

Role of COVID-19 in regeneration of Natural systems

Corresponding Author: Hassaan Noor

College of Earth and Environmental Science, University of the Punjab,
Lahore, Pakistan.

Email: Hassaannoor2@gmail.com

Second Author: Javeria Javed

College of Earth and Environmental Science, University of the Punjab,
Lahore, Pakistan

Email: javariaa29@gmail.com

Graphical Abstract:



Abstract:

Unusual outbreak of Covid 19 has put the whole new challenges around the globe. In a short span of time, the world has been changed, lifestyles, social events, cultural, political events everything has been put on hold as number of countries has enforced partial or complete lockdown that resulted positive in context of controlling spread and contamination of COVID-19. Such activities have also put some effects on environment in both positive and negative way. In this study only positive impacts of COVID-19 on Environment have been highlighted that played role in regeneration of natural systems i.e., reduced air emissions, cleaner air, beaches & water bodies, reduced noise levels, biodiversity rehabilitation etc.

Introduction

In December 2019 COVID-19 outbreak was first reported in Wuhan, China (Harapan et al., 2020) and has affected 26 countries worldwide (Xu et al., 2020). On January 30, 2020 the World Health Organization declared the outbreak as a Public Health Emergency of International Concern (Harapan et al., 2020) COVID-19 has imposed uncountable Impacts on most the countries (Zambrano-Monserrate et al., 2020). In fast few months the world has been changed. This unusual

outbreak of COVID-19 has affected Spain, Taiwan, Italy, USA, France, Taiwan, Iran, Germany, Turkey, U.K, Australia and many more and these countries are under complete or partial lockdowns ranging from some weeks to months. a number of social, cultural, political, religious, sports and political activities are put on hold, various industrial activities are stopped (Chakraborty & Maity, 2020) COVID -19 is spreading globally and is just not affecting health but also the economy and environment in different ways (Shakil et al., 2020). Hundreds of thousands of peoples have been infected while thousands of people died because of Novel corona virus outbreak. Entire globe is struggling at present to combat Covid-19, the early lockdown implemented has shown an absolute way towards restoring ecosystem and environment (Lokhandwala & Gautam, 2020). The entire lifestyle has been changed simultaneously within a short span of time (Saadat et al., 2020). In a period of just 1–2 months, “recovery of nature” is being witnessed by everyone. (Lokhandwala & Gautam, 2020)

From the beginning, human has manipulated the natural ecosystem according to its need. For the sake of meeting demands of growing population, urbanization and industrialization changes in natural

environment has produced some concerns as well that include air pollution, ozone layer depletion, water pollution, global warming, climate change, changes in biodiversity. Depletion in ground water level (Chakraborty & Maity, 2020). Since March 14th, lockdown measures were in place in Spain, restricting social contact, reducing public transport, and closing businesses⁵) In London all the public places have been closed and strict lockdown is imposed to avoid person to person contamination and to force people to stay at homes. Global flight operations are disturbed. Majority of peoples are staying in homes and working remotely (Harapan et al., 2020). All this has been enforced to control spread of corona virus and to decrease death rate. Environmentally, the Covid-19 outbreak also has constructive effects (Fenger, 1999). Transportation, Industries all other businesses have been shut down and caused sudden reduction in carbon emissions.(Saadat et al., 2020) Such restrictions have helped countries reduce their environmental pollution and improve air quality and quality of life (Shakil et al., 2020).

Air quality:

Urban activities are significant contributors to transboundary pollution and to the rising

global concentrations of greenhouse gasses (Fenger, 1999). 91% of total population of the world do not have safe and permissible air quality limits to breath. (WHO,2016). Prior COVID-19 pandemic Carbon dioxide emissions were increasing around 1% year over past number of decades (le Quéré et al., 2020) overall response around the globe due to pandemic has led to Significant reduction in greenhouse gases and air pollutants (Forster et al., 2020). Every country has imposed lockdown, traffic restrictions and closure of industries to reduce exposure and contamination of COVID-19. These measures have impacted positively on the environment as reduced movements lead to reduced air emissions, as lockdown in china (strict traffic restrictions & self-quarantine measures generated significant changes in air quality. PM 2.5 reduced by 1.4 $\mu\text{g}/\text{m}^3$ and NO_x was reduced by 22.8 $\mu\text{g}/\text{m}^3$ and 12.9 $\mu\text{g}/\text{m}^3$ in Wuhan and China, respectively. Copernicus Atmosphere Monitoring Service (CAMS) has shown reduction of 20-30% in NO_2 compared with data of previous years of the same duration. Moreover, data from satellite Copernicus Sentinel-5P has shown reductions in NO_2 over Paris, Rome and Madrid as well (Zambrano-Monserrate et al., 2020). daily Global carbon dioxide emissions was estimated to be reduced by -17% by start

