INTI JOURNAL | eISSN:2600-7320
Vol.2021:08

COVID-19 Pandemic- A Review of the Effects on the Environment

Selvina A/P Sandiawo, Ong Ghim Hock, Cheng Wan Hee*, Wong Ling Shing

Faculty of Health and Life Sciences, INTI International University,
Persiaran Perdana BBN, Putra Nilai,
71800 Nilai, Negeri Sembilan,
Malaysia

Email: wanghee.cheng@newinti.edu.my

Abstract

The scourge of the coronavirus diseases-2019 (COVID-19) has caused suffering to human population globally. It is one of the most devastating pandemic in history. With the current lockdown and restriction, there is a concern that this bleak period might spark an even more severe pollution and climate changes once this is over. This paper reviews the effects of post COVID-19 in the environmental perspective. Activities such as agriculture and urbanization has brought about the various input of pollutants into the natural ecosystem of Malaysia. In recent years it has been reported on the rise of the levels of harmful pollutants such as pesticides, heavy metals and hydrocarbons. Therefore, continuous monitoring and remediation researches has been carried out to curb the detrimental effects of pollutants in the natural environments of Malaysia. In this study, we discuss the status, impacts and sources of pollutions globally. It is hoped that the current review will provide a better picture of the current pollution status and to further aid to mitigate the pollution issues we are facing.

Keywords

COVID-19 pandemic, environmental effects, coronavirus

Introduction

The year 2019 has marks one of the most devastating event in the course of history – the outbreak of the global pandemic, coronavirus disease-2019 (COVID-2019) (WHO, 2020). The COVID-19 virus, first detected in Wuhan, also known as SARS-CoV-2 revealed a genomic analysis of being phylogenetically related with SARS virus and bats (Chakrborty & Maity, 2020). The SAR-CoV-2 virus is known as an infectious pathogen causing diseases leading to severe acute respiratory syndrome, cardiac injury, and even death (Rume & Islam, 2020; Islam et al., 2020; Nghiem et al., 2020; Wang et al., 2020; Holshue, 2020).

The mode of transmission of SAR-Cov-2 is via direct contact or inhalation of water droplets discharge from COVID patients (Islam et al., 2020; Li et al., 2020; Wang et al., 2020). Furthermore, as reported by WHO, 216 countries were affected with alarming figure of 876,616 of deaths. Hence, to control the rate of infections and death by government authorities from different countries had enforced movement control order (Rume & Islam, 2020) and lockdowns (Praveena & Aris, 2021). In conclusion, the pandemic has led to both advantages and disadvantages towards the environment. The massive convulsion in global-socio-

Submission: 27 October 2021; **Acceptance:** 29 October 2021

economic, in which directly or indirectly ameliorates the environment by improving the quality of air and water, reduce in noise pollution and reclamation of ecology (Chakraborty & Maity, 2020; Somani et al., 2020; Saadat et al., 2020). On the other hand, an increase in environmental waste particularly in the medical sector from excessive usage of personal protective equipment (PPE) such as medical gloves, medical gowns, goggles, face shield, face mask and desultory waste ensued (Fadare & Okoffo, 2020; Nghiem et al., 2020; Singh et al., 2020). In particular circumstances, a study was conducted to examine the environmental consequences due to the pandemic.

Methodology

This review is based on a compilation of data on the effect of COVID-19 virus on different countries on the environmental perspective. Keywords such as COVID-19, pandemic impact to the environment, post- and pre-pandemic effects were used during the search on the Internet. Data from various studies were acquired via literature databases such as ScienceDirect, Google Scholar, Research Gate and PubMed.

Results and Discussion

Several effects have emerged on the environment attributing to the COVID-19 pandemic. While improvements were seen in various aspects of the environmental quality, negative impacts were observed in the management of medical waste. The positive and negative impacts are discussed in the following section.

Positive Effects

Air quality

The transportation and manufacturing industries had decreased or stopped operating due to the pandemic have resulted a significant decline in the emission of greenhouse gases (Rume & Islam, 2020). It has been reported worldwide on a decrease in air pollution (Praveena and Aris, 2021). Dangerous emissions from the industry and vehicles such as nitrogen dioxide gas (NO_2), carbon monoxide gas (CO) and particulate matters (PM_{25}) have decreased within a range of 25-70% in Asia, Europe, and America (Biswal et al., 2020; Ghosh, 2020; Saadat et al., 2020; Somani et al., 2020; Zambrano-Monserrate et al., 2020; Praveena and Aris, 2021). It is evident that decrease in the consumption of fossil fuel has significantly reduced the emission of greenhouse gases (GHGs), in which aids in combating the global climate changes (Rume & Islam, 2020). Besides that, the lock down period during the pandemic has resulted in a significant drop in coal consumption, which is a primary source of greenhouse gas due to the less energy demands by consumers.

