Impact of COVID-19 on environmental ecosystem

Muhammad Aqeel Ashraf1,2 · Muhammad Faheem1 · Muhammad Azher Hassan3

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Introduction

During the first two weeks of December 2019, a cluster of pneumonia cases started to appear in Wuhan, China. A total of 482,914 people are expected to have died from the outbreak by June 25, 2020 (Irwansyah et al. 2020). The governments of the majority of the countries in which the virus is present instituted movement restrictions to slow the spread of the virus and decrease the death toll. During this time, except for emergency services (e.g., medical, fire, police, food supply, and so on), all other organizations are closed to encourage the general public to remain at home. Most public transportation services (such as buses, trucks, trains, and airplanes) were halted except for the distribution of vital resources and emergency services. The worldwide socio-economic disruption caused by the pandemic led to improved air and water quality, reduction of noise, and recovery of ecosystems (Ashraf and Faheem 2020a; Somani et al. 2020). As a result, this study intended to look into the environmental advantages and disadvantages of the COVID-19 pandemic and to suggest measures for environmental sustainability that could be implemented in the future.

The COVID-19 has caused global disruption as well as climate change. Air quality has improved in many cities because of the reduction in water pollution, which was achieved because of movement restrictions and slowdowns in social and economic activities. Additional concerns include the use of personal protective equipment (e.g., face mask, and gloves), the careless disposal of which, as well as the generation of a large amount of hospital waste, all having negative environmental impacts (Singh et al. 2020). The pandemic affects human lives and the global economy, either directly or indirectly, which ultimately affects the environment and climate. The positive and negative impacts of COVID-19 on the environment and potential strategies of sustainability have been discussed here and presented in Fig. 1.

Positive environmental impacts

From the shutdown of various industries, businesses, and transportation, the sudden drop in greenhouse gas emissions has occurred. Vehicles and airplanes are generally considered to be important sources of emissions in the transportation sector, and each contributes over 72% and 11% of the transportation sector’s total GHG emissions (Henriques 2020). Domestic and industrial wastes are dumped into rivers without treatment, resulting in water pollution being common in developing countries like India, Pakistan, and Bangladesh. Major industrial sources of pollution have either decreased or stopped during the lockdown period, thus helping to reduce pollution load (Yunus et al. 2020). Due to a ban on public gatherings, many tourist destinations and water activities experienced a decrease in the number of visitors. Reductions in industrial water consumption are seen in most sectors of the global textile industry.

In addition, noise pollution is also the high sound levels, caused by various human activities (e.g., machinery, cars, and building works), which may result in adverse effects on humans and other living organisms. Noise, more commonly than we realize, causes health problems. It can cause cardiovascular disease, hypertension, and sleep disturbance in humans. People were required to stay home and were restricted in their commercial and communication activities, which lowered the noise level in most cities. Overall, COVID-19 lockout and decreases in business activity
lowered noise pollution around the world and offer an opportunity to enjoy birds chirping that is usually 40–50 dB (Gandhiok and Ibrar 2020). The outbreak of COVID-19 and other local restrictions have contributed to a reduction in the number of tourists who visit tourist spots around the world. Many visitors inadvertently deposit a variety of unwanted garbage that impairs the environment and creates an ecological imbalance.

**Negative environmental impacts** COVID-19 outbreak has caused an explosion in the amount of medical waste, making it a severe concern to public health and the environment. Hospitals produce a significant amount of infectious and biomedical waste every day during the outbreak, whereas before the pandemic, the level of waste production was much lower (Saadat et al. 2020). In addition to a sudden rise in hazardous waste, it has become a significant challenge for the local waste management authorities to keep up with their proper management. The waste generated in hospitals should therefore be managed properly to reduce further infection and pollution of the environment, which is currently a global concern.

Increasing municipal waste generation (both organic and inorganic portion) has direct and indirect environmental consequences such as air, water, and soil pollution. The quarantine rules worldwide have led to a growing need for domestic internet shopping, which eventually increases the amount of domestic waste from the products supplied. Overall, municipal garbage, waste recycling, and waste management routines have been disrupted, and waste and environmental pollutants have increased worldwide. Additionally, recently, an enormous amount of disinfectants has been used to kill the COVID-19 virus on roads, commercial, and residential properties. Such extensive use of disinfectants may result in an ecological imbalance, especially if it kills non-targeted species that contribute to overall ecosystem health (Islam and Bhuiyan 2016).

