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Dr. Shambhu Prasad Chakrabarty
Head and Research Fellow
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Dr. Shambhu Prasad Chakrabarty
West Bengal National University of Juridical Sciences, Kolkata
Room No. 22, WBNUJS,
12, LB Block, Sector 3, Salt Lake City,
Kolkata700098
Email: crsgpp@nujs.edu/spc@nujs.edu
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The people of the world are now facing an unprecedented pandemic posed by the coronavirus which is spreading rapidly throughout the globe. The coronavirus is proving to be disturbingly resilient. The government had to declare lockdown and it was extended twice and will continue till May 17, 2020. Some estimates have pegged Indian economic losses during this phase of lockdown at Rs.78 lakh crores. The absence of a comprehensive fiscal stimulates or bungled exit strategy could make the matter worse. Therefore the moment demands from us that we rise to the serious circumstances we are facing and fully assume our human, professional and academic responsibilities.

-Prof. Nirmal Kanti Chakrabarti  
Vice Chancellor  
WBNUJS
India is going through a very hard time. Not only India, but the entire world is passing through a test called COVID-19. Perhaps, it is one which looks quite familiar to that of a modern world war. Under such testing times, we have witnessed huge challenges in uplifting the basic principles of law and most certainly, the Rule of Law.

There are many such instances, where human rights violation have become rampant and most likely such bitter experiences are going to escalate in the coming days. During the World War II, in US, people with Japanese descent were man-handled and arrested without trial. Laws were made arbitrary post 9/11 which empowered arrest and detention for days in the US. As we can see, the brutality shown by people with the rod of office, against those without arms escalates during such time of crisis. Arbitrary decision-making power being infused by police in preventing the exercise of fundamental democratic rights by the people. Could a notification over power the basic principles of human rights and more important the constitution? In other words, can the rule of law be violated arbitrarily by the protectors of democracy in the garb of ‘saving the Realm’?

Bending of rule of law and basic legal principles as discussed earlier is not uncommon and requires further retrospection. In the backdrop of WW-II, when the Germans were in the verge of hitting the coast of England, a similar situation arose that led to the famous case of Liversidge v. Anderson (1942) AC 206 in the House of Lords. It was noticed that instead of questing the arbitrariness and high handedness of the people with power, under the garb of ‘protecting the Realm’ major legal principles including the rule of law was compromised.

Lord Atkin, in the dissenting judgement however warned about such risk over a legal system of which we all are an integral part. He reiterated,

“amid the clash of arms, the laws are not silent. They may be changed, but they speak the same language in was as in peace”.

He reiterated that even the governments are subject to review of their actions. As the saying goes, no
one is above law, not even the king. The 1215 version of the great Magna Carta reiterates in Clause 39 and 40:

“No free man shall be seized or imprisoned, or stripped of his rights or possessions, or outlawed or exiled, or deprived of his standing in any way, nor will we proceed with force against him, or send others to do so, except by the lawful judgment of his equals or by the law of the land” and “To no one will we sell, to no one deny or delay right or justice.”

But, in practice, time and again, we have seen the violation and non-adherence to these basic principles. What makes the Germans and their laws during the regime of Hitler no law at all as has been debated in the famous Hart and Fuller debate. This tendency of bifurcating the basic tenements of law is so strong that it even affects the strongest legal minds. In a recent case dealing with data protection, in Apple v. FBI, where the FBI was unable to crack the apple encrypted software to access the iPhone recovered from a prospective terrorist. The matter was before the Federal Court and in ‘protecting the Realm’ the court ordered Apple to provide technical assistance to FBI to unlock the iPhone. Apple denied complying with the direction stating that it will allow FBI to bypass the security system in any other case. The ‘protection of the Realm’ perception was so strong that the critics feared the death of privacy rights on its hearing in the supreme court of US. However, FBI managed to crack the code and the case was withdrawn and perhaps the right to privacy was saved.

Equality, transparency, independence and accessibility to legal remedies are integral aspects of rule of law and under no circumstances, they should be compromised. The objective of rule of law is the foundation for the development of peaceful, equitable and prosperous societies.

India needs to protect the spirit of rule of law amidst this COVID 19 crisis and prevent the pandemic to overpower the principles of justice in the largest democracy of the world.

We at CRSGPP are proud to present this one of a kind interdisciplinary special edition of our journal which includes legal, quasi legal, technical and scientific papers focusing on the COVID 19 pandemic which has changed the way humans lived their life on Earth.

I thank all the authors for their timely contribution. My sincere gratitude to Hon’ble Vice Chancellor sir for his continuous guidance and Dr Abhijit Mitra, Advisor of our esteemed journal for making this project a reality.

-Dr Shambhu Prasad Chakrabarty
Head and Research Fellow
CRSGPP, WBNUJS

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iMagnus Carta
iiCarolyn Harris: Magna Carta established that nobody, not even the king, was above the law of the land, available at https://nationalpost.com/opinion/carolyn-harris-magna-carta-established-that-nobody-not-even-the-king-was-above-the-law-of-the-land, accessed on April 15th 2020
iiiU.S. District Court for the Central District of California, Nos. 16-cm-00010 and 15-mj-00451
ivDecember 2015 attacks in San Bernardino, CA
Uncertainty and Intellectual Property Rights

Ana Penteado

In this time of uncertainty, innovation and technology have been rapidly evolving to find solutions for our global health care crisis. There are now over one million COVID-19 cases around the world\(^i\), with a persistent increase in the number of deaths caused by a virus which has no cure. There are at least 500 clinical trials worldwide in an active investigation for new therapies and a vaccine for this virus\(^ii\), but few if not only one therapy had advanced to be approved for alleviating severe COVID-19 cases.\(^iii\)

The scientific community is united with the pharmaceutic industry to find a vaccine for a lethal virus that months ago was unknown to the scientific academy and the public and for which our immunity system has no defence. Transparency on clinical trials is crucial so that the population can be informed on the most updated and correct information on confirmed therapies. Some say COVID-19 is a game-changer for compulsory licenses on drug discovery. Before the 2001 Doha Declaration\(^iv\), the right to use compulsory licenses to export or produce locally essential medicines was rarely used before.\(^v\)

We have seen many jurisdictions updating their local intellectual property legislation to cope with the demand for novel medicine still to come to alleviate overwhelming hospitals and health care workers around the world. France, Israel, Ecuador, Chile, Germany are the policymaker's frontrunners enacting intellectual property legislation that allows compulsory licenses on patents and even price control to avoid a tragedy of unsurmountable proportions in which more human lives may be lost.\(^vi\) Sound public policy should encourage access to essential medicines or vaccines at a reasonable price. It is well-known that compulsory licenses do not create a stimulus to find efficient therapies, but rather it may decrease the goodwill to find a solution.\(^vii\)

Other elements that are pre-patent grant may be more useful, such as global clinical trials. Clinical trials are investigative by nature, interventional studies designed by phases to provide studies of potential drugs eligible for approval by regulatory agencies.\(^viii\) Clinical trials may be conducted before the patent examination or after, but their results may affect the outcome of a patent application.\(^ix\)

The clinical trial and its evaluation may produce variable results. A clinical trial is a costly, lengthy and unpredictable process for all stakeholders. The risk is that the conducted studies may not produce the outcome expected, so it is a risky project. On the other hand, clinical trials are of extreme importance.
to intellectual property rights associated with them. That is because when the clinical trial confirms a useful drug, there is a profitable outcome. Novel drugs can be commercialized locally or worldwide if the local authorities certify the data compiled on a registered clinical trial. In a sense, it produces evidence in the form of data that will provide safety for the therapy. Clinical trials then become a crucial part of the patent framework, especially for novel drug compounds, because they validate the novelty of the medication and its claimed use. Clinical trials are not included expressly in the patentability principles, though. If a clinical trial is successful, the patentability of the subject-matter is validated by its results. Conversely, if a clinical trial does not result in a confirmation for a new drug, then the whole process and the research associated with the invention may be a failure.

It is a world of fierce competition; a patent application that discloses a claimed therapy, which has not materialized is an investment lost. In a nutshell, the world of pharmaceutical inventions, a global market that accrued in 2018 more than one trillion dollars, is risky.

The amount of investment required for such clinical trials, small or large, is not set in stone, because not all clinical trials are equal. It depends on the designed trial, on the number of patients, on the follow-ups and protocols designed to evaluate results. That is why COVID-19 changed the rules for drugs discovery and intellectual property rules to a fast-pacing and global effort to speed up clinical trials results to be approved rapidly. The nature of the virus does not allow any waste of time.

COVID-19 is a lethal virus that replicates inside a host living cell in hours, leaving research and development teams around the world working with an unknown sub-microscopic infectious agent that replicates with a fury not seen before with other lethal diseases as Ebola, SARS or HIV.\(^5\)

That is where transnational intellectual property enters to assist the quest for an efficient therapeutic or an effective medicine to combat this plague. Transnational intellectual property may bring harmonization of intellectual property rules among different countries in which these research teams are located so that the information can run fast. Many research teams have started working together remotely, which will require more collaborative communication and feedback. Thus, transnational research means jointly work for a solution after the COVID-19 genetic code became public. Generally, the COVID-19 research has been grouped on four basic concepts for producing vaccines candidates: the virus itself, viral vector, nucleic acid and protein-based formulations.\(^{11}\)

With the dissemination of COVID 19, many individuals around the globe have been exposed to the virus, so an international commitment to share research and clinical trial results are imperative. The fact that many private and public institutions are joining efforts around the world is remarkable. A brief analysis of the regions racing on Research and
Development may indicate that North America, China, Europe and Australia are leading the race to find vaccines. Upon more detailed study, the transnationality of research teams is verifiable, for instance, an Indian manufacturer in full collaboration with an American research team may have the capacity to mass-produce a successful vaccine in a short period of time.xii

The public at large hopes that this opportunity to collaborate and produce a vaccine to save lives will avoid practicing prohibitive prices or restrict availability for poor and developing countries. There is hope that having a rich sample of volunteers around the world, one of the most extensive clinical trials ever conceived in our times, will be a game-changer. The pharmaceutical industry, health institutes and universities are working in various research projects unite for a viable vaccine instead of racing against each other to reach out to be granted a patent. That spirit of union in the scientific community allied with private biotechnology and pharmaceutical companies is an answer to the humanitarian crisis we are currently living in.

For private global companies, research institutes and universities globally to unite their efforts to find a solution for a pandemic that has killed more than 244K worldwide, the virus represents an excellent opportunity to revisit the meaning of collaboration. Joint research means spreading the costs among all stakeholders. Intellectual property rights have also an impact on the control of prices for exported goods. Any novel drug in the marketplace, particularly in the case of COVID-19 is beneficial for the whole population in the planet to be inoculated and achieve one of the established principles of intellectual property – to disclose the invention for the public.

In the case of COVID-19, a virus that kills the host rapidly, it is of extreme importance that a vaccine would be discovered in the short term to halt an increase in the number of deaths. For that matter, the versatility of intellectual property protection on arranging licenses for free dissemination of scientific information is crucial for sharing knowledge. This knowledge can be shared among researchers to be useful on technology and to inform the public. Our human ingenuity can find solutions, but the population must be informed of the benefits of receiving a vaccine for this malaise. It has been estimated that over 500 clinical trials are active for finding a cure for COVID-19, in which the Solidarity Trial is worth a mention.xiii The World Health Organisation has created the Solidarity Trial, which is a non-bureaucratic clinical trial that aims to speed up registration and certification of clinical trial results.

The Solidarity Trial is sponsored by the World Health Organisation, with a clear and fast procedure for hospitals, in which most of the COVID-19 severe patients are admitted for care and be monitored for clinical trials after enrolling in the program with no bureaucracy attached. This initiative demonstrates that less paperwork for
researchers and healthcare professionals on collecting consistent evidence will generate efficient treatment faster for all.\textsuperscript{xiv}

Intellectual property can be of great help to halt this lethal virus. We are sharing information using free publications, shared data, allowing compassionate use requests, which are not elements of what the established principle of patent monopoly is understood.\textsuperscript{v} Compulsory licenses were used as the last resort for diseases such as the HIV that decimated lives in the 1980s until antiretroviral treatment was developed. Litigation for intellectual property rights does not reach a benefit for the population at large, but it demonstrates the antagonism of humanitarian values and principles. We have high hope that this time of COVID-19 it will be different with the help of a robust and innovative transnational intellectual property system.

