

6. Impact of Covid 19 on Environment

Mr. Ajit D. Gaikwad

M. Tech {Chemical and Biotechnology},
Dept. of Technology,
Savitribai Phule Pune University,
Pune, Maharashtra, India.

Abstract:

The novel Coronavirus pandemic (COVID-19) hit the world severely in the first half of 2020 which forced several nations to impose severe restrictions on all sorts of activities involving human population. Environmental health across indicators in India is rapidly declining, and the state's failure to regulate sources of, and causes for, environmental degradation has never been more apparent.

The reasons for this failure are numerous and complex: conflicting interests in limited resources; inadequate regulatory capacity to design and enforce the law effectively; lack of interagency coordination; and environmental issues not being politically salient enough to trump competing policy interests and priorities. As the country grapples with an increasing array of environmental problems, it is an important moment in time to reflect on the nature and quality of the environmental regulation that is in place.

Keywords: Pandemic, degradation, environment, coronavirus, health.

6.1 Introduction:

The current outbreak of coronavirus disease (COVID-19) got reported first from Wuhan, China, on 31 December 2019. A novel coronavirus disease 2019 (COVID-19) outbreak is a global dramatic pandemic that is immeasurably impacting our communities. Considering massive health and economic burden of the COVID-19 pandemic, any means by which to improve the condition of patients to accelerate recovery and to reduce the risk of deterioration and death would be considered of significant clinical and economic importance. People were mainly advised to remain home quarantined to curb the virus spread. Industrial and vehicular movements were ceased as a result of lockdown, and therefore the rate of pollutants entering the ecosystem was also reduced in many places.

Water and air pollution remained a major concern in the last few decades as these were gradually deteriorating in many spheres including the hydrosphere and atmosphere. As the nation-wide lockdown period in India completed more than two months, this study attempted to analyze the impact of lockdown on water and air quality to understand the short-term environmental changes. With substantially less vehicular movement, air quality has improved by leaps and bounds. Numerous sources have covered how air quality indices of the globe's largest metropolitan areas have improved extensively since strict coronavirus lockdowns were issued.

Even NASA satellites from outer-space show the significant reductions in air pollutants, which support Eco Watch's observation that the novel coronavirus pandemic has delivered the silver lining of decreased air pollution. Today, the World is a 'global village' due to the use of Information and Communication Technology and we are living there and deriving all the benefits from Nature. When we are deriving the benefits, we must have to bear some responsibilities. We have to develop environment centric approach to utilize the natural resources in such a manner so that we can achieve the inclusive and sustainable development with coexistence of all other species of organisms of the globe. The lockdown therefore provided us an opportunity to shift our ideology from anthropocentric or human centric worldview to eco-centric worldview. The former worldview puts the human beings in the centre giving them the highest status, considers man to be the most capable for managing the planet earth, realizes that man is the planet's most important species and is the in-charge of the rest of nature. It emphasizes that earth has unlimited resources for humans only and a healthy environment depends upon a healthy economy. The later worldview states that the earth resources are limited and belong to all the species that exist in nature [1]. Though humans have right to draw their requirements from the environment but certainly not the extent that degrades the environment and harms other species and living beings. This eco-centric worldview is therefore based on earth-wisdom and urges us to live on this earth as a part of it, like any other creature of nature and live sustainably. It realizes that healthy economy depends upon a healthy environment (healthy environment does not depend upon a healthy economy). Due to lockdown, a large number of birds including vultures are clearly started to appear [2].

