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## Effects of Covid 19 on Environmental Pollution

Ekrem Güllüce<sup>1</sup>, Şahin Korkmaz<sup>1,\*</sup>

<sup>1</sup>Department of Environmental Engineering, Faculty of Engineering, Atatürk University, Erzurum, Turkey

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### Abstract

Humanity throughout the history of the world; has faced with many diseases and epidemics that adversely affect its own destiny and all the world's ecosystems. The Covid-19 virus, which emerged in Wuhan, China in the last months of 2019 and transmitted to many people with its high spreading rate, has become one of the largest and most common epidemic diseases worldwide in recent years. The virus, which started in China in a short time and then spread all over the world, affects human health in an extremely fatal way. During the emergence of the virus and the pandemic period around the world, many preventive measures have been taken. On the other hand, the Covid-19 virus has many effects on the environment and human health worldwide. This virus has many environmental effects as well as its deadly effects on human health. During the pandemic period, some important changes and developments are experienced in air pollution, water pollution, soil pollution, waste disposal, energy use, global warming and climate change, depending on the changing human needs and habits. Within the scope of this study, the environmental effects of the Covid-19 virus, which has fatal effects on public health were examined in detail with the help of relevant articles and resources. The effects of the virus on air pollution, water pollution and soil pollution were discussed. All these environmental pollution effects, use of soap and detergents, disposal of glove and mask wastes, energy use and changes in global warming were evaluated.

*Keywords:* Air pollution; Covid-19; Ecosystem; Soil pollution; Water pollution.

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### 1. Introduction

While humanity in the world continues its kind as a part of this planet, it has encountered many natural disasters, wars and epidemics throughout history. Especially the Plague epidemic that emerged in the late 11th century and the Spanish flu that started in the first half of the 1900s are among the most important and deadly epidemic diseases remembered in history. In addition to outbreaks such as malaria, rabies and typhoid, outbreaks such as Ebola, Sars, Mers, Coronavirus (Covid-19) have been seen in many regions around the world in recent years, infecting of many people and also causing the death of many people.

The Covid-19 virus, which emerged in Wuhan, China in the last months of 2019 and spread to many people first in China and then all over the world, has become one of the largest and most common epidemic diseases worldwide. Not only did it spread across China in a short time, but spread to many countries around the

world within a few months, the virus affects human health in an extremely fatal way [1].

Looking at the latest figures of the virus, which continues to spread rapidly, as of December 2021, more than 81 million cases have been reached in the world and more than 1.8 million people died from the Covid-19 outbreak [2].

It is possible to attribute the rapid spread of the virus worldwide to many reasons. Due to the high mobility of people around the world, not taking the necessary precautions quickly, not obeying the rules of hygiene and distance, water scarcity, crowded world population and crowded cities and the lack of a drug or treatment that provides effective destruction of virus, virus spreads increasing rapidly every day [3]. It still continues to spread rapidly in the USA, Europe, India and Africa. The World Health Organization (WHO) is also concerned about the danger and developments on the subject.

Since the first spread of the virus, countries have primarily applied curfew restrictions and distance rules to their people, while all economic and industrial activities have been stopped. In a process where such important decisions are made, the Covid-19 virus has many effects on public and environmental health.

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\* Correspondance: Şahin Korkmaz, Department of Environmental Engineering, Faculty of Engineering, Atatürk University, Erzurum, Turkey  
E-mail: [sahinkorkmaz25@gmail.com](mailto:sahinkorkmaz25@gmail.com)