\textit{Ana Penteado is an Adjunct Associate Professor at The University of Notre Dame, Australia.}

\textsuperscript{x} For recent number of confirmed deaths which are updated daily. See, The World Health Organisation, Coronavirus disease (COVID-19) Pandemic, available at <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>


\textsuperscript{xiii} See, World Trade Organisation, The Doha Declaration explained, available at <https://www.wto.org/english/tratop_e/dda_e/dohaexplained_e.htm>

\textsuperscript{xiv} Compulsory licenses prior to Doha Declaration were connected to the HIV virus pandemic and the exorbitant prices practised by the developed countries pharmaceutical companies. In 1983, Brazil has its first diagnosed HIV case, from there the mortality increased exponentially because of restrict access to extensive drugs produced in the North hemisphere. Compulsory licenses to produce local medication that would be accessible to the large population was implemented by the Brazilian government, which influenced other developing countries to follow suit. See, , A Nunn, E. da Fonseca, and S. Gruskin, U.S. National Library of Medicine Institute of Health, Changing Global Essential Medicines norms to improve access to AIDS treatment: Lessons from Brazil, available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2768722/> See, also the World Trade Organization, DS 199, Brazil - Measures Affecting Patent Protection, available at <https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds199_e.htm>


\textsuperscript{xvi} When the Brazilian government of Fernando Henrique Cardoso and the Minister of Health Jose Serra changed the Brazilian patent law in 1996, the United States commenced a procedure against Brazil in the World Trade Organisation arguing the illegality of the AIDS program and the production of generic drugs to save lives. The strategy backfired in the public opinion worldwide, which brought light to the economic power of patent protection. Patents were on the bad side of the public policy, particularly on public health for developing countries with no access to essential medicines. See, A. Nunn, E. da Fonseca and S. Gruskin,US National Library of Medicine National Institute of Health, Changing Global essential medicines norms to improve access to AIDS treatment: Lessons from Brazil, available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2768722/> (for an account of the political struggle to bring control price on AIDS medicine which was contested by the United States in a trade dispute against Brazil at the World Trade
Organisation and other economic sanctions against developing countries using generic AIDS medicine).


Lockdown and Beyond: Impact of COVID-19 pandemic on global employment sector with special reference to India

Joystu Dutta, Ankita Mitra, Sufia Zaman and Abhijit Mitra

COVID 19: Facts and Figures on Death and Infection

COVID-19 or 2019-nCoV, the novel Coronavirus looms over the planet Earth as an imminent threat to mankind. It is a global public health emergency and a pandemic, as declared by World Health Organization. Until April 10, 2020; as we write this article, more than 1,615,046 people have been infected by this deadly virus with over 96,791 deaths and 362,538 recoveries and the figures are accelerating worldwide.

Lockdown: Prevention better than cure is the philosophy behind

Experts have suggested complete lockdown as the only measure to stop the exponential infectivity rates of the virus. Subsequently, on March 24, 2020, the Government of India ordered a nationwide lockdown for 21 days as a preventive measure against the spread of virus among more than 1.34 billion population of the subcontinent. This lockdown or complete safety restrictions imposed by the state ensure all services to close doors except emergency services such as drinking water, electricity, medical, police, fire, telecommunications, pharmacy, internet and other administrative sectors that have direct impact on sustenance of public life. This is in line with countries facing the pandemic and finding lockdown as the only relevant prescription to combat the virus spread among the civilians. However, the countrywide lockdown though is the only safety measure to be adopted without question at the moment, but the effects for a developing economy such as India is intimidating.

Picture of Lockdown: Indian Scenario

India’s occupational structure and poverty is not well equipped with the luxury of complete self-isolation or social distancing or lockdown at the moment. It is not a choice of lives on one hand and economic production on another; it is a question of lives versus lives. As nation’s economy is sinking and employments in both organized and unorganized sectors are going haywire with International Labor Organization (ILO) predicting the loss of more than 40 crore of jobs in India alone and more than 200 crore job loss globally. During the Great Depression which began in 1929, GDP plunged 50% from $105 billion in 1929 to $57 billion in 1932. One reason for GDP drop was deflation between 1929 and 1932 and average level of prices fell 30%. Nobody can predict the economic contraction to be caused by COVID-19 and its’ rippling effects on global employment sectors. Goldman Sachs predicted COVID-19 would cut US GDP by 34% in the second quarter of 2020 and by 6.2% for all of 2020, according to...
CNBC. Morningstar constructed several scenarios and its base case envisioned a 5% decline in 2020 US GDP- roughly in the middle of its optimistic and pessimistic scenarios. Morningstar expects global GDP to decline 1.4% in 2020 akin to what happened in 2008 recession and a big change from the global growth it had predicted for 2020. As per Mark Zandi, Moody’s Chief economist, Wall Street Journal, April 5, 2020, ‘This is a natural disaster. There’s nothing in the Great Depression that is analogous to what we’re experiencing now.’ The Great Depression caused exceptionally high levels of joblessness. Between 1928 and 1932, the unemployment rate soared from 3.2% to 24.9%- the highest rate in the history of USA. By April 2, 2020, US jobless claims in the previous two weeks have totaled nearly 10 million.

According to (Ray, et al., 2020), the Indian experience highlights, in a visceral way, both the Scylla of widespread viral infection and the Charybdis of socio-economic lockdown. India’s occupational structure is so diverse, and the base of the pyramid is so broad that it crumbles under the overwhelming population of fellow citizens below the poverty line. A comprehensive strategy of nationwide lockdown therefore must be accompanied with comprehensive State support for compensating welfare measures aimed at protecting the health, nutrition and psychological well-being of all households across the length and breadth of the country. This is undoubtedly a humongous job and impossible for any government across the globe taking into account the whopping population of 1.34 billion spanning over different geographies and socio-economic-political strata of the vast nation.

Viral outbreak has already exposed countless poor households (majorly in the urban peripheries and rural setups) to vulnerabilities of mortality and morbidity under the mercy of primary healthcare systems which neither have neither the manpower nor the expertise to combat a pandemic to the monstrosity of COVID-19. Adding to it is the lack of income and fear of employment loss giving ways to terrible food insecurity. The latest report published by Periodic Labour Force Survey paints a gloomy picture. Over 2017-18 FY, about 52% of rural households earned their bread through self-employment opportunities. Casual labor accounts for 25% of rural households while regular wage earners accounted for 12.7%. The urban picture demonstrates 32.4%, 11.8% and 41.4% figures for the above three parameters. We are reminded in our rural development lectures that urban poverty is more dangerous than rural poverty and India’s current lockdown phase combined with COVID-19 threats reclaims this fact. One thing that has to be admitted is that Government of India did institute a nationwide lockdown fairly early in the cycle, when the reported cases and casualty numbers were relatively low and we were standing in the midway of Stage 2 of community infection. However, the disastrous picture of millions of migrant workers panicking and rushing to their hometowns defying lockdown claimed lives too as shelter-less people walked down hundreds of kms with no food and water. These out-of-job workers along with or preceding the lockdown announcement lacking any relief package would constitute a huge population in
the nation’s unemployment graphs. It is a Catch 22 situation for the government. If it lifts the lockdown on April 14, we are certain to face a pandemic explosion with figures touching thousands and lakhs leading to complete collapse of healthcare systems as happened in USA and European countries, if not worse. On the other hand, extending the lockdown would call for a great economic depression and massive unemployment scenario with job losses and job cuts both in organized as well as unorganized sectors. In absence of comprehensive testing procedures for whooping population, countrywide lockdown or absence of it won’t be faithful in stopping the pandemic with silent increase in the number of asymptomatic carriers in population. This would make the battle longer and draining; socially, emotionally and of course economically.

**Solution in hand**
The pinpointed drug to prevent COVID-19 coronavirus is yet to see the light of accuracy. Rapid testing procedures in identified hotspots across the country along with state-imposed isolation and quarantine in state sponsored establishments while sealing the hotspot areas from rest of the country might bring a feasible alternative solution. Also door to door screening needs to be done with the support of unemployed local youths and healthcare professionals. This would not only make testing procedures loyal and free from local troubles but also ensure community cooperation. Local administration can play a key role in identifying the unemployed and eager youths in the process of door to door screening and provide them PPE as and when required.

As per global estimates, the worst affected sectors of global economic distress and COVID-19 impacts would include food and accommodation (144 million workers), retail and wholesale (482 million); business services and administration (157 million) and manufacturing (463 million) together adding up-to 37.5% of global employment and this is where the ‘sharp end’ of the impact of the pandemic is being felt now. India shows no difference and the scenario would far exceed the financial crisis and unemployment waves of 2008-2009. Workers and businesses alike would face urgent catastrophe in absence of any alternative economic package and oxygen from respective governments, already crumbling under the ongoing stress of COVID-19. However, frontline workers must be kept safe and protected with medical professionals, healthcare workers, supporting staffs and allied sectors combatting head on with COVID-19 crisis.

We make and break governments. This is not a time to either socialize or politicize. We need to play our own safe roles while supporting our co-civilians with basic supports like food, drinking water and medical attention. COVID-19 knows no geographical boundaries, no caste, creed, color or religion. It knows no economic or political strata or social boundaries but impacts everyone on this planet. Therefore, we must combat this crisis together and play our individual leadership roles in guiding communities not only in this crucial public health emergency situation but also in coming out of the closet of economic depressions.
Joystu Dutta is a Research Scholar at Department of Oceanography, Techno India University, West Bengal.

Ankita Mitra is a PhD Scholar at Department of Evolutionary Biology, University of Haifa, Israel.

Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.

References:

Weblinks:
https://mohfw.gov.in/
COVID-19: Few Facts & Figures

Roopali Roychowdhury, Sufia Zaman and Abhijit Mitra

Abstract

Human civilization is under the dark shadow of COVID-19 coronavirus which is a unique virus. The nucleus of this disease is supposed to originate in the Wuhan province of China from where the disease started to take a grip across the nations. The present paper highlights some facts and figures on COVID-19 along with a list of drugs that may serve as a lifeline in the present situation. Some home remedial measures have also been highlighted in the paper synchronizing with the concept “PREVENTION IS BETTER THAN CURE”.

Keywords: COVID-19, Disease, Coronavirus, Remedies, Prevention

Introduction

Novel Coronavirus disease (COVID-19) is an infectious disease which is caused by a new virus (Lu H et al., 2020). This disease had first shown its emergence in the city of Wuhan, Hubei Province in the Mainland China in early December 2019, and was hence known as Novel coronavirus disease nCoV (COVID-19) caused by the novel lineage B beta coronavirus known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) having a series of atypical pneumonia cases. Initially, tentatively named 2019 novel Coronavirus (2019-nCoV), the virus has now been named SARS-CoV-2 (Fig. 1a & 1b.) by the International Committee on Taxonomy of Viruses (ICTV)(Gorbalenya et al., 2020).

Fig. 1a. Novel Coronavirus SARS-CoV-2

Fig. 1b. 3D structure of SARS-CoV-2


Starting from Wuhan, the viral infection has spread rapidly worldwide, leaving almost no country untouched (LiQ et al., 2020; Chen et al., 2020; Huang et al., 2020; Wang C et al., 2020; Holshue et
al., 2020). Fig. 2 represents the major areas in China with positive cases of the COVID-19 virus during the outbreak (as of 28th January).