6.2 SARS-CoV-2 Impact on Environment:

The “oral-feces” transmission of COVID-19 is threat to environment. Detection of SARS-CoV-2 in the human feces is an alarming threat where it can spread to whole compartments of environment through the sewage sludge and waste water. There are various countries having more population below the poverty lines and they can't afford toilets. The detection of SARS-CoV-2 in the human feces and transmission may cause the drastic consequences for the counties having larger slum areas. The bigger problem with slum areas is to maintenance of social distancing where area are overcrowded and five or more persons are staying in single room[3]. If virus is not eradicated on early stage it may cause the drastic results. If virus spread on large scale, whole compartments of environments to be rebooted which is impossible task. The environment compartments like surface and ground water, sewage sludge, animals, solids and sediments, waste water, and crops will be effected where depth screening to be required on the transmission of virus to total environment. Improper disposal of hospital waste may spread SARS-CoV-2 so waste management including hospital waste and sewage sludge will be the hot area of future research. There are few well-known approaches to clean the environmental compartments including waste management. Techniques like nitrifying-enriched activated sludge (NAS) approach, micro-organisms based approach and conventional activated sludge (CAS) approaches are most effective to clean the environment. Nitrifying-enriched activated sludge (NAS) approach is considered as best technique for treatment of wastewater and sludge. NAS approach is 2.5 times better than conventional activated sludge (CAS) [1]. NAS approach increase the lifetime (two times) of membrane bioreactors. As wastewater contain low carbon/nitrogen ratio so NAS approach decrease the foul smell and enriched nitrifiers population in membrane bioreactors[2].

6.2.1 Effect of Climatic Conditions on SARS-CoV-2:

Environmental conditions like temperature pH and humidity are the major factors to access the efficiency of the microorganisms. Under variable climatic conditions, mutation of microorganisms is the other threat. Virus mutagenic capability depends upon several factors, including the fidelity of viral enzymes that replicate nucleic acids. RNA viruses are known for higher mutation rate, up to million times higher than their hosts. As, SARS-CoV-2 is a RNA virus mutate through RNA dependent polymerase (RdRp). Pachetti et al., (2020) has found 8 mutations of SARS-CoV-2 where 5 mutations were found in Europe and 3 mutations were observed in North America. In England (UK), RdRp based mutations were found with median of 3 points mutations (range 2–5 at p value < 0.001). An amino acid composition changing mutation in RdRp were noticed in Italy (Lombardy) with median of 1 point's mutations (range 0–3 at p value < 0.001). They has suggest that the virus is evolving and European, North American and Asian strains might coexist, each of them characterized by a different mutation pattern[4]. Some positive and negative environmental and socio-economic aspects of COVID-19. There are few positive aspects of COVID-19 where environment is becoming pure day by days. Due to lockdown, air quality and noise pollution is decreased consequently total environment is improving. Rivers and sea beaches are becoming neat and clean due to lockdown conditions. The emission of green-house gases was found significantly low after the time of World War II which is due the effects of lockdowns. It has been reported that the air quality was improved where 55 % particulate matter decreased in India during first lockdown period of 21 days. The other positive aspect learned from COVID-19 was that every country is trying its best to uplift the healthcare services. Various countries have opened new hospitals especially dedicated to the COVID-19. Various countries have strengthened their traditional medicine system to fight against COVID-19. Work from home culture was adopted by various companies which is entirely new culture and new lesson learned from COVID-19. The major negative aspect of COVID-19 is the social distancing, which may leads to anxiety and frustration. The psychosomatic traits like anxiety and frustration can disturb the immune and COVID- 19 has been noticed in patients with weak immune system. In the era of 21st century everyone was living fast life and they enjoy their weekends with friends which is curtailed due to lockdowns and social distancing. Unsocial behavior of human is also observed during the outbreak where a rat race for N95 masks was observed. Black marketing was noticed due to excess demand of personal protection care equipment was noticed. *Climate Change Effects on Environmental Functionality* is a timely reference to better understand environmental changes amid the COVID-19 pandemic and the associated lockdowns [5].

6.3 COVID-19 in the Environment:

Impact, Concerns, and Management of Coronavirus highlights the research and technology addressing COVID-19 in the environment, including the fate, transport, and disposal. It examines the impacts of the virus at local, national, and global levels, including both positive and negative environmental impacts and techniques for assessing and managing them. Utilizing case studies, it also presents examples of various issues around handling these impacts, as well as policies and strategies being developed as a result. P-1 Environmental change is one of the biggest challenges of the 21st century. In spite of all their efforts to restore the nature during the last few decades, humans could only move a few steps forward, not up to the commendable extent.

But during the last few months, consequences of the COVID-19 pandemic have successfully recovered the environment to a large extent that should definitely set positive impact on global climate change. It of course changes the daily behaviour of humans and the surrounding ecological system. The present review article deals with the multiple positive effects of lockdown on environment and society including biodiversity [6].