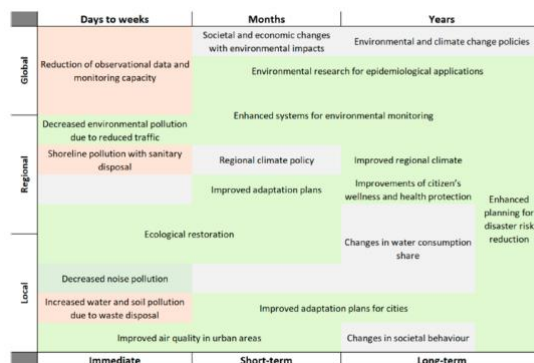
With the reduction of human activities, the reduction of anthropogenic damages to the environment means a decrease in environmental pollutants. With the sudden reduction of all processes and mobility, it is in question that air pollution, water pollution, soil pollution, the reduction of pollutants on the ecosystem of cities and the world ecosystem is less affected by anthropogenic pollution for a while. With the interruption of production and logistics processes worldwide and the decrease in human / material mobility, it reduces carbon emissions worldwide. In addition, the reduction in production and consumption processes also reduces the amount of solid, liquid and gas waste generated by industries. On the other hand, it should not be forgotten that some human activities during the pandemic process continue to have worldwide effects. With the increase of hygiene rules, the use of increasing amounts of disinfectants, soaps and detergents triggers a significant increase in contaminants in wastewater. With the use of personal hygiene in this process, water consumption increases. In particular, country governments carry out hygiene and cleaning operations by consuming plenty of disinfectants and cleaning products in cities and using abundant water. This causes a significant increase in water consumption. In addition, the use of cardboard, gloves and masks causes high levels of solid waste generation.

In the present article, the environmental effects of the Covid-19 virus, which has important effects on public health and the environment, have been searched in detail with the help of relevant articles and resources. The effects of Covid-19 virus on air pollution, water pollution and soil pollution were discussed. In addition, all environmental effects have been examined in detail. The disposal of glove and mask wastes, energy use and carbon emission changes in global warming were evaluated. The necessary measures regarding the environment against these environmental effects of the virus are listed.

## 2. Covid-19 Virus Effects on the Environmental Pollution

Many studies have been conducted on the effects of the Covid-19 virus on the environment [4-6]. The slowdown or even cessation of many industrial activities, the decrease in the intensity of vehicle movement, and the restriction of people's social activities have created many effects on the environment.

In this period, in which the Covid-19 virus continues its impact at full speed, its effects on the environment and human health continue in the short, medium and long term. Even if the virus is brought under control, its effects on the environment and human health will continue for a while. In Figure 1 shows the effects of these effects of the Covid-19 virus in the short, medium and long term [5].



**Figure 1.** Covid-19 virus on the environment, negative and positive effects in the short, medium and long term [5]

While discussing the effects of the Covid-19 virus on the environment, it would be more appropriate to address the issue under three main headings in terms of the environment. In the following section, the effects of Covid-19 on the environment are examined under three main headings air pollution, water pollution and soil pollution.

### 2.1. The effect of Covid-19 virus on air pollution

It reduces carbon emissions worldwide, with the reduction of production and logistics processes and human / material mobility worldwide. In addition, the reduction in production and consumption processes reduces the amount of gas waste generated by the industries. There are many studies on the subject and are ongoing [7-10]. In these studies, it is observed that the air pollutants of anthropogenic origin are reduced as a result of the reduced human activities (Figure 2).



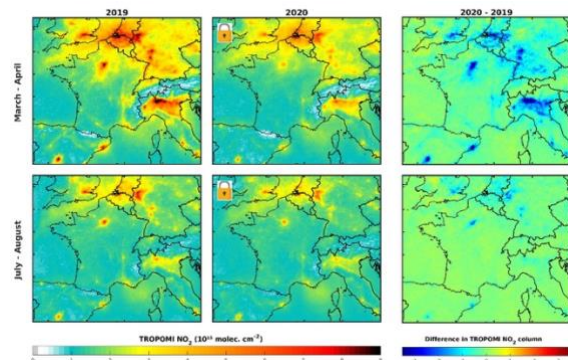
**Figure 2.** Comparison of air quality in some cities around the world before and after Covid-19 [7]

It has been determined that in areas where people's mobility is restricted, traffic-related air pollutants decrease and many air pollutants in the city have less effect. Many governments have imposed curfews and intercity transit restrictions, countries have closed border gates with neighboring countries, and all national and international flights have been stopped [11]. The worldwide decline of industrial activities has led to a reduction in air pollutants from factories. Kerimray et al. 2020 stated that during the 27 days quarantine period in Almaty, Kazakhstan, air pollutant concentrations decreased and air quality improved [12].

Mahato et al.2020 reported to positively affect the air quality in the quarantine process in Delhi, India [13]. Dantas et al. 2020 observed that Carbon monoxide (CO) emissions decreased by approximately 30.3-48.5% during the quarantine process in Rio de Janeiro, Brazil [14].