Fig. 2. Emergence of Coronavirus in China, with the number of positive cases
Source: China National Health Commission, BBC Research 28 Jan 2020

As of April 8th, 2020, 2019-nCoV has resulted in more than 1.4 million confirmed cases and over 86,000 deaths worldwide, affecting more than 209 countries/regions and has become a global pandemic (WHO). After February 26th the epidemic disease COVID-19, has crossed international boundaries, and severely affected countries like US (430k), Spain (150k), Italy (140k), Germany (110k), France (82k), Iran (67k), and UK(60k) (https://www.who.int,https://www.worldometers.info/coronavirus/) and many more, surpassing the number of affected persons compared to that of Mainland China. The disease causes respiratory illness (like the flu) with preliminary symptoms of cough, fever, and in severe cases, difficulty in breathing. Early studies have documented a possible link between fish and animal market to be a leading cause towards most of the possible coronavirus infection from animal to humans, but human to human infection of SARS-CoV-2 is mainly spread through contact and droplet transmission (Gorbalenya et al., 2020; Wang C et al., 2020; Carlos et al., 2020). The clinical spectrum of COVID-19 ranged from asymptomatic or mild respiratory infection to uncontrollable pneumonia with acute respiratory distress syndrome or multiorgan failure, which is fatal (Guan et al., 2020; Huang et al., 2020; Wang C et al., 2020). Most patients infected with SARS-CoV-2 exhibited symptoms of fever, cough, myalgia, fatigue and shortness of breath (Young et al., 2020). Coronavirus disease spreads primarily through contact with an infected person when they cough or sneeze, where, water droplets are the mode of transmission. It can further spread through contact of a person with a virus contaminated surface or object and touching their eyes, nose, or mouth. Wang D et al. have reported 41% of patients showing hospital related transmission of the virus (Wang D et al., 2020). Some of the researches have also pin-pointed that asymptomatic carriers have also contributed immensely towards growing infection ratio globally (Zhao et al., 2020; Biscayart et al., 2020).

Since the outbreak of this disease in the city of Wuhan, it has grown exponentially, due to which it was classified as a pandemic by the World Health Organization (WHO) on March 11, 2020. In
addition to the number of patients affected, the increasing death toll among patients, has raised concerns regarding infection transmission from patients tested positive for the disease, to the healthcare workers (HCWs) and the medical fraternity, towards the best known practices for personal protective equipment (PPE) use in a resource and information constrained environment (Workman et al., 2020).

The possibility of a person being infected by SARS-CoV-2 can be confirmed with laboratory-based testing methods for possible accurate diagnosis. Thus, testing for SARS-CoV-2 RNA has become the standard protocol for COVID-19 diagnosis (Li Q et al., 2020). In India the disease has spread rapidly in the majority of the states, which have quite a few patients who have a past history of travel to virus infected countries. In addition to this, due to multiple mode of transmissions, the number of COVID-19 patients is increasing at an alarming rate. However, proper testing for COVID-19 infection is essential to rule out the common cold and flu symptoms, before treatment. Quite a number of false negative results have been reported earlier, according to Li et al. which has resulted in a failure to quarantine the infected persons. Being unchecked, this has largely contributed towards viral transmission locally (Li Z et al., 2020). In India, reports of coronavirus infection started showing up at a fast pace and due to unavailability and insufficiency of test kit, it was criticized for not testing at the prescribed rates. Finally, on March 18 the first COVID-19 testing kit was developed by a Pune-based diagnostic firm Mylab's research and development. Minal Dakhave Bhosale and her team, from Mylab, prepared the coronavirus testing kit called Patho Detect, in just six weeks. This test can effectively diagnose, whether a patient is COVID-19 positive or negative in two and a half hours, while the imported testing kits take almost six-seven hours. Mylab laboratories have been registered as the first Indian company to have the validation for its Covid-19 diagnostic test kits, also known as the Reverse Transcription Polymerase Chain Reaction (RT-PCR) tests by the Drug Controller of India, after validation from the National Institute of Virology.

Materials and Methods
This is a first order analysis on COVID-19 collected from the research contributions of various workers, whose details are highlighted in the reference section. The authors have attempted to collect secondary data and stitch them in a systematic manner to present a comprehensive view of this disease, whose remedy is yet to be discovered.

Results and Discussion
COVID-19 is spread through transmission, i.e. from people to people. A small droplet from the nose or mouth of a person with COVID-19 can affect millions together in contact. The unaffected person becomes prone to this disease by personal contact or by contact through contaminated surfaces including paper, cardboard, steel, glass, wood, etc. In other words, it is highly contagious and can cause life threats if unattended. COVID-19 is a virus, and hence the antibody treatment is not feasible or sufficient in this case. Being a novel strain, the success in finding out a possible treatment is still
keeping the scientists and medical practitioners on their toes. The most effective ways to protect the body are, frequently washing hands with soap and water (preferably for 20 seconds), cover the cough with the bend of the elbow or tissue, and to maintain a distance of at least 1 meter (3 feet) from people who are coughing or sneezing or wear a protective mask covering nose and mouth. According to WHO, above 209 Countries and Territories around the world have reported more than 1.4 million confirmed cases of the coronavirus COVID-19 that had originated from Wuhan, China, and a death toll of over 86,000 as of April 8th, 2020. A comparative graph is represented in Fig. 3 which shows the rise in the number of new cases in each day. Fig. 4 represents the total number of Coronavirus cases, recoveries and deaths, worldwide (updated 8th April 2020).

Fig. 3. Graphical representation of the number of newly affected patients vs. number of recovery patients
Source: Worldometer - www.worldometers.info

Fig. 4. Coronavirus cases, recoveries and deaths, worldwide
Source: John Hopkins University, 8th April 2020

Scientists worldwide are trying to take the initiative in pioneering a medication and/or a vaccine, and possible medication strategy, for this pandemic disease. On this track the U.S. has come up with 3 types of vaccines for coronavirus (Table 1).

**Table 1. Types of vaccine in U.S.**

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Name of Vaccine</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Moderna’s mRNA-1273</td>
<td>Kaiser Permanente Washington Health Research Institute in Seattle</td>
</tr>
<tr>
<td>2.</td>
<td>Regeneron’s REGN3048-3051</td>
<td>Regeneron Pharmaceuticals of Tarrytown, New York</td>
</tr>
<tr>
<td>3.</td>
<td>Inovio’s INO-4800</td>
<td>Inovio Pharmaceuticals of Plymouth Meeting, Pennsylvania</td>
</tr>
</tbody>
</table>

Source: https://www.nbcnews.com/health/health-care/here-are-3-drugs-development-fight-coronavirus-2-vaccines-one-n1163191
Besides, different companies in the world are also involved in the making of vaccines (Table 2) (Published: April 5, 2020).

Table 2. Companies in the World involved in making of vaccine

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Company Name</th>
<th>Vaccine name</th>
<th>Phase treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BioNTech SE and Pfizer Inc.</td>
<td>BNT162</td>
<td>Preclinical</td>
</tr>
<tr>
<td>2.</td>
<td>CytoDyn Inc</td>
<td>Leronlimab</td>
<td>Phase 2 clinical trial</td>
</tr>
<tr>
<td>3.</td>
<td>Gilead Sciences Inc.</td>
<td>Remdesivir</td>
<td>Phase 3 clinical trials</td>
</tr>
<tr>
<td>4.</td>
<td>Regeneron Pharmaceuticals and Sanofi</td>
<td>Kevzara</td>
<td>Phase 2/3 clinical trial</td>
</tr>
<tr>
<td>5.</td>
<td>Roche Holding AG</td>
<td>Actemra</td>
<td>Phase 3</td>
</tr>
</tbody>
</table>

Source: https://www.marketwatch.com/story/these-nine-companies-are-working-on-coronavirus-treatments-or-vaccines-heres-where-things-stand-2020-03-06

A longevity biotech company in Japan, named Gero, established by a team of scientists and entrepreneurs having vast experience in the area of life sciences and specialization in AI-driven (artificial intelligence) drug discovery, have used its AI basics to identify the anti-COVID-19 drugs. Some of their drugs have been familiar for decades and approved in many countries for human or veterinary use, some of them have even confirmed the potency against SARS-CoV and SARS-CoV-2 viruses, while others were not much effective. Some drugs are listed in Table 3 which are formulated in different countries and considered to be effective against COVID-19.

Table 3. List of drugs against COVID-19

<table>
<thead>
<tr>
<th>Name of drugs</th>
<th>Types of drugs and treatment</th>
<th>Approved in countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niclosamide</td>
<td>Oral anthelmintic drug used to treat parasitic infections in millions of people worldwide</td>
<td>Italy, the United States (now withdrawn), France, and some other countries</td>
</tr>
<tr>
<td>Nitazoxanide</td>
<td>Broad-spectrum antiparasitic and broad-spectrum antiviral prescription drug used in medicine for the treatment of various helminthic, protozoal, and viral infections</td>
<td>U.S., India, Mexico and some other countries</td>
</tr>
<tr>
<td>Ixazomib</td>
<td>Prescription medicine used in combination with the medicines REVLIMID® (lenalidomide) and dexamethasone to treat multiple myeloma in patients who have received at least one prior treatment for their multiple myeloma</td>
<td>U.S., EU and some other countries</td>
</tr>
</tbody>
</table>


Scientists are evaluating the possibility of using two anti-malarial drugs, Hydroxychloroquine and Chloroquine, in the treatment of COVID-19, which may prove to be useful for prevention and treatment of people with infections. Chloroquine has been effective to inhibit the growth of the novel
coronavirus under laboratory conditions, and also been applied in China to treat critically ill patients. Another drug Avigan is already approved in China for treating symptoms of COVID-19. Avigan has been earlier used in Japan as a candidate anti-influenza drug, which had been developed decades earlier by the Fujifilm subsidiary Toyama Chemical, and has been approved for possible treatment of SARS CoV-2. Following this, a critical step involving clinical trials, which is likely to conclude by the end of June may provide a light of hope in this treatment. Although there has not been any documented data in support of Avigan’s effectiveness as a Covid-19 treatment, on March 17, Zhang Xinmin, a Chinese official at China’s Ministry of Science and Technology, has confirmed Favipiravirto be the generic version of Avigan, which has proved to be effective in the treatment of Covid-19 patients at the hospitals in Wuhan and Shenzhen. Japan now finds it safe to use Avigan as a prescription medicine for COVID-19 treatment(https://www.wired.com/story/japan-is-racing-to-test-a-drug-to-treat-covid-19/). However, Japan’s government is waiting for of its own clinical trials before utilizing the drug on a mass scale. Many countries are now relying on this medicine along with Indonesia and have joined the race to try their fortune.

**Home Remedies for COVID-19**

Some home remedial measures may provide protection from respiratory infections or may reduce the duration of symptoms

(a) Zinc is effective in reducing the length of certain viral infections, thus taking lozenges, syrups, and tablets containing zinc, might help in prevention of infection. The NIH (The National Institutes of Health) notes that the body needs zinc to create white blood cells that fight infections.

(b) For respiratory infection, Vitamin D is beneficial. Deficiency of which causes respiratory diseases like tuberculosis and pneumonia. Thus, Vitamin D levels can be checked for disease prevention to some extent.

(c) In a Chinese hospital, during the outbreak of COVID-19, Vitamin C was put into a phase 2 clinical trial where, researchers have proposed that being an antioxidant, Vitamin C may reduce lung inflammation.

**Testing laboratories in India and other countries**

In diagnostic laboratories, Real Time Reverse Transcription Polymerase Chain Reaction (RT-PCR) test (detects the presence of viral RNA in human samples) is used for COVID-19. The Indian Council of Medical Research (ICMR) has given the permission to conduct the test in 176 labs that includes 47 private labs. The U.S. Govt. Authority of Food and Drug Administration (FDA) has authorized 20 manufacturers and kits for diagnostic testing for COVID-19. Genetic and microbial testing firm, Bione has introduced a Rapid COVID-19 at-home testing kit that exhibits accurate results within minutes. This kit is approved by the Indian Council of Medical Research (ICMR)however it will be available after proper quality checks and affirmations. This company can supply about 20,000 kits per week and can make manufacturing
facilities in the coming months to sufficiently cater to the high demand. The price of the testing kit is varied between INR 2000-3000/- which depends on the global supply.

The first Indian molecular diagnostic company named Mylab Discovery, in Pune (Maharashtra) has received the approval for supplying coronavirus (COVID-19) test kit known as Mylab PathoDetect Covid-19 shown in Fig. 5 (a, b) which is called Reverse Transcription Polymerase Chain Reaction (RT-PCR) tests. It has also been approved by the Indian FDA / Central Drugs Standard Control Organization (CDSCO) for uses in commercial purpose. and will be available for approximately INR1200.