In humans, several corona viruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). In December 2019, a new infectious respiratory disease emerged in Wuhan, Hubei province, China and was named by the World Health Organization as COVID-19 (coronavirus disease 2019). It is caused by recently discovered a class of corona virus, known as SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2). It is basically a single stranded RNA virus. The SARS-CoV-2 viral particles are spherical and have mushroom shaped protein called spikes protruding from their surface, giving the particle a crown like appearance. The spikes bind to the human cells and allowing virus to gain entry. The spike protein of novel corona virus shares 98% sequence identity with the spike protein of bat coronavirus. The researchers found that spike protein of SARS-CoV-2 binds to the cellular receptor called angiotensin converting enzyme 2, which is entry point into human cells. It has 10 to 20-fold higher binding affinity than SARS. The higher binding affinity causes higher human to human transmission [1, 2].

COVID-19 is a zoonotic disease with intermediate host. Although the intermediate source of origin and transfer to humans is not clearly known. Intermediate host for SARS-CoV is palm civet and camel while the possible intermediate host for SARS-CoV-2 is pangolin or snakes. The reserve host for all the three is bat. Bat carries so many viruses and around 200 corona viruses without getting sick. So the primary mode of transmission is from bats to intermediate host to humans. The transmission of COVID-19 can be direct in the form of droplets produced during sneezing, coughing, speaking and accidentally inhaling the droplets in a closed proximity of an infected person. Droplets are water holding entities of diameter more than 5µm and these can be caught by a healthy person within a certain range of 1 m approximately. The indirect transmission is when virus is deposited on a dead surface like door bells, lift buttons, stairs, vegetables, fruits etc. which may come in contact with rest healthy persons frequently. From here the virus reaches to eyes, nose and mouth and finally leads to a new corona patient. Even fecal matter of infected person is found to be the transmitting source hence it can spread 585\through fecal-oral transmission. Studies showed that WHO has published guidance on adjusting public health and social measures for the next phase of the COVID-19 responses. Some governments have suggested that the detection of antibodies to the SARS-CoV-2, the virus that causes COVID-19, could serve as the basis for an 'immunity passport' or 'risk-free certificate' that would enable individuals to travel or to return to work assuming that they are protected against re- infection.

There is currently no evidence that people who have recovered from COVID - 19 and have antibodies are protected from a second infection. WHO continues to review the evidence on antibody responses to SARS-CoV-2 infection? Most of these studies show that people who have recovered from infection have antibodies against virus. However, some of these people have very low level of neutralizing antibodies in their blood, suggesting that cellular immunity may also be critical for recovery.

At this point in the pandemic, there is not enough evidence about the effectiveness of antibody-mediated immunity to guarantee the accuracy of an immunity passport or risk-free certificate. People who assume that they are immune to a second infection because they have received a positive test result may ignore public health advice. The use of such certificates may therefore increase the risks of continued transmission [7].

6.4 COVID-19 and Global Warming:

From the beginning of civilization, human beings gradually started manipulating the nature as per its own benefit. In order to satisfy the demand of increasing population; industrialization and urbanization became inevitable, and the obvious significance was proved to be detrimental on the global climatic changes. The desire to drive the nature as per their own whims and desire, human beings started to destroy the nature in numerous ways by anthropogenic activities without caring for sustainable development. As an inevitable consequence, environmental pollution has become a big issue of the present day. It is obvious that environmental pollution will change the distribution and burden of various vector borne infectious diseases including bacterial and viral diseases [8].

But, due to the unusual outbreak of COVID-19, almost every big and small cities and villages in the affected countries is under partial or total lockdown for a long period of time ranging from a few weeks up to a few months. All local and central administrations instructed to close the academic institutions and imposed a ban on free movement of their citizens outside their home and non-essential businesses in order to avoid community transmission.

The various religious, cultural, social, scientific, sport, and political mass gathering events like Hajj, Olympics etc. are cancelled. Various industries are not functioning and all types of travels like airplanes, rails, buses and private vehicles are restricted or cancelled[5].