Potential environmental management strategies must be adopted. As a result, some possible approaches to global environmental sustainability are discussed below. These include environmentally friendly industrialization, the use of renewable energy sources, the promotion of public transportation rather than personal automobiles, waste recycling and reuse, wastewater recycling and reuse, ecological restoration and ecotourism, and environmental restoration and conservation (Ashraf and Faheem 2020b; Jones and Faheem 2020; Rume and Islam 2020).

**References**

Ashraf MA, Faheem M (2020a) Environmental toxicology and biogeochemistry of ecosystems. Environ Sci Pollut Res 27:37173–37175

Ashraf MA, Faheem M (2020b) Green technology: a step towards clean environment. Asia Pac J Chem Eng

Gandhiok J, Ibrar M (2020) Covid-19: noise pollution falls as lockdown rings in sound of silence. Times of India

Henriques M (2020) Will Covid-19 have a lasting impact on the environment. BBC News, London

Irwansyah E, Budiharto W, Widhyatmoko D, Istamar A, Panghurian FP (2020) Monitoring coronavirus COVID-19/SARS-CoV-2 pandemic using GIS dashboard: international and Indonesia context.

Islam SD-U, Bhuiyan MAH (2016) Impact scenarios of shrimp farming in coastal region of Bangladesh: an approach of an ecological model for sustainable management. Aquacult Int 24:1163–1190

Jones D, Faheem M (2020) Geology ecology and landscapes. Geol Ecol Landsc 1–2

Rume T, Islam SD-U (2020) Environmental effects of COVID-19 pandemic and potential strategies of sustainability. Heliyon e04965

Saadat S, Rawtani D, Hussain CM (2020) Environmental perspective of COVID-19. Sci Total Environ 138870

Singh N, Tang Y, Ogunseitan OA (2020) Environmentally sustainable management of used personal protective equipment. Environ Sci Technol 54:8500–8502

Somani M, Srivastava AN, Gummadivalli SK, Sharma A (2020) Indirect implications of COVID-19 towards sustainable environment: an investigation in Indian context. Bioresour Technol Rep 11:100491
Yunus AP, Masago Y, Hijioka Y (2020) COVID-19 and surface water quality: improved lake water quality during the lockdown. Sci Total Environ 731:139012

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Professor Dr. Muhammad Aqeel Ashraf is currently working as Professor at School of Environmental Studies, China University of Geosciences, China and Visiting Professor at College of Agriculture, Henan Agriculture University, China. Dr. Muhammad Aqeel Ashraf is a prominent scientist in the field and has published more than 300 research articles in the web of science journals.

Engr. Dr. Muhammad Faheem has completed his Ph.D. as a distinguished scholar in Environmental Sciences and Engineering from China University of Geosciences, Wuhan, in 2020. Previously, he has completed his M.Sc. (Hons.) from the School of Environmental and Biological Engineering, Nanjing University of Science and Technology, Nanjing, China, in 2017. During his master and doctoral training period (2014–2020), his research was mainly focused on the valorization of different sector-generated wastes to convert them into adsorbents and catalysts having a potential application for the sake of wastewater purification or restoration. Engr. Dr. Faheem has published over 25 peer-reviewed papers in high-impact journals and a book chapter. Currently, his research interest is the development of value-added products from various sectors generated wastes after being subjected to physical, chemical, and biological treatments.

Mr. Muhammad Azher Hassan is currently pursuing a Ph.D. in Environmental Engineering from Tianjin University. Previously, he has completed his MPhil from the School of Space and Environment, Beihang University, Beijing, China. During his master and doctoral training period, his research was mainly focused on modeling and computing air quality-related issues. His research interest includes tropospheric ozone, particulate matters, the chemical life cycle of ozone and its precursors, and air pollution modeling and simulation. He got excellent hands on environmental safety and public health management and has a problem-solving attitude. Mr. Muhammad Azher Hassan has published over 10 peer-reviewed papers in high-impact journals and few book chapters.