Different companies in the World have received approvals for antibody based rapid test kits. Among them most of the companies are from China, namely Hangzhou Biotest Biotech, Getein Biotech, AmonMed Biotechnology Co., Beijing Tigsun Diagnostics Co. Ltd., Hunan Lituo Biotechnology Co., Vivacheck Lab and Wondfo, Biomaxima (in Poland),Sensing Self Ltd based in Singapore and CTK Biotech and BioMednomics are from the U.S. Cranfield University has engaged its researchers in developing a new test to detect SARS-CoV-2 in the wastewater of communities infected with the virus. As faecal contamination with the said virus is reported by researchers (https://www.nature.com/articles/s41575-020-0295-7), the wastewater-based (WBE) approach may provide an effective and quick way to predict the specific genes effectively and works on any Realtime PCR instrument available in the lab, and hence does not require any new or closed systems.

Fig.5. TRUPCR® SARS CoV-2 Real-Time PCR test kit

![TRUPCR® SARS-CoV-2 RT qPCR KIT](https://www.3bblackbio.com/trupcr-product.html)

In India, the 2\textsuperscript{nd} approved company is 3B BlackBio Biotech which is located in Bhopal. They have received the ICMR approval for their COVID-19 Real-Time PCR detection kit on April 02, 2020. 3B Black bio Biotech (I) Ltd. a branch of KILPEST India Ltd. The kit named TRUPCR® SARS CoV-2 Real-Time PCR test kit (Fig. 6) is a molecular detection test which screens and detects COVID-19
possible spread of novel coronavirus pneumonia (COVID-19) by banking on biomarkers in faeces and urine samples from suffering patients or disease carriers entering into the sewage system. This employs Rapid test kits made up of paper-based devices to be used on-site at wastewater treatment plants to rule out potential COVID-19 carriers in local areas.

It has been reported that, in addition to seasonal influenza, pathogens of pneumonia are also found in adenovirus, human bocavirus, human metapneumovirus, parainfluenza virus 1/2/3, rhinovirus and respiratory syncytial virus A/B. Study using molecular methods, and the role of these viruses in causing pneumonia has achieved significant acclamations. SARS-CoV-2 has been reported to be a positive-sense, single-stranded RNA virus belonging to the genus Beta coronavirus (Chan et al., 2020; Lu R et al., 2020; Zhu et al., 2020). Based on the documentations of genomic investigations by Jiang et al. (2020) and Zhou et al. (2020) it can be evaluated that the presence of bats and live animals in the Wuhan seafood market, may have been the causative agent for SARS-CoV-2 through bats or bat droppings which had contaminated the market and surrounding regions (Jiang et al., 2020 and Zhou et al., 2020). COVID-19 virus being airborne and having small particle size can travel extensively as aerosols and hence it is mandatory to use specific PPE to protect against inhaled transmission. N95 respirators qualify for the same as they are air purifying respirators and protect against droplet or airborne transmission. Their filtering efficiency is satisfactory as set forth by the National Institute for Occupational Safety and Health (NIOSH) N95 standard, which filter large droplets and penetrating aerosols 0.3µm in diameter with 95% efficiency. The typical infection is specified by respiratory problems, which indicates droplet transmission being the major route. However, reports of gastrointestinal problems in some patients with SARS-CoV-2 infection along with the presence of viral RNA or live virus infection in their faeces, reflects another possibility of faecal–oral transmission (Hindson, 2020).

Although the exact mechanism of SARS-CoV-2 interaction with the gastrointestinal tract is unknown, SARS-CoV-2 is believed to use ACE2 mRNA as a viral receptor, which is expressed in the gastrointestinal system. Clinical specimens from over 73 hospitalized patients with SARS-CoV-2 infection were examined by gastroenterology researchers. Among them, 39 patients tested positive for SARS-CoV-2 RNA in stool samples, but 17 patients were found to be positive for SARS-CoV-2 in stool samples, although being negative in their respiratory samples or nasal swabs (Xu, et al., 2020). Additionally, waste-water-based epidemiology (WBE) approach may be an effective tool to detect local area contamination of novel coronavirus pneumonia (COVID-19) in waste waters, using biomarkers of faeces and urine. Paper based Rapid testing kits can be used on-site wastewater treatment plants to determine the spread of contamination and possible carriers of this disease (Kang et al., 2020). According to Dr Zhugen Yang, Lecturer in Sensor Technology at Cranfield Water Science Institute, for those people who are...
unknown of the fact, that they may be carriers or are infected, this type of analytical device can help in the rapid screening, quarantine, prevention and cure (Cranfield University, 31 March 2020). If monitored at local and individual levels at an early stage, possible restrictions for contacts and socializing may be done which may reduce pathogen spread to further populations. The WHO declared the COVID-19 outbreak as a public health emergency of international concern, after H1N1(2009), polio(2014), Ebola in West Africa (2014), Zika(2016) and Ebola in the Democratic Republic of Congo(2019).Thus, health workers, governments and local people need to co-operate at a global level to prevent the spread (Yoo, 2020). Most of the global business and the travel industry has been affected by this pandemic setback. As a result of the disease transmission, the majority of the world is undergoing a lock down period to prevent mass gatherings and travel. The United States and most of Europe have enacted travel bans and put major cities on lockdown to slowdown the spread of coronavirus. Similarly, Japan and other countries, including India, have closed schools and cancelled many sporting events, to avert further disease transmission. Not only many positive cases are reported every-day, but thousands of people with travel history from the affected areas or those who have tested positive for COVID-19 but are asymptomatic, have been kept under quarantine and isolation to avoid further risk of contamination. The local government has ensured stay at home safety measures by creating awareness among people, to avoid contact with affected persons, washing hands with soap and water and sanitization of hands with alcohol-based sanitizers. The concept of ‘Social distancing’ has also been in practice so as to fight the battle against the Coronavirus. As limited knowledge about this novel virus is available, it remains advisable to implement infection control measures to prevent the spread of SARS-CoV-2 via human-to-human transmission. Strict monitoring of the situation and patients in isolation and quarantine can help in controlling the spread of the disease, resulting in the number of deaths. Clinical trials of vaccines and drugs are still awaited, and the need of the hour is to support the health care workers and the Government to get over from this pandemic. The more we remain indoors and confined, the better it would be.

Roopali Roychowdhury is serving as a Post-Doctoral Fellow in the Department of Oceanography, Techno India University, West Bengal.

Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.

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Introduction

No one imagined that world is going to be at a stand-still as it is today. The world of automation has come to a halt. The best of economies has suffered terrible losses. The vulnerability of being human was exposed like never before. The novel coronavirus, christened as COVID-19 (Coronavirus disease 2019) is a zoonotic disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), previously known as 2019 novel coronavirus (2019-nCoV), a strain of coronavirus. The initial cases were seen in Wuhan, China, in December 2019 before spreading globally. The current outbreak was officially recognized by the WHO as a pandemic on 11th March 2020. While it is spreading like wildfire killing people and wreaking havoc upon the world economy, unprecedented efforts are still on across the world to control this viral strain from further spread. Instances of major cities and towns being blocked, all air travel across the world banned, ships stranded and quarantined, and streets have been de-peopled across the world. As COVID-19 continues to devour upon the health and economy of countries across the globe as the pandemic looms large, the world witnesses the downfall of mankind unprecedented since World War-II.

This article provides an overview of its impact on force majeure clause and on commercial leases to tickle wits of intellectuals on how easily a microscopic organism can bring down superpowers of the world.

1. Force Majeure clause and The Indian Contract Act, 1872 (hereinafter referred to as “the Contract Act”)

The concept of force majeure (generally construed as superior force) has its origins in Roman law. Under the name “vis major” or “vis divina”, Roman law designated unforeseeable and irresistible events that excused a debtor of performance. The concept was later adopted by civil law countries and was later incorporated in the French Civil Code 1804 (Napoleonic Code).

India inherited major commercial laws from her colonial rulers. Under Indian law, this clause must be explicitly provided for in the contract and accordingly protection shall be afforded in a given situation. It is a contractual provision that is usually agreed upon at the time of entering into a contract by parties involved. It seeks to cover extraordinary events or circumstances beyond the control of parties to a contract and typically includes events described as act of god or natural disasters, war or
war-like situations, labour unrests, strikes, epidemics or pandemics. In simpler terms, *force majeure* is a jolt that one wouldn’t be able to foresee or protect themselves from. The intention of this clause is to save the parties to a contract from facing consequences over which they have no control. It is therefore, an exception to what would ordinarily otherwise amount to a breach of contract.

Given that a *force majeure* event has enough capacity to delay, interrupt, or even lead to cancellation of the performance of many contracts, some reference can be made to Section 32 and Section 56 of the Contract Act in this regard.

The term *force majeure* has been clearly dealt with over a century ago by McCardie J. in *Lebeaupin v. Crispin*iv, which was later cited by the three-bench judge of Supreme Court of India in *Dhanrajmal Gobindramv. Shamji kalidas and Co*.v. It elaborated that *force majeure* is an act that a person has no control over, and in law, it is intended to save a performing party to a contract from the repercussions of such act.vi

It is worth clarifying that the concept of *force majeure* extends well beyond an “act of god” (natural calamities such as earthquakes, typhoons etc.) and includes man-made circumstances as well, such as change in law, government policy etc. It may include the ancillary acts to the main contract as well. However, that may vary from the facts and circumstances of each case.

Therefore, in light of this inference the lockdown imposed by the governments in the current times is fit to fall under the definition of *force majeure*.

To dive into the details of *force majeure*, it is important to bifurcate it into the following two situations:

1.1.Presence of a *force majeure* clause in a contract

In *Satyabrata Ghose v. Mugneeram Bangur & Co.*vii, the Supreme Court held that

‘...When such an event or change of circumstance occurs which is so fundamental as to be regarded by law as striking at the root of the contract as a whole, it is the court which can pronounce the contract to be frustrated and at an end’

The Supreme Court in *Energy Watchdog v. Central Electricity Regulatory Commission & Ors*viii, held that

‘Force majeure is governed by the Indian Contract Act, 1872. In so far as it is relatable to an express or implied clause in a contract, such as the PPAs before us, it is governed by Chapter III dealing with the contingent contracts, and more particularly, Section 32 thereof. Insofar as a force majeure event occurs de hors the contract, it is dealt with by a rule of positive law under section 56 of the Contract.'
1.2. **In the absence of a force majeure clause in the contract**

In the absence of any *force majeure* clause in a contract, on the occurrence of an event that results in the impossibility of performance of obligations by any party to the contract, Section 56 of the Contract Act would apply. Here the test is the significant change in the situation originally agreed upon which affects the performance of the obligations of the parties.

Indian courts have held that the term ‘impossibility of performance’ is not restricted to physical or literal impossibility but also includes circumstances wherein it may be impracticable and useless from the point of view of the object and purpose of the agreement which the parties had in view due to an untoward event or change of circumstances. As per section 56 of the Contract Act, an agreement to do an impossible act is void and therefore the parties are discharged from compliance with their respective obligations.

The impracticability has to be demonstrated by the parties and shall be decided on a case to case basis. Mere difficulty in performing an obligation or increase in price rendering such delivery expensive is not sufficient. The cost of performing the obligation should be highly excessive and unreasonably high rendering it impracticable to perform and thereby impossible.

In the above-mentioned case of *Satyabrata Ghose v. Mugneeram Bangur & Co.*\(^{ix}\), the Supreme Court also held that,

> ‘Section 56 lays down a rule of positive law and does not leave the matter to be determined according to the intention of the parties.’\(^{x}\)

It is quite apparent that when a force majeure clause is present in a contract, the intention of the parties to discharge obligations upon the occurrence of certain contingencies is a determining factor. In the absence of the clause, the situation shall be governed by Section 56 of the Contract Act which is also termed as the doctrine of frustration.

As per the doctrine of frustration, the performance of the agreement is excused in the situations wherein:

(a) the circumstances changed fundamentally from the situation contemplated at the time of the entering into the agreement; and

(b) the performance of the agreement becomes entirely impossible without a willful default or negligence of either of the parties to the agreement.