Water quality

Water pollution has always been a major environmental issue various developed or developing countries in the twenty-first century (Schwarzenbach, 2010). These are attributed to extensive disposal of industrial waste to the water resources without proper treatments (Bodrud-Doza et al., 2020; Yunus et al., 2020). The substantive manufacturing non-essential industries have discontinued their operations widely; hence there was a significant reduction in the disposal of waste sources and on the water pollution rate (Yunus et al., 2020). They, Yunus et al. (2020), have observed a notably reduction of suspended particulate matter by 15.9 % post-lockdown

period. Singhal and Matto (2020) also reported an improvement of water sources in Ganga and Yamuna rivers due to the temporary cessation of industrial operations in India during the pandemic. This is mainly due to the water disposal from the sewage and industrial effluent plummeted drastically (Singhal & Matto, 2020; Somani et al., 2020).

To conclude, several reporting has deduced the COVID -19 lockdown in several countries have helped to curb water pollution issues. Clearer water quality were observed in the grand canal of Italy with rematerializing of several aquatic species (Clifford, 2020) while countries in the South East Asia regions were reported with a significant increase in the purity level of water and decrease in water pollution rate (Rahman, 2020; Jribi et al., 2020; Praveena & Aris, 2021). In addition to that, Malaysia was reported to experience improvement in river water quality index (Praveena & Aris, 2021). Hence, COVID-19 pandemic does result in a positive impact towards the environment.

Noise

Noise pollution is an increase in the degree of sound, measured in dB units, resulting in adverse side effects in living organisms (Caraka et al., 2021). Undoubtedly, the pandemic measures have reduced the level of noise pollution due to decline in the economic pursuit and communication worldwide in most of the cities and countries (Zambrano-Monserrate et al., 2020). For instance, report showed a significant reduction up to 40% - 50% in noise level in New Delhi due to the restriction movement order (Somani et al., 2020). Basu et al. (2021) reported significant reduction in noise from 12 sound stations in Dublin due to reduced traffic and air activities during the lockdown period. Hence, decrease in the economic activities globally due to the COVID-19 outbreak had resulted in a massive dwindle in noise pollution (Rume & Islam, 2020).

Negative Effects

Waste generation and management

The COVID-19 pandemic has resulted in a massive global disruption in which effects human health and environment. Especially the generation of waste materials from medical and municipal sources had significantly spiralled globally in which resulted in a major threat towards the environment (Rume & Islam, 2020; Maalouf & Maalouf, 2021). A data was recorded a spike of 370% increment of waste material in Hubei Province China (Klemeš et al., 2020; Maalouf & Maalouf, 2021) while from Wuhan, China were estimated to produce more than 240 metric tons of medical waste per day during the outbreak compared to 50 metric tons on ordinary period (Saadat et al., 2020). India was reported to generate 570 tonnes of waste from various sectors of the medical departments and it is estimated to have increased by six fold as compared to the amount before the pandemic (Kothari et al., 2021). In South east Asia, are observed with similar incline in the production of biomedical waste ranging from 154-280 m tonnes each day compared to the usual times (Rume & Islam, 2020). Such circumstances had made a huge hurdle among the waste management authorities, as stringent and excessive waste treatment are required before disposal (Rume & Islam, 2020).

The repercussion of the COVID-19 pandemic expands towards the pattern of municipal waste generation bringing grave effects to the environment (Maalouf & Maalouf, 2021). One of the most distinct changes is the increase of online shopping due to the lockdown in many countries resulting in household waste from shipped plastic packages (Somani et al., 2020; Zambrano-Monserrate et al., 2020). Praveena and Aris (2021) have attributed the rise of plastic waste in South East Asia to the increased usage of plastic based materials used in packaging

and delivery services. On top of that, the public were instructed to wear facemask, hand gloves and safety equipment for front liners to curb the spreading of COVID-19 virus, in which directly increases the quantity of healthcare waste (Rume & Islam, 2020). Furthermore, a study reported by Fadare and Okoffo (2020) that facemask and plastic based protective equipment are the potential source of microplastic fibres in environment. Global plastic wastes accumulation have soared to an approximate figure of 1.6 million tonnes per day globally with an expected daily disposal of 3.4 billion single-use face masks and shields (Yousefi et al. 2021). Various studies showed recycling techniques are effective methods to inhibit pollution, save energy and conserve natural resources, however due to lockdown many states delayed waste recycling programs to reduce the rate of transmission of COVID-19 viral infection (Rume & Islam, 2020).

