commercial vehicles, passenger vehicles, Indian Railways along with the agriculture and industrial sector. Consumption of diesel fell 24.23 per cent to 5,651 TMT in March 2020, as compared to the corresponding month a year ago. In March 2020 alone consumption of petroleum fell 18 per cent to 16,083 Thousand Tonne (TMT) as compared to the same month a year ago, fresh data sourced from the oil ministry showed [23].
This pandemic would ultimately save energy and also might have an effect on reducing the consumption of polluting fuels in power stations as the demand has been dropped in India.

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- **Reduction of environmental noise level:**

Environmental noise is defined as an unwanted sound that could be generated by anthropogenic activities (for instance, industrial or commercial activities), the transit of engine vehicles, and melodies at high volume. Environmental noise is one of the main sources of discomfort for the population and the environment, causing health problems and altering the natural conditions of the ecosystems (ZambranoMonserrate and Ruano, 2019) [24].

In industrial areas, the permissible limit is 75 dB for daytime and 70 dB at night. In commercial areas, it is 65 dB and 55 dB while in residential areas it is 55 dB and 45 dB during daytime and night respectively Permissible limit given by CPCB.

Negative indirect effects of COVID-19 on the environment:

- **Increased medical waste:**

The generation of organic and inorganic waste is indirectly accompanied by a wide range of environmental issues, such as soil erosion, deforestation, air, and water pollution (Mourad, 2016 [25]; Schanes et al., 2018) [26].

India generates about 550.9 tonnes of biomedical waste every day as per the data published in--Unearthing the Growth Curve and Necessities of Bio-Medical Waste Management in India, 2018.India is likely to generate about 775.5 tonnes of medical waste per day by 2022 from the current level of 550.9 tonnes daily, a study conducted jointly by industry body ASSOCHAM and Velocity has said [27].

- **Reduction in waste recycling:**

Waste recycling has always been a major environmental problem of interest to all countries (Liu et al., 2020) [28]. Recycling is a common and effective way to prevent pollution, save energy, and conserve natural resources (Varotto and Spagnolli, 2017 [29]; Ma et al., 2019 [30]). All these developments have created acute challenges for the waste management industry at a time when they are operating with limited capacity due to the coronavirus crisis. Many export-oriented producers produce volumes far too large for output to be absorbed in local markets, and thus organic waste levels have mounted substantially. Because this waste is left to decay, levels of methane (CH4) emissions, a greenhouse gas, from decaying produce are expected to rise sharply in the crisis and immediate post-crisis months. As exports of agricultural and fisheries products have declined, production levels have plummeted, causing unemployment levels in both sectors to grow substantially.

- **Poaching Increases:**

Natural ecosystems and protected species are at risk during the coronavirus crisis. In India, environmental protection workers at national parks and land and marine conservation zones are required to stay at home

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in lockdown, leaving these areas unmonitored. Their absence has resulted in a rise of illegal deforestation, fishing and wildlife hunting. The stoppage of ecotourism activity has also left natural ecosystems at risk of illegal harvesting and encroachment [31]. Exotic birds were captured and wild animals hunted as monitoring decreased and administrative officers were kept busy with running emergency services [32].

- **Intense Use of Sanitizers and Disinfectants:**

Disinfectants are potentially noxious/harmful substances which are used for disease control programmes. In fulfilling this role ,disinfectants may also have an adverse impact on the environment. All indoor ares such as entrance lobbies, corridoers and staircases are moped with a disinfectent with 1% sodium hypochlorite or phenolic disinfectants. Directly, it is causing many diseases (nerves, kidney, brain, lungs etc.) and indirectly it is affecting us by destroying ozone layer.

CONCLUSION:

In this study, we assessed the factors i.e. Positive and Negative Indirect Effects of COVID-19 on the environment , It is expected that the impacts of these factors could be even more or less effects the environment. the quality improvement of the beaches and the reduction of environmental noise were highlighted as positive indirect effects.On the other hand the increase in domestic and medical waste (such as contaminated masks, gloves, used or expired medications, and other items can easily be mixed with domestic waste) were mentioned as the indirect effects on environment. Through proper management of Bio-medical waste we can protect the environment.Now a days, due to worldwide lockdown, things are getting better. Ambient air pollution is decreasing significantly which is a good news. Many of the environmental challenges caused by the coronavirus crisis will gradually resolve on their own once the crisis comes to an end and previous levels of economic activity resume.

But it is also true that the benefits of air pollution reductions will also be erased. Overall, the crisis may thus have no permanent environmental effects.

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