In the present scenario, there is room to argue that the outbreak of the COVID-19 can be categorized as a supervening impossibility. In the cases where parties to a contract have chosen not to include a force majeure clause, section 56 of the Contract Act can be analyzed on a case-to-case basis, to determine whether the parties’ obligations under such agreements can be dispensed with.

While the aforesaid recourse under section 56 of the Contract Act may be available depending on the facts of the case, it is prudent for the parties to
commercially evaluate whether such a recourse resulting in the underlying contract between the parties being rendered void is a desirable step or not.

2. Impact of COVID-19 over Commercial Leases

The outbreak of COVID-19 can prove to be the biggest black swan event for the real estate sector. This situation has found all countries amidst a crisis on all fronts. Beyond the obvious health repercussions, this global pandemic has caused major pandemonium in the global business arena. On one hand, where we can see direct commercial impacts on specific sectors, with interruptions to supply chains, challenges in meeting contractual obligations and implications under funding arrangements, other impacts are universal.

Due to the fluid nature of the outbreak and uncertainty of getting back to the grind, parties to commercial lease agreements are likely to encounter challenges in meeting their contractual obligations. The order of the state governments instructing the shut-down of commercial establishments engaged in non-essential services has encouraged employers and employees to work from home and has rendered leased premises unusable for the time being. Additionally, the loss of business due to the outbreak may consequentially affect lessees’ ability to perform their obligation with respect to payment of rent. Under these circumstances, lessees may renegotiate the terms of their leases. However, any such re-negotiation is based on mutual agreement and lessors are not likely to entertain requests for the same without being contractually bound to, due to their personal reasons or any other whatsoever.

In order to ascertain whether the failure to perform contractual obligations under lease agreements due to COVID-19 related causes constitutes a breach of contract or default due regard needs to be given to the provisions of the lease agreement. Although most lease agreements provide for force majeure clauses, the circumstances under which the clause may be invoked and the party that may invoke it may not be straightforward.

Pertaining to the interpretation of force majeure clauses which has been discussed in detail above, in order to understand whether the force majeure clause covers the COVID-19 outbreak, the construction of the force majeure clause will come into play. If the force majeure clause contains terms such as ‘epidemic’, ‘pandemic’, ‘act of God’, ‘acts and regulations of government of India’, ‘natural calamity’, ‘these situations and events are beyond the reasonable control of affected party, or such situations or events could seldom be prevented through employment of prudent utility practices’ etc., the COVID-19 outbreak may fall within the ambit of a force majeure event as stipulated under the lease agreements.

The right to suspend payment of rent or any other financial obligation in the event of a force majeure event, is seldom the intention of the parties while negotiating a lease agreement. Therefore, the unequivocal answer to whether the lessee’s
obligation to pay rent will abate on account of the COVID-19 outbreak is not likely to be specifically addressed in lease agreements. That said, lessees could attempt to argue that premises are unusable due to external factors and therefore, rent payments should abate.

In the event the present scenario the parties may seek the relief provided under the clause. However, even in the event of an undisputed force majeure event, lease agreements often also specify potential result of the force majeure event only upon the occurrence of which the clause may be invoked. Specifically, the agreement may state that the parties’ obligations will be suspended only in the event that the premises are damaged or destroyed and therefore cannot be used by the lessee. For instance, the language may read, ‘In the event Lessee is prevented from using of the premises, or any part thereof, due to destruction or damage thereof, by reason of fire or other casualty or accident, natural catastrophes, governmental action, war or other violence, any change in law or any other act outside the control of the Party whose performance is affected, performance of such act will be excused for the period of the delay and the period of performance of such act will be extended for a period equivalent to the period of such delay’, it may be argued that the obligations of both parties shall be suspended, including the lessee’s obligation to pay rent, while the force majeure event subsists.

Further, it is pertinent to note that in order to invoke the force majeure clause, the party invoking the clause may be required to undertake certain procedural obligations such as providing notice to the other party.

If the lease agreement does not provide for a force majeure clause, neither party is protected from any claim of breach against it, even if the same was beyond its control. However, in the event that the premises are damaged due to ‘fire, tempest or flood, or violence of an army or of a mob, or other irresistible force’ rendering it unfit for the purpose for which it is leased, the lease may be void at the option of the lessee, in accordance with Section 108 (e) of the Transfer of Property Act, 1882.

It may be argued that the doctrine of frustration, as discussed earlier, may apply where a force majeure event has occurred but there is no damage to the premises leased. However, the Supreme Court, in the case of Raja Dhruv Dev Chand v. Raja Harmohinder Singh held,
“the doctrine of frustration as stipulated in section 56 of the Contract Act does not apply to leases. It held that a lease is a completed conveyance rather than an executory contract, and that ‘Where the property leased is not destroyed or substantially and permanently unfit, the lessee cannot void the lease because he does not or is unable to use the land for the purpose for which it is let to him.’”

Conclusion

This crisis leading to numerous government directives, would play a vital role in the domain of contracts and commercial leases once the pandemic subsides. The parties to various such contracts must know their legal position as well as the legal position of their contracts to avoid unnecessary complications in these testing times. Inter alia, a proper understanding of the position coupled with sector specific government directives would definitely help to avoid legal complication and in rebuilding India economy in the years to come.

Abhijeet Agarwal is a BA.LL.B. Fifth year student, Amity Law School, Kolkata.

Dr Shambhu Prasad Chakrabarty is the Head and Research Fellow of CRSGPP, WBNUJS
Abstract

SARS-CoV-2 has turned the world on its head in less than six months. The disease has engulfed the world, irrespective of economic standing, medical infrastructure or military prowess. India too has fallen prey to this disease and is currently in the midst of battling it. As the battle intensifies against this ominous pandemic, India, in addition to the extensive scientific and medical research undertaken, has started taking several supporting steps in the form of janta curfew, nationwide lockdown, travel bans, lighting diya, banging of utensils etc. to curb the widespread of COVID-19 and boost the morale of people. Since the inception and more specifically in the last few weeks, the country has witnessed certain stark anomalies while implementing measures like social distancing and awareness programs. These anomalies ran contrary to basic human rights and constitutional principles.

The paper undertakes a brief and specific study of instances of violation of basic legal and constitutional principles and underlines the legal recourse against such violations. The paper also examines the principle and scope of the concept of secularism, limitations of police powers, quality of information and questionable content distributed and introduced in the information system and challenges thereto. From a holistic point of view, the article attempts to address the growing concern violating basic human rights of the people of India amidst this coronavirus outbreak.

1. Introduction

“Everyone has a plan until they get punched in the mouth”, the famous quote by Mike Tyson, could not have been more relevant than now. As the world grapple with the pandemic named COVID-19, nation state’s governments have been busier than ever, trying to come up with plans to react positively to this pandemic. Realization of the importance of research on science and medicine and the significance of the robust health care system is unprecedented. The existence of human coronavirus can be traced to the year 1965 when it was named as B814. Time and again humankind has been revisited by viruses leading to respiratory diseases, the latest being in the form of COVID-19. With the introduction of COVID-19, the so-called developed nations which are categorized as ‘economic powerhouses’ with state-of-art research and health care systems, and a plethora of arms and ammunition to burn down the world several times, are struggling to address the pandemic. Developed Countries have fared worse some developing countries. Governments, virologists, scientists, health care workers, sanitation workers, media workers, the police force are all working hand in
hand to “flatten the curve”. Due to the highly contagious nature and severity of the disease coupled with lack of treatability measures and poor health care infrastructure, prevention of the spreading remained the most viable option for developing nations like India. Indian Prime Minister invoking Disaster Management Act, 2005, announced a nation-wide lockdown while the State governments resorted to Epidemic Diseases Act, 1897 to frame rules, regulation and guidelines for the prevention of COVID-19 even though it was expected to cause an adverse impact in the economy. However, the economic dip could be considered as a fair price to pay for saving thousands of lives, if the mitigation efforts are successful. What was not taken into account at the inception of lockdown was the possibility of violation of human rights and constitutional principles in the form of excessive force used by the police power or questionable content circulated over social media or religious or racial discrimination being propagated. In this article, the authors intend to bring forth the extra COVID-19 challenges which are of no less concern than the disease itself and are to be addressed simultaneously. Not addressing these would significantly mar the battle against COVID-19. The article is divided into five segments; Introduction is followed by a section on Information System, Social Media and Questionable Content in India, in the time of COVID-19, Fine line between Social Distancing and Discrimination, Police Support aided by Police Brutality and finally Conclusory Remarks.

2. Information System, Social Media and Questionable Content in India in the time of COVID-19

Over 500 million Indians are considered to be active users of the Internet as of 2019\(^i\), while the number of social media users are exceeding 350 million\(^{iii}\). The number of users is only expected to go higher in the years to come. However, since the majority of Indians are still receiving their share of news and information through the offline medium, it is imperative we look at their source of information, and the role and impact of questionable online information, in both online and offline information consumption. In this segment, we will engage in the study of the quality of information and questionable information regarding COVID-19 circulated online and offline, and the impact of dissemination of this questionable information.

The lack of information, knowledge and research on COVID-19 gave rise to misinformation and questionable content, both online and offline, ranging from the religious narrative of ‘judgment day ‘dawning upon humankind to punish them for the sins\(^{iv}\) to political narrative of COVID-19 being a man-made bioweapon’. Between the ranges, lay a plethora of questionable content, capable of feeding on the insecurities of educated and uneducated alike. When it comes to non-internet-based dissemination of information, televised advertisements\(^{vi}\), radio\(^{vii}\), poster campaign in multiple languages\(^{viii}\), informative cartoon books for children\(^{ix}\), leaflets for public distribution\(^x\), TV &
Radio Spots\textsuperscript{xi}, etc. have been the primary media. Besides these, there has been evidence of individuals announcing and spreading awareness about COVID-19 and lockdown and do’s and do not’s during this pandemic. With such extensive measures, it is expected that people who are not connected to the world through the internet would follow the instructions and act prudently. However, the question arises as to why some people are refusing to stay at home and defying the lockdown orders\textsuperscript{xii}? Why are people still gathering in mass? Why are migrants out of their house and attempting to cover thousands of miles from an industrial workplace to their respective hometowns? Why aren’t the people with symptoms of COVID-19, voluntarily submitting themselves for tests\textsuperscript{xiii}? Is it possible that their judgment and power to reason is clouded by the barriers of misinformation circulating over the information system online and offline, through word of mouth, their own experience with their surroundings?

There is a general assumption that all those who don’t have access to the internet are immune to misinformation or questionable content. However, we fail to realise that rumours and questionable content are not a by-product of the internet age --the practice exists since long. Hence, individuals without access to the internet may not be subjected to questionable online misinformation directly but will be exposed to misinformation through word of mouth. This is coupled with observation of the behavioral pattern of the so-called “literate and educated individuals” making them an indirect victim of misinformation and influence their actions. There have been efforts from community radio and government to curb the menace; still, questionable information continues to largely hover on the people. While a significant number of the population remains indoors respecting the lockdown and saving lives, while honing culinary skills, engaging in board games, online games, social networking, and exploring the possibilities of work from home, there lies a large section of the population who are far from their comfort of home, living in slums. Groups of 7-10 individuals holed up in a single room, do not have the Luxury of social distancing, have no opportunity to earn their daily wages by working from home and have nothing to send back to their needy families back home\textsuperscript{xiv}. The psychological unrest which exists amongst these migrants is not relatable for the population that can virtually carry out their jobs from their homes. Awareness programs conducted by government irrespective of the media have only limited reach to this set of population. With such a diverse set of the population, from a cultural, socio-economic and religious perspective, is it appropriate to expect a standard and uniform impact on people of the government-run advertisements? On one hand, we have a population that is in regular interaction with the internet and have the comfort of home and basic amenities being taken care of, on the other we have a mixed population where all the individuals do not have digital footprints, living far away from their family, earning daily wages and limited sense of security. Dissemination of information may not
always be enough to cater to fundamental rights; the quality, standard and medium of information depend much on the recipients. This set of the population depending upon offline resources are suffering from certain limitation. If those limitations are not taken into the account while disseminating information to this population, even real information has the potential to be misconstrued as misinformation and questionable content due to the quality of reception and self-contextualization.

