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Indirect effects of COVID-19 on the environment

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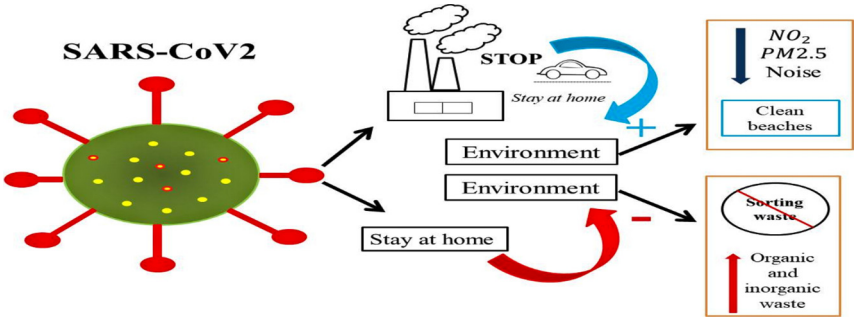
HIGHLIGHTS

- Positive and negative indirect effects of COVID-19 on the environment are presented.
- Contingency policies are linked to improvements in air quality, clean beaches and less environmental noise.
- Increased waste and the reduction of recycling are negative side effects of COVID-19.
- Decreasing GHGs during a short period is not a sustainable way to clean up our environment.

GRAPHICAL ABSTRACT



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ABSTRACT

This research aims to show the positive and negative indirect effects of COVID-19 on the environment, particularly in the most affected countries such as China, USA, Italy, and Spain. Our research shows that there is a significant association between contingency measures and improvement in air quality, clean beaches and environmental noise reduction. On the other hand, there are also negative secondary aspects such as the reduction in recycling and the increase in waste, further endangering the contamination of physical spaces (water and land), in addition to air. Global economic activity is expected to return in the coming months in most countries (even if slowly), so decreasing GHG concentrations during a short period is not a sustainable way to clean up our environment.

1. Introduction

The new coronavirus (SARS-CoV2) has generated an unprecedented impact in most countries of the world. The virus has affected almost every country on the planet (213 in total), spread to more than 2 million people, and caused around 130,000 deaths (WHO, 2020a).

Currently, most countries have tried to fight the spread of the virus with massive COVID-19 screening tests and establishing public policies of social distancing. It is clear that the priority revolves around people's health.

For this reason, the indirect impact of the virus on the environment has been little analyzed. The first studies estimated a positive indirect impact on the environment. On the one hand, climate experts predict that greenhouse gas (GHG) emissions could drop to proportions never before seen since World War II (*Global Carbon Project*, 2020). This outcome is mainly due to the social distancing policies adopted by the governments following the appearance of the pandemic.

For example, in Hubei province (China), strong social distancing measures were implemented in late 2019. These measures affected

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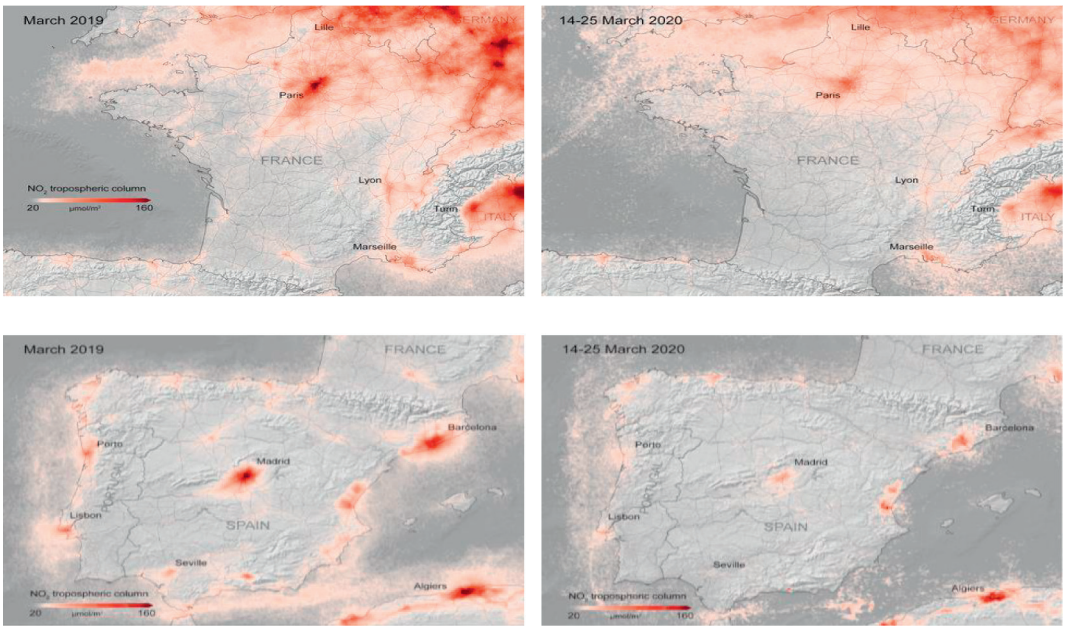