of April 2020 with the larger changes in following order China) United states) Europe) Asia. China over a reduction of up to -242 MtCO₂, United states with a decrease of -207 MtCO₂, Europe with reduction of up to -123 MtCO₂ and India up to reduction of -98 MtCO₂ (le Quéré et al., 2020). global NO_x levels declined up to 30% in April 2020 and it is being estimated that the direct effect on the global warming is negligible by pandemic-driven response, with a cooling of around 0.01 ± 0.005 °C by 2030 compared to a baseline scenario (Forster et al., 2020) An abrupt fall of 8.8% in global CO₂ emissions was recorded as compared with the same duration in 2019 (Liu et al., 2020). According to the ministry of Ecology and Environment, the amount of good quality air was around 11.4% compared with the same time last year in more than 330 cities all over China (Saadat et al., 2020). Air pollution levels dropped by 50% during lockdown, NO₂ and Black carbon dropped about 45-51% in Barcelona, Spain. (Shakil et al., 2020)

In India, march is usually the month with highest GHG emissions, however in 2020 these emissions were reduced due to COVID-19 lockdown measures. Nationwide lockdown was introduced in March 2020 and that resulted in 15% less emissions than in March 2019. Moreover, this reduction hits

almost 40% in April 2020 compared with April 2019 due to complete lockdown (Andrew, 2020).

Natural landscapes

beaches are quite important natural assets that provide land, recreation, sand, and tourism that are very crucial for coastal community survival. Irresponsible acts and misuse of natural resources has led to deuteriation of natural beauty and other pollution problems. Due to Covid-19 strict lockdowns, lack of transportation and tourism, maintaining social distance has led to a significant change mainly at beaches like those of Acapulco (Mexico), Barcelona (Spain), or Salinas (Ecuador) now look cleaner and with crystal clear waters (Zambrano-Monserrate et al., 2020).

Moreover, in Venice, unexpected environmental impact of corona virus has been observed. As numbers of tourists were reduced due to lockdowns because of covid 19. Fish could be seen again the canals, motor boats, churning and other pollutants have been reduced and the water in Venice canals are clearer than past and residents are amazed to see the changes (Saadat et al., 2020). In India, the rivers like Ganga, Yamuna, and Cauvery etc. have become clean & clear due to less industrial effluents entering the river

because of strict lockdowns and marine life is visible (Lokhandwala & Gautam, 2020). and Suspended particulate matter dropped by 15.9% in Vembanad Lake resulted in improved surface water quality, compared with pre lockdown phase (Shakil et al., 2020).

Noise Levels:

Noise is unwanted sound that can be generated by natural or anthropogenic activities i.e., Industrial activity. Heavy traffic etc. noise pollution is a serious concern of urban environments as it affects wellbeing, productivity and human health (Maisonneuve et al., 2009). According to world health organization noise pollution is considered as most dangerous pollution after air and water pollution affecting human health's (Basu et al., 2021). Globally imposed Quarantine measures by governments has significantly reduced the noise levels in most cities of the world as commercial activity got stopped entirely, significant decrease in public transport, self-quarantine/work from home/stay at home, protection measures helped in this case (Zambrano-Monserrate et al., 2020).

In Dublin Ireland 12 noise monitoring stations performed hourly monitoring between January and May 2020. 80% Results

showed almost 60% reduced noise levels compared to noise levels before lockdown and this is mainly attributed to less air and road traffic due to COVID-19 (Basu et al., 2021).

Biodiversity

Biodiversity is under great threat due to uncontrolled urbanization and it is still not properly understood that how animals will adapt with these abrupt changing natural environmental factors (Gordo et al., 2021). However, Lockdowns, restricted human movements, less anthropogenic activities and less natural resource deuteriation due to COVID-19 has driven to positive changes on biodiversity. Vultures and other large numbers of birds starting appearing, insect pollinators appeared in abundance on crops. Clean and clear water of waterbodies in which aquatic life is visible and clean environment is being observed where biodiversity is stated to flourish (Kumar Verma & Prakash, n.d.).