The menace of questionable information is far more apparent over social media, and online news portals. At the international scale, the top myths which circulated over the internet were (a) COVID-19 is Just another flu; (b) Heat kills COVID-19; (c) Home remedies can cure COVID-19 (d) Origin of COVID-19 being a Bio-weapon, (e) The vaccine already exists for COVID-19\textsuperscript{xv}, these myths have been successfully debunked and a large section of the population have disengaged from such narratives. However, the damage of these questionable contents continues to hover around, now and then. While it has been evidenced through research that questionable content is primarily floated for ideological propagation or pecuniary benefit, but the pandemic in question brought eminent figures and national leaders actively participating and contributing to the questionable contents. Donald Trump, the President of the United States of America urged the use of hydroxychloroquine, to counter COVID-19, without any hard evidence at his hand regarding its efficacy\textsuperscript{xvi}. The President in question had not stopped at that, excerpts of a series of tweets on a microblogging site called twitter, showed that he on a regular interval delivered questionable content over social media\textsuperscript{xvii}. Misinformation and questionable content have not only derailed scientific research and medical developments but also impacted several other rights which are inalienable. Accidental deaths\textsuperscript{xviii}, Religious discrimination\textsuperscript{xix}, racial discrimination\textsuperscript{xx}, abuse of the right to information\textsuperscript{xxi}, police brutality\textsuperscript{xxii}, mass disinfection of individuals\textsuperscript{xxiii}, marginalization based on race and region\textsuperscript{xxiv} etc. all could be apportioned to the questionable contents circulating over the information system. The Indian government has proactively engaged in debunking misinformation, fake news and questionable contents through a dedicated window for a fact-check\textsuperscript{xxv}. Through this portal, tweets and other questionable news with respect to governmental measures can be verified and true position can be ascertained. Facebook and other social media have their share of tie-ups with third-party fact-checkers\textsuperscript{xxvi} and have been playing an essential role to curb fake news. Nonetheless, the menace continues. There have been portals and dedicated account numbers which may assist in fact-checking. However, the problem continues to plague, due to the nature of the content, which feeds on insecurities or reaffirms belief which acts as the psychological resistance to put the effort to question it and verify it\textsuperscript{xxvii}. A mind incapable of making critical approach is automatically barred from active participation in the process of fact-checking\textsuperscript{xxviii}. Furthermore, the styling and content are targeted to
such vulnerable individuals, that it is getting well spread due to its unique feature of being able to travel at a faster speed through the algorithm of social networking before it is check. Thus, the whole scheme of information system, offline or online needs a re-look from the perspective of the actor, rationale, medium, and recipient (ARMT). To eliminate the challenges of questionable information, a multifaceted approach involving customized awareness program to effectively provide information, enable mass to think critically and not be mere machine line product along with robust fact-checking systems are imperative.

3. The Fine line between Social Distancing and Discriminatory Behavior

COVID-19 brought a unique situation before the world, were not only fellow countrymen, but all of humankind declared that they are together in the fight against COVID-19, the behaviour mirrors plot points from popular Hollywood film where the world is under threat from aliens and together they fight it off, albeit the US leading the way. COVID-19 brought forth such an emergent situation that the countries are facing such an enemy who is one without any religion, nationality or ideology, it did not target based on one’s race or socioeconomic status, the disease has been the most indiscriminate in choosing its target.

India, suffering through a significant turmoil over religion and political issue over the past few months, has been no exception from the being an indiscriminate target of the disease. The pandemic situation prevailing currently provided the best opportunity to bring down the conservative and toxic thoughts of several people. The virus had paradoxically, provided an opportunity for healing of the partisan wounds. With measures such as “Janta curfew” and lockdown, Indian Government showed took a strong position against the pandemic and resolution to protect human life. Through social media individuals in India showcased their solidarity against COVID-19 through several acts such as lighting Diya and banging utensils from their respective balconies, while that being inspirational and reflect the seriousness of the pandemic, could not be categorized as a complete story.

Days after the announcement of 21days lockdown it was learnt that there was a congregation of Tabligh Jamaat at Nizamuddin Markaz, Delhi from 13th - 15th March 2020, at the Somnath Temple, Gujarat, has seen around five thousand (5000) devotees per day between 18th and 19th March 2020, just a few days after the Nizamuddin gathering. Besides religious gathering, there were wedding ceremonies with thousands of attendees, involving relatives of political leaders irrespective of their alliance, and birthday parties by the common man. These acts reflect anything but an act of social distancing.

The trouble starts when the solidarity India showed, while lighting Diya and gave the hope that India is capable of fighting the battle together irrespective the diversity, goes out of the window, the moment the people stopped viewing the victims of COVID-
19 as patients, rather perpetrators of spreading the disease and associate them with their particular belief system. It has been seen that following the reporting of Tablighi Jamaat gathering, lead to the circulation of a large number of questionable contents through videos and news, which showed the believers of the Islamic faith in a negative light, with the hashtag “corona jihad” appearing for lakhs of times being viewed by millions of people since 28th of March, 2020. While only limited media coverage could be seen with regard to the temple gatherings. Separate events, different religions, one not forming the majority of the population gets negative media attention and being considered scapegoat for the spread of the disease and circulation of material condemning the whole religion for it; while the other religion forming the majority of the population, holds similar gathering prior to the announcement of lockdown gets limited media attention. Reports say that a case of criminal conspiracy has been filed against the organizers of the Nizamuddin gathering for violating the Central Government Guidelines to strictly follow social distancing while no reports of similar action against the ones responsible for mass gathering at religious institutions have surfaced yet. To make matter worse some eminent political party leaders accused Tablighi Jamaat of carrying out a “Talibani crime”, described their members as “human bombs, but in the guise of coronavirus patients”, and called for Tablighi Jamaat leaders to be both hanged and shot. While another leader tweeted: “Tablighi Jamaat people have begun spitting on the doctors and other health workers. It’s clear, their aim is to infect as many people as possible with coronavirus and kill them. As said by the Chairman of the Islamic Center of India, Khalid Rasheeed, even after the pandemic gets over, the virus of communal disharmony will be very hard to kill and the of secularism envisioned in the preamble and fundamental rights would be nothing but lost, thereby leading to further communal tension in India. Pandemic COVID-19 demanded social distancing and solidarity, however, what we have experienced that a single event, when propagated with religious colour and aided with questionable information, is capable of spreading “Islamophobia” and discriminatory treatment. Such treatment towards any religious community can be anything but an act of solidarity against the pandemic.

The elements of unfair and discriminatory treatment are not based on religion alone as citizens of the country continued to experience marginalisation and discrimination. It is reported that the families of the Yanadi community, residing in a village in Vijayawada, Andhra Pradesh, working mainly as waste pickers, drain cleaners, etc., were segregated way before the outbreak of COVID-19, since they belonged to the Dalit community. These poor people due to their social status have been banned to go downhill for the purchase of essential commodities. Furthermore, the people from North-East have been subject to increased discrimination, a lady from Sikkim residing in Kolkata was questioned whether if she belonged from China and was asked to undergo COVID-19
test just because of her appearance though she had no symptoms of the deadly virus and was suffering from a mild urinary tract infection\textsuperscript{xi}. In a report shared by social activist and lawyer Alana Golmei, an incident took place in Vijay Nagar, Delhi, where a Manipuri woman who in her early 20s was teased by calling her “corona” and spat by a man in a two-wheeler\textsuperscript{xli}. Such, feeling of resentment and marginalisation is plaguing and weakening the solidarity India as a country had shown at the beginning of the fight against the COVID-19.

While the lockdown measure, was a reflection of the government’s commitment to the preservation of life and prevention from the spread of COVID-19, an oversight about the status of migrant workers and daily wage earners, seems to have become the biggest violation of human rights and constitutional principles which Indian Constitution stands for. A significant share of the population with limited means and education in their kitty has left their homes for urban and industrial areas in search of work and undergoes daily struggle to survive and provide for dependents back home. Around 45 million migrant workers are left listless and clueless since the lockdown, some have started to reach their hometown on foot with child on the shoulder, some without a roof, some without means to purchase livelihood and most without job or means of livelihood or any form of security\textsuperscript{xlii}. There was a huge crowd of more than thousand migrant workers were witnessed in the Bandra railway station, with only one demand from the government i.e. to make provisions of sending them back home since they were trapped and they did not have any means to return home during the extension of the lockdown\textsuperscript{xliii}. The efforts of the Governments to prevent the spread of disease are undoubtedly laudable and brave, but the question may arise about the preparedness and use information system during the lockdown. While a section of the population is sitting safely behind their closed doors with the option of working from home and other activities to keep themselves occupied and maintain sanity, this large set of population, who enjoy equal citizenship right as any other enjoying higher socioeconomic status, are struggling to survive. This set of the population is not well informed or educated or have any form of security. The Governmental steps for spreading awareness are uniform and fail to take the comprehension capacity of the diverse target audience and their insecurities. The panic behaviour amongst the people from higher socioeconomic status leads to further distrust in the information they receive. These people are just as scared as anyone else, maybe even more as they are far from their loved ones and no means to reach them. The fear they share is not only for ‘today’ but also extends to their future, as per reports, approximately over 80% of the country’s daily wage workers are at constant fears of running out of food and other essential goods\textsuperscript{xliv}. “It is a matter of utmost fear and concern that they will not be able to find work once the lockdown ends, found Jan Sahas, which surveyed 3,196 migrant and daily wage workers across Northern and Central India between March 27 and 29”\textsuperscript{xlv}. Lockdown, a measure to ensure social
distancing if have shown anything other than prevention from the spread of the pandemic \(^{xlvii}\), is a collective apathy towards the situation of migrants \(^{xlvii}\).

Secularism, Principles against Racism, Equality, and Principles of Non-discrimination are the ethos upon which constitutional principles and human rights are founded. The documents such as Constitution, International Covenant on Civil and Political Rights, 1966, (ICCPR) as well as the International Covenant on Economic, Social and Cultural Rights, 1966, (ICESCR), Universal Declaration on Human Rights, 1948 (UDHR) are not mere documents but were created to help the citizens to live a fulfilling life. These principles are truly tested in a time when there is a crisis, the pandemic COVID-19 brought out the best of humankind, but such cruel acts of discrimination and marginalisation will always be remembered even after the pandemic is over, unfair and discriminatory treatment, even to a handful, cannot be condoned as it shakes the foundation upon which the humankind rests. People remember their experience in a difficult time, while some would look back as better air quality, time spent with family, and being locked inside their homes and some would look back as the time when they were stranded in the street, with nowhere to go, nothing to make them feel remotely comfortable. Unbeknownst to humankind, as discriminations in various forms continue, the concept of social distancing slowly inches towards discrimination and at one point the line between them obliterates.

4. Role of Lathi in the Pandemic

“Responsibility works for hand in hand with capacity and power”, quoted by Sir. J G HOLLAND, which means when a particular authority has been given a phenomenal responsibility it shall not only perform to its utmost capacity but also keep in mind that it does not abuse its conferred powers. The police force in any system of governance has such great responsibility for maintenance of law and order. Model Police Act, 2006 states that the responsibility of Indian Police personnel involves the quality of being accessible, interactive and dynamic \(^{xlvi}\). Police personnel has to play multiple roles of helper, saviour, friend and also referee \(^{xlvi}\). It is one of the most demanding jobs, physically and mentally.

With the outbreak of the pandemic COVID-19 and subsequent measure of lockdown brought forth a new nationwide challenge before the police personnel, to ensure social distancing all across India. While the individuals are obligated to stay indoors, here are these individuals who have to ensure that there the population of over one billion are not on the street without pressing need and remain safe while they do that. Undoubtedly this is a daunting task, as India is comprised of the extremely diverse population.