Fig. 2. Evolution of NO_2 concentrations in some regions of Europe.
Source: ESA (2020b).

transportation has decreased significantly. Also, commercial activities have stopped almost entirely. All these changes have caused the noise level to drop considerably in most cities in the world.

2.4. Increased 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; Schanes et al., 2018).

The quarantine policies, established in most countries, have led consumers to increase their demand for online shopping for home delivery. Consequently, organic waste generated by households has increased. Also, food purchased online is shipped packed, so inorganic waste has also increased.

Medical waste is also on the rise. Hospitals in Wuhan produced an average of 240 metric tons of medical waste per day during the outbreak, compared to their previous average of fewer than 50 tons. In other countries such as the USA, there has been an increase in garbage from personal protective equipment such as masks and gloves (Calma, 2020).

2.5. Reduction in waste recycling

Waste recycling has always been a major environmental problem of interest to all countries (Liu et al., 2020). Recycling is a common and effective way to prevent pollution, save energy, and conserve natural resources (Varotto and Spagnolli, 2017; Ma et al., 2019). As a result of the pandemic, countries such as the USA have stopped recycling programs in some of their cities, as authorities have been concerned about the risk of COVID-19 spreading in recycling centers. In particularly affected European countries, waste management has been restricted. For example, Italy has prohibited infected residents from sorting their waste.

Also, the industry has seized the opportunity to repeal disposable bag bans, even though single-use plastic can still harbor viruses and bacteria (Bir, 2020).

2.6. Other indirect effects on the environment

China has asked wastewater treatment plants to strengthen their disinfection routines (mainly through increased use of chlorine) to prevent the new coronavirus from spreading through the wastewater. However, there is no evidence on the survival of the SARS-CoV2 virus in drinking water or wastewater (WHO, 2020b). On the contrary, the excess of chlorine in the water could generate harmful effects on people's health (Koivusalo and Vartiainen, 1997).

3. Discussion

This research aims to expose the first indirect effects that the new coronavirus has had on the environment. The positive and negative indirect effects are highlighted. The positive indirect effects revolve around the reduction of PM 2.5 and NO_2 concentrations in China, France, Germany, Spain, and Italy. Precisely the high concentrations of these gases are one of the greatest environmental problems of developed countries (Sharma and Dhar, 2018). Also, the quality improvement of the beaches and the reduction of environmental noise were highlighted as positive indirect effects. On the other hand, among the negative indirect effects, the increase in domestic and medical waste were mentioned. The restriction to recycle waste in countries like the USA and Italy has been another negative indirect effect of SARS-CoV2.

It is essential to mention that although the emissions of some GHGs have decreased as a result of the pandemic, this reduction could have little impact on the total concentrations of GHGs that have accumulated in the atmosphere for decades. For a significant decline, there should be a long-term structural change in the countries' economies. This result can be achieved through the ratification of the environmental commitments made. Furthermore, the decrease in GHG emissions currently observed in some countries is only temporary. Since once the pandemic ends, countries will most likely revive their economies, and GHG emissions will skyrocket again.

On the other hand, the safe management of domestic waste could be critical during the COVID-19 emergency. Medical waste such as contaminated masks, gloves, used or expired medications, and other items can