Biodiversity

The COVID-19 rate of transmission is accelerating and effecting human health severely. However, the negative impact does not only pressurize human life but also the global biodiversity of species (Kumar et al., 2020). The drop of visitors on natural ecosystem had significantly reduced the stress level on wildlife species however this is not resulted in long term as potential threats on the conservation of biology are observed after the COVID-19 pandemic (Kumar et al., 2020). Despite the decline in human activities, GHGs emissions and environmental pollutions benefiting the nature however, forest sector was believed to be a primary source on the development of economics after the COVID-19 crisis (Corlett et al., 2020). As forestry sources are used to produce essential products such as hygiene and sanitary items, respiratory papers, papers and biomass for heating in the generation of energy. Hence, this would lead to excessive use of natura products in which able to disrupt a balance biodiversity (Muhammad et al., 2020).

Conclusion

The COVID-19 pandemic is affecting human lives and global economics severely. However, after reaching the post pandemic situation we are required to uptake effective methods to strengthen our environment state and to save our globe from any imbalance environmental changes. For instance, bioremediation and waste managements should be encouraged to maintain the well-being of the environment as a post pandemic measure. Plastic usage should be controlled or replaced with more biodegradable materials. Hence, people should work together to combat threats to humankind.

References

Basu, B., Murphy, E.,, Molter, A., Basu, A.S., Sannigrahi, S., Belmonte, M., Pilla, M. (2021). Investrigating changes in noise pollution due to the COVID-19 lockdown: The case of Dublin, Ireland. *Sustainabile Cities and Society*, 65: 102597.

Biswal, A., Singh, T., Singh, V., Ravindra, K., Mor, S. (2020). COVID-19 lockdown and its impact on tropospheric NO_2 concentrations over India using satellite-based data. *Heliyon*, 6:e04764.

Bodrud-Doza, M., Islam, S.M.D., Rume, T., Quraishi, S.B., Rahman, M.S., Bhuiyan, M.A.H., (2020). Groundwater quality and human health risk assessment for safe and sustainable water supply of Dhaka City dwellers in Bangladesh. Groundwater for Sustainable Development, 10: 100374.

Caraka, R.E., Yusra, Y., Toharudin, T., Chen, RC., Basyuni, M., Juned, V., Gio, P.U., Pardamean, B. (2021). Did noise pollution really improve during COVID-19? Evidence from Taiwan. *Sustainability*, 13: 5946.

Chakraborty, I., Maity, P., (2020). COVID-19 outbreak: migration, effects on society, global environment and prevention. *Science of the Total Environment*, 728: 138882.

Clifford, C. (2020). The water in Venice, Italy's canals is running clear amid the COVID-19 lockdown. https://www.cnbc.com/2020/03/18/photos-water-in-venice-italys-cana ls-clear-amid-covid-19-lockdown.html. (Accessed 17 April 2020).

Corlett, R.T., Primack, R.B., Devictor, V., Maas, B., Goswami, V.R., Bates, A.E. (2020). Impacts of the coronavirus pandemic on biodiversity conservation. *Biological Conservation*, 246: 108571.

Fadare, O.O., Okoffo, E.D. (2020). Covid-19 face masks: a potential source of microplastic fibers in the environment. *Science of the Total Environment*, 737: 140279.

Ghosh, I. (2020). The emissions impact of coronavirus lockdowns, as shown by satellites. https://www.visualcapitalist.com/coronavirus-lockdowns-emissions/. (Accessed 13 April 2020)

Holshue, M.L. (2020). First case of 2019 novel coronavirus in the United States. *The New England Journal of Medicine*, 382: 929–936.

Islam, S.M.D., Bodrud-Doza, M., Khan, R.M., Haque, M.A., Mamun, M.A. (2020). Exploring COVID-19 stress and its factors in Bangladesh: a perception-based study. *Heliyon*, 6(7): e04399

Jribi, S., Ismail, H. B., Doggui, D., Debbabi, H. (2020). COVID-19 virus outbreak lockdown: What impacts on household food wastage? *Environment, Development and Sustainability*, 22(5): 3939-3955.