Police personnel, armed with powers vested upon them by virtue of legislation such as The Epidemic Diseases Act, 1897, the Disaster Management Act, 2005 and the Indian Penal Code, 1860 \(^{l}\) started patrolling to ensure social distancing and
flatten the curve. The legislations entailed a responsibility of maintaining the social distancing through penal provisions, The Disaster Management Act, 2005, provides that if a person leaves his home premise for non-essential work and without any reasonable cause, obstruct the work of an officer and does not comply with his direction is liable to impose with fine and/or imprisonment for up to 1 year. Furthermore, the violator can be under section 188 of Indian Penal Code, 1860 disobedience of order promulgated by a public servant. It is still blurred, on how and why the police personnel felt that it is legally justified to use force and use of lathi or baton on the citizens for coming out of their house and violating the lockdown. Several incidents are reported and circulated over social media in the form of a photo, video, audio, text etc. showing use corporal forces like lathis and batons to enforce the law. It was reported that on 26.03.2020, that an individual named Sonu Shah, an essential service provider, driving a pickup truck driver ferrying potatoes in Patna, Bihar refused police personnel to bribe, and was shot at his foot. Incidents showing sanitization of lathi as “full tayari” for ensuring lockdownli, numerous other videos police personnel beating and schooling are being circulated, it was also seen that the bystanders who engaged in shooting such incidents found these events funny or righteous, a large section of the society who were not victims of such brutal acts and corporal punishment felt these measures being a justified action. These form corporal measures are undertaken by the police personnel to ensure social distancing has no legitimacy or legal justification. The most unfortunate element in this act is people treating the event as ‘normal’, in a civilised society, such acts of violence from state machinery can never be considered as normal. “Normalisation” such behaviour will only be regressive in term of human rights and constitutional principles. The easiest method to make people stay behind closed doors may be such violent and aggressive measures but they are far from the ethos of human rights and constitutional values. Lathi-charge, sit-ups, etc. employed by the police personnel, leads to both physical and mental agony and injures individual’s dignity too which forms part of Article 21 of the Constitutionliii. It is rather unfortunate that Indian police personnel still resort to measures from the colonial era to school citizens, with complete disregard for provisions of constitutional rights. When it comes to police brutality during COVID-19, it could be seen from the reported incidents that the victims are from the lower socio-economic segment, the migrant who has embarked upon a journey towards their hometown. It was reported that in Bareilly, Uttar Pradesh, the officials were asked to sanitize the buses, whereas they out of “over-enthusiasm” made the frustrated migrant workers sit on the road with their eyes closed, while they were bathed with disinfectant and sodium hydrochloride or bleachliv.

Owing to these incidents reflecting abuse of power a plea was filed before Hon’ble Madras High Court, seeking directions to be issued to the police
personnel for refraining from violation of human rights and fundamental rights, while trying to help the nation to flatten the curve\textsuperscript{lv}. The Hon’ble High Court issued a notice to the please and stated that a sympathetic, balanced and humane approach must be adopted by the Police Administration in this fight against the pandemic\textsuperscript{lvii}. If India does not address the issue of corporal measures administered by police service without the mandate of law during such a crisis, then the whole basis of human rights and constitutional principles must be questioned.

5. Conclusion

Humankind collectively is the victim of COVID-19. The global pandemic has brought questions upon science, technology, medical infrastructure, economy, international law, international relations, and human life amongst others. These questions are yet to be resolved -- brilliant minds in the fields of health, politics, sanitation, police, media, etc. are all relentlessly working to save humankind.

In the midst of all of this, the most essential factor is the information. The circulation of questionable information is a greater threat to humankind than the virus itself. The information system has the power to create the right knowledge to make humankind progress. However, the process of information dissemination is substantially vitiated due to questionable content, and the same needs to be addressed collectively. To successfully address the pandemic, the humankind needs to have genuine information system without offline and online misinformation and address the issue through ARMT model and essentially customize awareness content created by keeping the target audience in mind; else no show of solidarity can be truly realised. Furthermore, a diverse country like India finally came united against the COVID-19, and was a ray of hope, for brighter future and the possibility of truly united India irrespective of the diversity and differences, or it appeared so. The reaction towards Tablighi jamaat incident, discrimination against people from the northeast part of India and apathy towards the migrants, and the police behaviour showed that the solidarity India exhibited at the initial stage of the fight-back is not absolute, rather on occasion have been violative of human rights and constitutional principles. A victory which involves marginalisation, discrimination, abuse and humiliation of a country’s citizen in the hands of their fellow citizens, would leave an indelible mark that will decades to erase.

Souvik Mukherjee is a Research Associate at CRSGPP & Research Scholar, West Bengal National University of Juridical Sciences, Kolkata.

Abhra Jena is a 5\textsuperscript{th} Year Student, Amity Law School, Kolkata

Vikramjit Mullick is a 5\textsuperscript{th} Year Student, Amity Law School, Kolkata.

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The ‘Surge’ in Domestic Violence: A Gendered Study of COVID-19

Vijoy Kumar Sinha and Sanghamitra Baladhikari

Abstract

The devastating outbreak of COVID-19, apart from magnifying the broader concerns of economy, health, social conflicts, has amplified the rising concerns of gender-based violence against women. While tracing existing research on ‘Pandemics’, it is concluded that the outbreaks of such diseases derail the primary function and goal of feminism. At the outset of COVID-19, various national and international organizations anticipated a surge in the statistics of violence against women and children, both being the vulnerable groups of the society. In times of economic uncertainty, societal unrest, pandemics pave the way for exaggerating the dynamics of the forms of violence. One such form of interpersonal gender-based violence is domestic violence. Nations across the globe are adopting measures to address this issue. Many actions have authorized, such as social distancing, a complete shutdown of educational and employment sectors and restricting travel. But unfortunately, on one side where the lockdown is perceived as a national and international weapon to curb the concerns arising from COVID-19, the other side of the reflects a more menacing consequence, appearing post-lockdown. In the midst of constant isolation, increased number of domestic violence cases is reported. The paper aims to trace the possible mechanisms behind the surge of violence with an historical insight and the redressal measures.

Keywords: Domestic Violence, Gender, COVID-19, Crime, Law

Position of Women during Pandemics-Through the Feminist Lens

The history of women’s vulnerabilities in the social, cultural, economic and, most importantly, the domestic spheres is deeply structured within the patriarchal crux of the society. The United Nations have responded to the consequences of the surge in domestic violence by stating the need to acknowledge women’s safety as the nation respond to the pandemic. In the United States of America, a study conducted by the National Domestic Violence Hotline identified various instances where the perpetrators of violence in times of COVID-19 used the fear, anticipation and trepidation of the ‘virus’ to manifold the threat in isolating the victim, making almost 40 percent of the women under lockdown, as extremely vulnerable to the acts a domestic violence.

The paper aims to locate the mechanisms towards violence against women that are identified through the given illustration. There an urgent need to decipher the mechanisms behind the surge in domestic violence because it will help the
government and the policymakers to address the root causes and thereby develop mitigation measures, during and in the aftermath of the ‘pandemic preparations.

Feminist activists have stated the role of women during the domestic sphere has significantly risen in times of COVID-19. The World Health Organisation recognizes that in this familial space, women in exploitative and abusive relationships is likely to be exposed to domestic violence significantly as there is a lack of spatial difference among the family members and they are perpetually in close proximity coping with ancillary economic and psychological conflicts. Except for this, women losing their jobs against the backdrop of COVID-19 becomes a reason for their lack of financial stability and they are further marginalized into domestic vulnerabilities and isolation. Thus, increasing the menacing atmosphere of a patriarchal home. The General Secretary of National Federation of Indian Women (NFIW), Annie Raja affirmed that the setback is that the government authorities have not considered is the impact of the imposition of the lockdown on families, which are extremely feudal and dogmatic. The role of women within the household, according to the Marxist philosophy, is not acknowledged as productive in nature or considered to be the ‘unpaid labour’; thus, the constant surveillance of the patriarchs of the household in the lockdown doubly marginalizes women. The consequences of the pandemic, therefore, has branded the family as a fundamental site of abuse, especially families that are considered subordinate to the social class hierarchy, such as the Dalits or economically backward.

Covid-19 and Domestic Violence Through the Legal Lens

Domestic violence is a form of gender-based violence against women, which constitutes discrimination against women. According to the current report of the National Crime Records Bureau, in 2018, there was 100,636 cases reported by women for cruelty by the husband or his relatives.ii Recently, the National Commission for Women affirmed that they have received 239 emails regarding domestic violence between 23rd March and 16th April, 2020 (the immediate week to the inception of the lockdown period) during a pandemic situation.iii The state government of Kerala and Punjab have also taken cognizance of this alarming trend.

Fig 1: Mechanisms towards domestic violence in the lockdown period.
Globally, the countries are witnessing a pitch in domestic violence cases, which lead United Nations Secretary-General Antonio Guterres to appeal to all the governments of all the nations to give attention and prevent a “horrifying global surge in domestic violence” in lockdown measures. The United States National Domestic Violence Hotline has received more than 2000 calls since March, 2020, reaching out for help as victims of domestic violence. Other nations such as Lebanon and Malaysia have reported domestic violence via their helpline numbers since the pandemic started. In China, the calls have been tripled, whereas Spain has noted that there has been a 47% increase in the number of calls within the first two weeks of April, 2020 in comparison to last years’ records. In some of the countries, it is noticed that there is a drop in the calls recorded by the domestic violence help lines. The reason behind this is the threat prevailing in the household and consequently, calls are disconnected, or victims cannot reach out because they are under constant control of the perpetrator of domestic violence. The subsequent increase in alcohol consumption and lack of indulgence in constructive activities is also traced as one of the reasons behind the shaping of gender-based violence.

From the international perspective, article 7 of the International Covenant on Civil and Political Rights acknowledges the right ‘to not be subjected to torture or to cruel, inhuman or degrading treatment or punishment’. Adhering to the global initiatives of protection against violence, to protect the women from such types of abuse, Protection of Women from Domestic Violence Act, 2005 was passed by the legislative body under the Government of India. Previously, this Act defined that domestic violence could take on various things like physical, emotional, verbal, sexual or economic violence. But, in April 2013, the parliament amended the law and incorporated new categories of offenses and made the punishment more severe.

There is also another law to protect the women from these types of cruelty like the Criminal Law (Amendment) Act, 2013 and the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act. Human Rights Watch has reported that sometimes women feel threatened to report the attacks in anticipation of being stigmatized. They also feel that they will not able to able to prevail over from these institutional barriers in a criminal justice system that offers no security to victims or witnesses. Even if they show courage to report about the abuse, some unhelpful officers deny filing an FIR, which is the first step to initiate a police
investigation. This type of incident happens if victims belong from economically or socially marginalized communities.

To overcome the fatality of domestic violence, several nations across the globe have introduced new ways to curb this surge of domestic violence. For example, the French government has decided to redress towards the victims of this crime by placing them in the hotel rooms and initiated open counselling centres in grocery stores. The Spanish government has started a campaign by keeping all the helpline numbers open supporting women to raise their voices against the violence during the lockdown. The South African government has taken the decision to keep the court open for urgent protection orders. Active texting line through which victims can get help is also a part of the judicial strategies in combating the dangers risen due to COVID-19.

The Indian government has communicated a helpline number at the district level and psychologists for counselling. They also are taking complaints via social media applications such as ‘WhatsApp’. They vigilance panel, which is keeping track of these cases, is offering counsel to the offending husband. If the counselling doesn’t help, then they will be sent for the institutional quarantine. The vigilance panel is further keeping track of the pregnant women and lactating mothers so that they can receive an uninterrupted supply of essential items. A community radio program has been initiated in Uttar Pradesh, generating awareness about domestic violence, its identification, and the ways to deal with it during lockdown.

**Conclusion**

In India the predicament of domestic violence has increased but is often not even looked as violence. Women have been conditioned in such a way that they have accepted the violence as a daily event. One of the major limitations that the makers of mitigation strategies against COVID-19 is that there is a lack of comprehensive planning on the part of the Indian government to provide aid and assistant to several non-governmental organisations as they are unable to go beyond web counselling and telephonic assistance. The environment arising due to the virus is forcing women to be relegated within the coercive and abusive domestic space. It is therefore imperative for the world and the decision-makers to oblige this situation as important as the other point of address such as economy and health and thereby direct strategies to tackle the desolation from a distance.