Meanwhile, efforts to restrict transmission of the SARS-CoV-2, by restricting the movement have had an outstanding environmental effect. Due to non-functioning and closure of industries, industrial waste emission has decreased to a large extent. Vehicles are hardly found on the roads leading almost zero emission of green-house gases and toxic tiny suspended particles to the environment. Minimal activity from industrial sites, factories and construction sectors improving the air quality. As such, aviation emissions, which accounted for 2.4% of global CO₂ emissions in 2018, according to the Environmental and Energy Study Institute (EESI) have dropped significantly [6].

China has witnessed a drastic reduction in emission of NO_x, CO₂ and various hydrocarbons during the coronavirus lockdown (2020) as compared to the values last year (2019). The areas of Eastern and Central China showed a significant reduction (10-30%) in NO₂ levels. According to, there is significant reduction in the air pollution in major cities of United State of America due to lockdown. The lockdown is a highly sustainable approach to reduce the noise and injection of tropospheric and stratospheric pollutants. That means the coronavirus crisis is so far “trigger the largest ever annual fall in CO₂ emissions in 2020, more than during any previous economic crisis or period of war.” While this is encouraging news, experts say it still may not be adequate for meeting Paris Agreement [7].

Due to lesser demand of power in industries, use of fossil fuels or conventional energy sources have been lowered considerably. Ecosystems are being greatly recovered. In many big cities the inhabitants are experiencing a clear sky and clear river water for the first time in their lives. Due to Covid-19 lockdown, a variety of birds are seen in the localities. The pollution level in tourist spots such as forests, sea beaches, hill areas etc. is also shrinking largely. Ozone layer may also be healing. The pandemic has displayed its contrasting consequence on human civilization, in the sense that, on one hand it has executed worldwide destruction, but created a very positive impact on the world environment on the other hand. Thus the lockdown acts as a healing dose for climate change, ozone depletion, human health, brown haze etc. Insect pollinators have appeared in abundance on crops and other plants. All these are good indication for ecological balance and biodiversity. Almost total lockdown due to COVID-19 outbreak has minimized the anthropogenic activities including overexploitation of natural resources. The major human population is bound to live in their homes, automatically prevented to cause various types of pollution. The surrounding environment is reflecting clean and green. We all are observing a clean environment where almost all animals including birds etc. have started to flourish. Almost all humans are feeling healthy without any major clinical problems. Authors observed that during present lockdown period, the water of Rapti, Saryu, Ganga and Yamuna rivers in cities also became clear and transparent due less deposition of domestic and industrial effluents. During lockdown it was not possible to estimate the water quality parameters but the transparent condition of water of these holy rivers clearly indicate that pollution level definitely reduced to a great extent. These reductions in pollution level help in flourishing the aquatic organisms including fishes [8].

In a rare but substantial global achievement, the efforts of all the countries to stop the damage to the Ozone layer seem to be paying off as the damage to the Ozone layer above Antarctica has recovered, Science Alert reported citing a study. The development has the potential to clog the wheel of many disastrous chain of events that was taking place in the atmosphere of the Southern Hemisphere.

A new study has highlighted the positive role played by the Montreal Protocol which was agreed to by major world powers in 1987. Under the Montreal Protocol, developing as well as developed countries took substantial steps to stop the emission of Ozone Depleting Substances (ODS) that included refrigerators and Air Conditioners that relied heavily on Chlorofluorocarbons (CFCs). According to the new study, depletion of the life-saving Ozone layer had altered the path of Jet streams further from the South Pole. The development had led to magnanimous impact on the rainfall patterns of the planet along with ocean currents, Science Alert reported. Jet Streams are ultra-fast air currents that move towards the poles of our planet at high altitude. The study has highlighted that one decade after the Montreal Protocol came into being, the alteration in the Jet patterns stopped [9].

“The lockdown due to COVID-19 pandemic has resulted in improved air quality and water quality in rivers and lakes. The lockdown experience demonstrated that nature heals itself in a short period.” The lockdown, while having a positive result on the environment, has damaged the economies around the world. And so, we are again faced with the question of balancing out the economic activities with preservation of nature. This is also the agenda for the World Economic Forum 2021, which highlights the importance of taking steps in this direction.