Occurrence of birds in cities and towns during lockdown was not so high as changed induced by COVID 19 were sudden, drastic and of short-term duration that didn't allow proper colonization process. (Gordo et al., 2021)

Discussion:

Role of metrology is evident in changing Pollutant levels in air but are not identified in this study. It can be expected that lockdowns, closing of restaurants, shops and a large number of companies reduced the levels of certain air pollutants. (Amato et al., 2016). It is also important to highlight that GHGs are being accumulated in environment for several decades and the impact of reduction of GHGs due to pandemic over total GHG concentration is very low because of short term lockdown or ceased air polluting activities i.e. power generation, burning of fossil fuel etc.

Moreover, quarantine has also led to significant increase in waste production as online shopping for home delivery, online purchase of food, and medical waste had tend to increase in lockdown days significantly. As during outbreak on estimate 240 metric tons of waste was produced from Wuhan and in US there has been a significant increase in PPE's waste i.e., Masks and gloves. However, safe handling and management of domestic and medical waste during COVID-19 emergency was crucial.

Medical waste could easily be mixed with domestic waste. However, they should be

treated as hazardous waste and disposed of separately (UN, 2020).

Finally, it is concluded that COVID-19 will produce both positive and negative indirect effects on the environment, but the latter will be greater. Decreasing GHG concentrations during a short period is not a sustainable way to clean up our environment. Furthermore, the virus crisis brings other environmental problems that may last longer and maybe more challenging to manage if countries neglect the impact of the epidemic on the environment. (Zambrano-Monserrate et al., 2020)

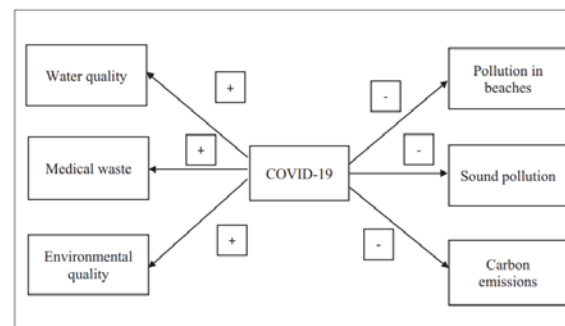


Figure 1 Impacts of COVID-19 on Environment

Conclusion:

Covid-19 has put the globe in a situation known as global emergency that has led to significant impacts on daily life, businesses, industries and every aspect of life. But in return has benefitted the environment as less pollution sources had led to cleaner and greener environment. Nature started

recovering itself fish started appearing in Venice, birds like vultures started appearing again, water bodies, beached became cleaner. Less GHGs production led to cleaner air. Reduction in noise levels has also been observed in densely populated cities. Hence COVID 19 played an important role for environment to regenerate its deuterating properties.