Klemeš, J.J., Van Fan, Y.V., Tan, R.R. (2020). Minimising the present and future plastic waste, energy and environmental footprints related to COVID-19. *Renewable and Sustainable Energy Reviews*, 127:109883.

Kumar, A., Malla, M. A., & Dubey, A. (2020). With Corona Outbreak: Nature Started Hitting the Reset Kothari, R., Sahab, S., Singh, H. M., Singh, R. P., Singh, B., Pathania, D., Singh, A., Yadav, S., Allen, T., Singh, S., & Tyagi, V. V. (2021). COVID-19 and waste management in Indian scenario: challenges and possible solutions. *Environmental science and pollution research international*, *28*(38), 52702–52723.

Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Kathy Leung, S.M., Eric Lau, H.Y., Jessica Wong, Y., Xing, X., Feng, Z. (2020). Early transmission dynamics in Wuhan, China, of novel coronavirus–infected pneumonia. *The New England Journal of Medicine*, 382:1199-1207

Maalouf, A. and Maalouf, H. (2021). Impact of COVID-19 pandemic on medical waste management in Lebanon. *Waste Management & Research*, 39(1): 45-55.

Muhammad S, Long X, Salman M. (2020). COVID-19 pandemic and environmental pollution: a blessing in disguise? *Science of Total the Environment*, 728: 138820.

Nghiem, L.D., Morgan, B., Donner, E., Short, M.D. (2020). The COVID-19 pandemic: considerations for the waste and wastewater services sector. *Case Studies in Chemical and Environmental Engineering*, 1: 100006.

Praveena, S.M., Aris A. Z. (2021). The impacts of COVID-19 on the environmental sustainability- A perspective from South East Asia region. *Environmental Science and Pollution Research*, 2021 Jan 6:1–8.

Rahman, M. (2020). Rare dolphin sighting as Cox's Bazar lockdown under COVID-19 coronavirus. https://www.youtube.com/watch?v¼gjw8ZllIlbQ. (Accessed 14 April 2020)

Rume, T., Islam, S.D.U. (2020). Environmental effects of COVID-19 pandemic and potential strategies of sustainability. *Heliyon*, 6(9): e04965.

Saadat, S., Rawtani, D., Mustansar, C., (2020). Hussain environmental perspective of COVID-19. *Science of the Total Environment*, 728: 138870.

Schwarzenbach, R.P., Egli, T., Hofstetter, T.B., Gunten, U. and Wehrli, B. (2010). Global Water Pollution and Human Health. *Annual Review of Environment and Resources*, 35:109-136.

Singh, N., Tang, Y., Ogunseitan, O.A. (2020). Environmentally sustainable management of used personal protective equipment. *Environmental Science & Technology*, 54(14): 8500–8502

Singhal, S., Matto, M. (2020). COVID-19 lockdown: a ventilator for rivers. DownToEarth. In: Somani, M., et al. (Eds.), Bioresource Technology Reports, 11, p. 100491. htt ps://www.downtoearth.org.in/blog/covid-19-lockdown-aventilator-for-rivers-70771 . (Accessed 20 May 2020).

Somani, M., Srivastava, A.N., Gummadivalli, S.K., Sharma, A. (2020). Indirect implications of COVID-19 towards sustainable environment: an investigation in Indian context. *Bioresource Technology Reports*, 11: 100491.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S., Ho, R.C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17, 1729.

WHO (2020). Coronavirus disease (COVIS-19) pandemic. World Health Organization, Geneva. https://www.who.int/emergencies/diseases/novel-coronavirus-2019 (accessed in 30 August 2021)

Yousefi, M., Oskoei, V., Jafari, A.J., Farzadkia, M., Firooz, M.H., Abdollahinejad, B., Torkashvand, J. (2021). Municipal solid waste management during COVID-19 pandemic: Effects and repercussions. *Environmental Science and Pollution Research* 28:32200–32209.

Yunus, A.P., Masago, Y., Hijioka, Y. (2020). COVID-19 and surface water quality: improved lake water quality during the lockdown. *Science of the Total Environment*, 731: 139012.

Zambrano-Monserrate, M.A., Ruanob, M.A., Sanchez-Alcalde, L. (2020). Indirect effects of COVID-19 on the environment. *Science of the Total Environment*, 728: 138813