6.5 Sustainability and Rejuvenation of Earth System:

The lockdown is a highly sustainable approach. Now, the flights are grounded resulting in reduction of noise and injection of tropospheric and stratospheric pollutants. Ozone layer is also reported to be healing. The road transport and factories are also closed and hence, the emissions of air pollutants are reduced. After the lockdown, a variety of birds are seen in the localities. People have realized that their survival needs are very less but for status in the society they were wasting the resources. I would say that the lockdown is teaching us the practical lessons how to achieve the Sustainable Development Goals (SDGs). The global shutdown is allowing the planet to heal and rejuvenate itself against the torture of Homo sapiens of twentieth century [7].

Spiritual Environmental Aspect During the lockdown, staying at home and working from home has forced us to opt all the alternate methods for keeping engaged. One of the best methods is meditation and Yoga that give peace and good health. We are not able to go to parks for physical exercise. Performing yoga, meditation and prayers regularly rejuvenates our body in terms of enhancing our immunity system, concentration of mind and confidence levels. Spiritual development is essential for humanity and positive personality development. There are a number of online yoga classes given by the experts, which is proving the utilization of lockdown time fruitfully. I guess a more positive behavior of public after the lockdown. If it happens, that will be a relief to the governments. A peaceful nation can make significant growth due to savings in no-war and no-crime state [8]. In a way the spread of COVID-19 has forced the globe to halt all outdoor human activities for the longest period in the memories of the present population of this planet. This lockdown will probably be marked in history forever. Nevertheless, this shutdown is a rejuvenation of the Earth, environment and human health systems. Despite the sudden changes to the daily behaviour of humans, our surrounding ecological systems are enjoying holistic and positive changes. This is a kind of Holistic treatment of ecological system as the shutdown has multiple positive effects. The implications and outcomes of the prohibition of outside activities is different for different aspects of the environment, as described below.

A. Physical Environmental Aspect Halting outside movements has stopped all types of transportation (aircrafts buses, cars, trucks etc.) which has controlled emissions of pollutants. China has witnessed a drastic reduction in NO_x during the Coronavirus lockdown (2020) as compared to the values last year (2019). Eastern and central China areas showed a significant reduction (10 – 30%) in NO₂ levels.¹ CBCB data showed more than 50% reduction in PM₁₀ and PM_{2.5} levels.²⁻³ According to reports in the United States of America, Coronavirus shutdown has resulted in a huge decline in pollution over major cities such as Los Angeles, Seattle, New York, Chicago and Atlanta etc. On average, a Jumbo Boeing 747 consumes around 150,000 litres fuel in a 10 hrs flight. Cumulatively around 400 billion litres of fuel is consumed annually by the commercial flights. Additionally, aircrafts fly at 8-13 km height from ground kevel emitting huge amount of NO_x, CO₂ and various hydrocarbons. These emissions affect radioactive forcing and stratospheric ozone [4, 6].

6.6 Conclusion:

The corona has proved that although humans are a superpower and have weapons that are capable to destroy the whole world but still if humans are creating mess with nature then even now nature is itself powerful to destroy humans with this small virus which is having very common symptoms like cold and cough.

The best way to prevent and hamper transmission is to protect yourself and others from infection by frequent washing of hands or using an alcohol based - rub frequently, not touching the face and follow social distancing norms. Use of mask is beneficial if anyone has to go out of home due to an urgent work. During the lockdown, staying at home and working from home should be followed. Yoga is the best methods for good health which rejuvenates our body in terms of enhancing our immunity system, concentration of mind and confidence levels. Spiritual development is essential for immunity, humanity and positive personality development. There are a number of online yoga classes given by the experts, which is proving the utilization of lockdown time fruitfully. No need to worry about the future because time heals everything. If there are negative impacts, we have various positive things to learn from this. Due to lock down, the resources are being consumed in a limited manner. The COVID-19 has proved that Nature has provided us with all the resources for leading a beautiful life and she nourishes us like a mother, humans should respect and nurture her. Indiscriminate development and overexploitation of natural resources should be minimized at the level of sustainability.

6.7 References:

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