References

1. Amato, F., Alastuey, A., Karanasiou, A., Lucarelli, F., Nava, S., Calzolari, G., Severi, M., Becagli, S., Gianelle, V. L., Colombi, C., Alves, C., Custódio, D., Nunes, T., Cerqueira, M., Pio, C., Eleftheriadis, K., Diapouli, E., Reche, C., Minguillón, M. C., ... Querol, X. (2016). AIRUSE-LIFE+: A harmonized PM speciation and source apportionment in five southern European cities. *Atmospheric Chemistry and Physics*, 16(5), 3289–3309. <https://doi.org/10.5194/acp-16-3289-2016>
2. Andrew, R. M. (2020). Timely estimates of India's annual and monthly fossil CO₂ emissions. *Earth System Science Data*, 12(4), 2411–2421. <https://doi.org/10.5194/essd-12-2411-2020>
3. Basu, B., Murphy, E., Molter, A., Sarkar Basu, A., Sannigrahi, S., Belmonte, M., & Pilla, F. (2021). Investigating changes in noise pollution due to the COVID-19 lockdown: The case of Dublin, Ireland. *Sustainable Cities and Society*, 65. <https://doi.org/10.1016/j.scs.2020.102597>
4. Chakraborty, I., & Maity, P. (2020). COVID-19 outbreak: Migration, effects on society, global environment and prevention. *Science of the Total Environment*, 728. <https://doi.org/10.1016/j.scitotenv.2020.138882>
5. Fenger, J. (1999). Urban air quality. In *Atmospheric Environment* (Vol. 33).
6. Forster, P. M., Forster, H. I., Evans, M. J., Gidden, M. J., Jones, C. D., Keller, C. A., Lamboll, R. D., Quéré, C. le, Rogelj, J., Rosen, D., Schleussner, C. F., Richardson, T. B., Smith, C. J., & Turnock, S. T. (2020). Current and future global climate impacts resulting from COVID-19. *Nature Climate Change*, 10(10), 913–919. <https://doi.org/10.1038/s41558-020-0883-0>
7. Gordo, O., Brotons, L., Herrando, S., & Gargallo, G. (2021). Rapid behavioural response of urban birds to COVID-19 lockdown. *Proceedings of the Royal Society B: Biological Sciences*, 288(1946), 20202513. <https://doi.org/10.1098/rspb.2020.2513>
8. Harapan, H., Itoh, N., Yufika, A., Winardi, W., Keam, S., Te, H., Megawati, D., Hayati, Z., Wagner, A. L., & Mudatsir, M. (2020). Coronavirus disease 2019 (COVID-19): A literature review. In *Journal of Infection and Public Health* (Vol. 13, Issue 5, pp. 667–673). Elsevier Ltd. <https://doi.org/10.1016/j.jiph.2020.03.019>
9. Kumar Verma, A., & Prakash, S. (n.d.). *Review Paper IMPACT OF COVID-19 ON ENVIRONMENT AND SOCIETY*. www.mutagens.co.in
10. le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J. P., Abernethy, S., Andrew, R. M., De-Gol, A. J., Willis, D. R., Shan, Y., Canadell, J. G., Friedlingstein, P., Creutzig, F.,

- & Peters, G. P. (2020). Temporary reduction in daily global CO₂ emissions during the COVID-19 forced confinement. *Nature Climate Change*, 10(7), 647–653. <https://doi.org/10.1038/s41558-020-0797-x>
11. Liu, Z., Ciais, P., Deng, Z., Lei, R., Davis, S. J., Feng, S., Zheng, B., Cui, D., Dou, X., Zhu, B., Guo, R., Ke, P., Sun, T., Lu, C., He, P., Wang, Y., Yue, X., Wang, Y., Lei, Y., ... Schellnhuber, H. J. (2020). Near-real-time monitoring of global CO₂ emissions reveals the effects of the COVID-19 pandemic. *Nature Communications*, 11(1). <https://doi.org/10.1038/s41467-020-18922-7>
 12. Lokhandwala, S., & Gautam, P. (2020). Indirect impact of COVID-19 on environment: A brief study in Indian context. *Environmental Research*, 188. <https://doi.org/10.1016/j.envres.2020.109807>
 13. Maisonneuve, N., Stevens, M., Niessen, M. E., Hanappe, P., & Steels, L. (2009). *Citizen Noise Pollution Monitoring*. <http://www.noisetube.net>
 14. Saadat, S., Rawtani, D., & Hussain, C. M. (2020). Environmental perspective of COVID-19. In *Science of the Total Environment* (Vol. 728). Elsevier B.V. <https://doi.org/10.1016/j.scitoten.v.2020.138870>
 15. Shakil, M. H., Munim, Z. H., Tasnia, M., & Sarowar, S. (2020). COVID-19 and the environment: A critical review and research agenda. *Science of the Total Environment*, 745. <https://doi.org/10.1016/j.scitoten.v.2020.141022>
 16. Xu, Z., Shi, L., Wang, Y., Zhang, J., Huang, L., Zhang, C., Liu, S., Zhao, P., Liu, H., Zhu, L., Tai, Y., Bai, C., Gao, T., Song, J., Xia, P., Dong, J., Zhao, J., & Wang, F. S. (2020). Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *The Lancet Respiratory Medicine*, 8(4), 420–422. [https://doi.org/10.1016/S2213-2600\(20\)30076-X](https://doi.org/10.1016/S2213-2600(20)30076-X)
 17. Zambrano-Monserrate, M. A., Ruano, M. A., & Sanchez-Alcalde, L. (2020). Indirect effects of COVID-19 on the environment. *Science of the Total Environment*, 728. <https://doi.org/10.1016/j.scitoten.v.2020.138813>