Conticini et al. 2020 reported that the amount of PM<sub>2.5</sub>, PM<sub>10</sub> and NO<sub>2</sub> emissions have decreased by 30% in Italy [8]. In another study, Wang et al. 2020 determined that fewer air pollutants are released into the world atmosphere due to the decrease in carbon, gas and diesel fuel use as a result of the decrease in logistics and industrial activities [15]. During the Covid-19 pandemic, according to NASA's satellite images, it is stated that NO<sub>2</sub> and SO<sub>2</sub> emissions decreased by 20-38% in Korea, China, Spain, Germany and the USA compared to the same periods of 2019 [16].

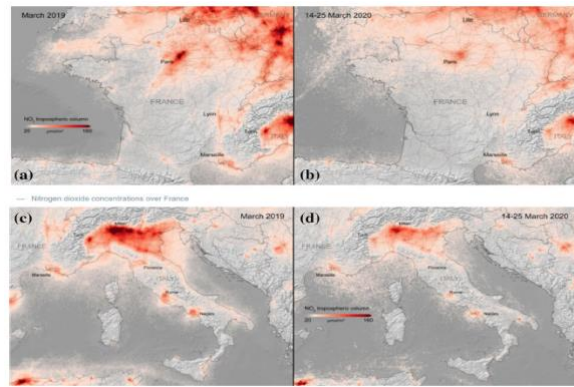
In addition, according to the latest data of the European Space Agency (ESA), it is observed that industrial air pollutants have decreased throughout the world during the Covid-19 pandemic. Particularly during the quarantine period in Europe around March-April, significant reductions in NO<sub>2</sub> levels were observed in densely populated and industrialized parts of Europe, including the Ruhr region in Germany and the Po Valley in Northern Italy [17]. The map prepared using data from the Copernicus Sentinel-5P satellite in China shows nitrogen dioxide concentrations (Figure 3) from 20 December 2019 to 16 March 2020.



**Figure 3.** NO<sub>2</sub> change in the European region [17]

The reason for the decrease in NO<sub>2</sub> concentrations in late January is due to the quarantine throughout the country. However, NO<sub>2</sub> concentrations have increased since March. In order to prevent the spread of the Covid-19 epidemic, it is stated that air pollution on Italy has decreased during the quarantine period throughout the country. It is stated that especially NO<sub>2</sub> concentrations (Figure 4) decreased in Italy during this period [18].

As can be seen in the relevant articles and studies, it is stated that during all this Covid-19, air quality in cities and industrial areas improved in general, traffic and linear emissions decreased due to the decrease in mobility / logistics, and accordingly, global carbon emission decreased with the decrease of human activities.



**Figure 4.** Change of NO<sub>2</sub> concentrations in France and Italy before (a, c) and after (b, d) the COVID19 pandemic period [18]

## 2.2. The effect of Covid-19 virus on water pollution

Although the world is surrounded by water, it is suitable to use only 1% of it with freshwater feature. Available water resources are decreasing due to the increase in population. With the increase of the population, the need for agriculture has emerged to meet the food of people. With the expansion of the fields of agriculture, the use of irrigation water has also expanded. Global warming is another factor that adversely affects usable water resources [19].

With the onset of the Covid-19 epidemic, people panicked and began to overuse cleaning products such as soap and detergents to protect themselves. The excessive use of these cleaning products leads to more pollution of the water. After soap and detergent are used, it reaches the wastewater treatment plant from the sewage. These wastewaters have been organic pollutants [20]. When soap and detergent wastewater are introduced into the receiving environment, foam formation, oxygen consumption after biodegradation, eutrophication and adverse effects on living organisms in water [21].

Personal hygiene is extremely important to struggle with the Covid-19 epidemic and hand cleaning is required for 20 seconds [22]. The amount of water consumed for hand washing in these 20 seconds is approximately 2 L. In a family of four that washes 10 times a day, 80 L of water will be consumed daily. This amount of water consumption is not very high in developed countries. However, this amount seems to be quite high for developing countries [23]. In addition to global warming, it is thought that available water resources will decrease during the covid-19 outbreak.

During the Covid 19 pandemic, vehicle movements and human activities have become stationary state. While the increasing industrialization in recent years has damaged the atmosphere, it has shown improvements in environmental areas with the pandemic period. In studies conducted in Lake Vembanad, India's longest fresh lake, it was observed that the value of suspended particulate matter (SMP) decreased and the water quality increased accordingly [24].



**Figure 5.** Glove and mask wastes thrown in the soil

### 2.3. The effect of Covid-19 virus on soil pollution

Covid-19 virus has an intense effect on soil and soil pollution as well as its effects on water and air. During the pandemic process, some protective materials and protective equipment are used worldwide to protect against the virus. These protective materials, which are used by the public except health personnel, can be thrown into the soil without being thrown into the necessary waste container after use. Therefore, gloves and masks, many cleaning products packages and many materials contaminated with viruses; It is thrown into the soil randomly and creates a large amount of solid waste. Some materials contaminated with the virus affect human health and allow the virus to spread faster. In addition, it has been observed that these solid wastes, which increase during the pandemic, negatively affect many living species and ecosystems.

During the pandemic, a large amount of medication was used throughout the world to overcome the disease. In addition to the effects of the use of these drugs on human health, their effects on the environment and ecosystem should be examined in detail. Especially these drugs pass into ecosystems as the last stop after use. In these ecological regions where many living things live, living things and their environment affect the entire ecosystem as strong, difficult to break down, even toxic chemicals [25]. In addition to, waste drugs many healthcare materials used by healthcare workers and field workers in order to effectively combat the virus, overalls, shields, mask and glove waste and medical waste also cause significant waste [26,27]. During the pandemic period, people stayed at their homes and made online shopping in order to meet their necessary needs. With the packaging of products purchased through online shopping, the amount of cardboard, plastic and packaging products increased (Figure 5).

### 3. Conclusions

The Covid-19 virus, which first appeared in Wuhan, China at the end of 2019 in the world, then spread to the whole world after China, infected many people and killed many people, has significant effects on public health and environment. With the virus becoming effective all over the world, all human activities decreased, curfews were imposed by restricting all human mobility, industrial activities production processes were stopped and all logistics movements were reduced. The slowing down and stopping of many industrial activities, the decrease in the intensity of

vehicle movement, and the restriction of human activities have effects on the environment. In addition, reduction of human mobility and production processes contributes to the reduction of global warming by reducing carbon emissions due to the reduction of energy consumption, while the renewal of ecosystems, seas and oceans, and reduction of pollution pressure. In addition, some increasing solid wastes, liquid wastes and increasing water consumption are the most important environmental pollution effects.

The excessive use of cleaning products such as soap and detergents for personal hygiene in order to protect against Covid-19 virus causes more pollution of the water. When soap and detergent wastewater is introduced into the receiving environment, it causes many problems such as foam formation, oxygen consumption after biodegradation, eutrophication. Effective treatment of these pollutants, not mixing disinfectant products with water, and reducing water use as much as possible can be listed as measures and recommendations to be taken against the effects of Covid-19 virus on water pollution.

The reduction of the production processes of industrial activities worldwide has led to the reduction of air pollutants. Reduced production and logistics processes, factory stoppages, and reduced human / material mobility (traffic reduction) reduce particulate matter and gas pollutants worldwide. In satellite imaging studies and other air pollution studies, it has been observed that air pollutants decrease in cities and industrial areas worldwide during the pandemic period.

Protectors such as gloves and masks, many cleaning products packages and many materials contaminated with the virus are randomly thrown into the soil, creating a large amount of solid waste. Hazardous medical solid wastes generated in the healthcare area must be disposed of with the necessary methods. Solid wastes generated as a result of logistics and packaging should be recycled. If recycling is not possible, disposal is possible. Glove and mask wastes should not be thrown into the streets, parks, seaside and sea, but should be collected and disposed of glove and mask collection containers.

As a result, the environmental effects were reflected during the covid-19 pandemic. From the past to this time, many epidemics have been effective in the world and the struggle against these diseases has come to an end. Covid-19 epidemic disease will surely end one day. However, its effects on the environment will continue for many years.

### Conflict of Interest

The authors declare no conflict of interest.

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