*Vijoy Kumar Sinha is a Research Assistant at Centre for Regulatory Studies, Governance and Public Policy, The West Bengal National University of Juridical Sciences, Kolkata.*

*Sanghamitra Baladhikari is Research Scholar at St. Xavier’s University, Kolkata and Research Assistant at Centre for Regulatory Studies, Governance and Public Policy, The West Bengal National University of Juridical Sciences, Kolkata.*
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\( ^{i} \) National Domestic Violence Hotline is a 24-hour confidential service for survivors, victims and those affected by domestic violence. It advocates to the issues that the victims face via online methods such as chats, free confidential calls.
\( ^{ii} \) For more details, see, https://ncrb.gov.in/sites/default/files/crime_in_india_table_additional_table_chapter_reports/Table%203A.2_0.pdf (last accessed 28/04/2020; 4:00 P.M.)
\( ^{v} \) For more details, see, https://thediplomat.com/2020/04/indias-shadow-pandemic/ (last accessed 28/04/2020; 7:00 P.M.)
\( ^{vi} \) Ibid.
\( ^{vii} \) Ibid.
\( ^{ix} \) International Covenant on Civil and Political Rights is a multilateral treaty adopted by United Nations General Assembly Resolution in the year 1966. The treaty acknowledges humanitarian and political rights of citizens across globe such as right to life, right to personal integrity, right to individual liberty, etc.
\( ^{x} \) Protection of Women from Domestic Violence Act, 2005
\( ^{xi} \) Criminal Law (Amendment) Act, 2013
\( ^{xii} \) Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act.
\( ^{xiv} \) Vigilance committee consists of women from three agencies: Women and Child Department, anganwadi workers and self-help groups of gram panchayats.
COVID-19 and Global Order: Issues for Global Cooperation

Udayan Das

Abstract

With the engines of globalisation coming to halt, the state becoming a primary agency in the distribution of public goods and a container of society, the charges on global cooperation has been of power ridden ineffectiveness with questions of its sustenance in the future. The present article intends to do three things. First, it seeks to locate the problem at hand and contextualise the pandemic and the lack of international cooperation. Second, following from the context, the article situates the problem through the theoretical paradigms of neo-realism and neo-liberal institutionalism, both sharing a synthesis of core principles – centrality of state and anarchy of the international setup. Finally, the article puts forward two issues – information sharing and human security, on which future multilateral cooperation might depend on, however, with considerable questions.

There are two very rudimentary, albeit contradictory, observations to start off with. First, the spread of Coronavirus in terms of three dimensions – intensity, time and scale, has been extremely rapid. A common sensical factor here is that the spread of the virus depends upon a carrier, which in this case been the human agent. Channelized into the existing templates of connectivity, the spread has been rampant. The obvious deduction being that the global capital, citizens, value chains are intrinsically connected and interdependent. If one draws this observation further, the conclusion is that security and ecology are intertwined. In sharp contrast to this is the response to the pandemic. While the effect has been global, the response has been national in terms of scale. An available evidence of this is the shutting down of borders, grounding of international travel, suspension of maritime operations and disruption of the global value chains.

Where do these two observations lead us? Plethora of writings are claiming that the state is back in international relations. Borders are back in the game sovereignty is paramount again and monopoly of the state over public goods is unquestioned. This resurrection of the state directly questions the principles of globalisation which altered the primacy of the state. The high tide of globalisation had several questions on the primacy of the state as the only actor at the global level. Through the transnational capital flows, international and multinational organisations, increasing fluidity in terms of cultural and social capital, the essential components of the state – borders, sovereignty and autonomy, were challenged. Globalisation made borders more fluid, sovereignty more contested and autonomy more shared. It also presented the case that with growing interdependence, the world is now looking at global problems demanding global solutions.
The response to the pandemic, however, has put many of those strands of thought under considerable doubts. Under this crisis and owing to the risks of transmission, the engines of the globalisation are the first to be closed and the borders have been sealed. The nations are on themselves. The state is back in terms of solely devising its policies, being the container of the society and the most significant actor in international relations. That does not mean that the other scales of responses – regional and global are absent. However, there have been significant questions on the future of multilateral institutions given the fact that they have not responded well in the times of crisis and have been largely ineffective. If states are for themselves and multilateral institutions are ineffective, what is the future of international cooperation?

**COVID and Cooperation**

Before assessing the claims against international cooperation, a primer of the recent trends in international relations is essential. First among the key trends are the already existing and growing voices of anti-globalisation in the world. A chief proponent of this has been American President Donald Trump. His ideation and praxis have deviated the American grand strategy with a considerable a turn. Snapping ally commitments, withdrawing from significant multilateral treaties and engagements along with the anti-migrant rhetoric has led a different direction to the American foreign policy from the past years. One can argue that this mix of insulation and anti-globalisation rhetoric have been characterised by several other states as well, prominent among them being the Brexit. This trend has been complimented by a rise of ‘strongmen’ leadership, exemplified by Erdogan in Turkey, Orban of Hungary and Bolsonaro of Brazil. Parallel to this is the gradual transformation of the structure of world power in terms of declining and rising powers. With a arguably declining United States is a simultaneously rising China, added with the rest as well, indicating to a change in the nature of distribution of power and order in the international system.

The point of this context is to argue that the changes that are being debated and hotly contested in terms of global cooperation are not solely the products of COVID–19 alone but is a manifestation of continuing and lingering factors in the global arena that has been pushed off the edge by the catalytic effect of this pandemic.

The ineffectiveness of global cooperation can be understood through five key aspects. First, the states have not been able to coordinate and act on the level beyond the nation-state. World leaders have made symbolic utterances about a global resolution of the problem and advocating for more cooperation at the regional and global level, but that has not been translated into substance in terms of any concrete measures and commitments. Second, the mudslinging within the states has been another chief factor that has hindered cooperation. China has been on the receiving end of this being the epicenter of the pandemic. The US- China rivalry was at display...
with the American President Donald Trump alleging that the spread of the virus is to the credit of China’s reluctance and irresponsibility. Naming it as the “Chinese Virus” is also a part of the stigmatisation at a global level. Fourthly, the international organisations or the multilateral institutions are ridden with power politics that is representative of the international order and its power balance. The UN Security Council has been unable to produce any constructive resolution because of the Chinese attempts at deflecting any call on the situation. However, this is a continuation of the exiting character of the international organisation for some decades now. The UN Security Council was earlier turned into an institutional collateral damage in terms of its functioning because of the US-USSR Rivalry during the Cold War years. In this case, there have been considerable apprehensions on how the World Health Organisation (WHO) has sided with China in terms of disguising data. Finally, a considerable clout of the international organisations is dependent on the financial capital and leadership bestowed by the member states. Post-Cold War international order in this sense has been characterised by US leadership, more so categorised as the leadership of the West. With the American foreign Policy withdrawing from its erstwhile role and the EU as well losing its earlier salience of multilateral cooperation and turning unstable, the international organisations are losing financial clout and leadership direction.

Principles Positions: Neo – Realism and Neo-Liberal Institutionalism

There are certain core assumptions that we can draw from the problem that has been discussed. States have undoubtedly been positioned as the primary actors at the global scene. The second aspect that underscores this lack of cooperation in global governance is the driving principle of anarchy in the international order. With the global value chains disrupted, the global order represents the Hobbesian model of ‘war of all against all’. Actions have been marked by securing national supplies first at any cost and any relationship has been a result of a material and transactional exchange. With the exception of China’s deliverables in certain cases, most transactions have been driven by other means than that of cooperation alone. In such a case, what has international relations to offer in situating the prospects of cooperation?

The problem here overlaps with the shared assumptions of two schools of thought who have their own models of cooperation to offer – neo realism and neo-liberal institutionalism. Both the models have an abiding acceptance to a set of basic principles, clubbed under the umbrella of rationalism. Both the traditions believe that the state is the primary actor and anarchy is the principle that governs the international order. However, the reasons and model of cooperation that they provide are starkly dissimilar.

Neo-Realism explains cooperation through the model of balance of power. In a model of self-help,
analogous to a billiard pool-table, states cooperate by balancing against the bigger power through advancing its own capabilities (internal balancing) or forming alliances (external balancing). Neo-Realism stresses on the fact that international politics is largely a game of power and states always look to gather and maximise power for their survival as they are unsure of what the other states might do. Cheating and deception being the mainstays of the game, the states are practically on their own and they behave rationally in terms of augmenting their security from others who are potential threats. In the process of this, states might find suitable, but changing allies, to balance against the potential threats.

On the other hand, neo-liberal institutionalism holds that with the growing capital flows, the duality of economic merit and globalisation has produced an interdependence of states on each other. Therefore, they agree with the realist school of thought that states are primary but they part ways in believing that cooperation can exist between states and institutions can prevail which talks about absolute and long-term gains between states.

With the continuing factors aggravated and accentuated by COVID-19, the present international order stands in contestation between these principled positions. While the evidence suggests a balance tilted in the favour of the realist logic, there have been also assurances in favour of restoring faith on multilateral institutions. American President Trump has openly flouted international norms and structures, while French President Emmanuel Macron has advocated for a rethink on multilateralism, starting with EU, stressing on common benefits of cooperation and the need for humility. The jury remains divided as these are contrary positions which do not reconcile would compete with each other. The next section explores on which issues these debates would linger post-COVID.

**Issues and Trajectories**

On what issues will cooperation and the ensuing debates of these two positions happen? There are two issues on which the debates would linger in the situation that we stand as of now—information game and human security.

Globalisation has ensured that the speed and intensity of interactions and flows are rapid. Information has become the chief currency of these network societies. Even if territoriality has not been unbundled, the conception of territory has gradually changed. Information seeps through borders and now control over networks is considered even more vital than control over spatially marked territory. The rampant spread of the Coronavirus underscores how important information sharing is at a regional and international level. Since any threat of the present era would wrap the ‘shrunk’ world, information remains a key in terms of any response. That relates to information transparency at two levels – within the states (information flow and transparency between the state and the people) and outside the states (including a web of inter-state
cooperation along with non-state actors). Neo-Liberal Institutionalism would argue that such information sharing would increase confidence building among the states, reduce transaction costs, build long term commitments and norms and ultimately make states more secure. Realist logic would be undoubtedly be apprehensive of information sharing and would not institutionalise such. The information sharing would only be within a sub-set of the states would like to build an alliance against the larger set of states. In that case, information sharing can be divisive and weaponised.

The two schools of thought have central complications in this. The neo-liberal argument misses that information in terms of the states is a part of the components that make up its security. For the state, it is not automatic to become subservient to institutions and forego the logic of survival. Similarly, for the realists, the suspicion is enough to obviate larger and more consistent gains. A plausible situation is dependent on which states deposit their will in terms of setting up the information regime. If the more authoritarian counties would take the lead in terms of institutionalising the norms, the information sharing would be restricted and would only insulate the nations. In a recent survey during the pandemic, the study calls for a group of 4 countries – Belarus, Brazil, Nicaragua and Turkmenistan as the “Ostrich Alliance” who are fudging information within their states\textsuperscript{\textcopyright}. The fact that these states would try to fudge data to cover up for their inadequacies within the states goes to translate that they would not vouch for a robust information sharing mechanism. For democracies, they are more adept in subtleties of hiding and misinforming their audiences\textsuperscript{\textcopyright}. Therefore, even if this issue becomes a latent factor for cooperation, the content of information and the extent of it becomes important as the mechanism can sway between cooperation and surveillance.

The second issue is that of human-centered security. In both the viewpoints, the referent object is the state. The state security is primary. While the viewpoints refer to the conceptions of security differently, the focal point remains the state. There have many important works in terms of arguing for a more deepening and broadening of the agendas of security\textsuperscript{\textcopyright}, COVID-19 has augmented this debate further in terms of dimension of human security\textsuperscript{\textcopyright}. The threats are therefore not only for the existence of the state, but the state, along with other sources, becomes the cause of the threat to human agency. If one reads further into this dimension, the present pandemic and the threat to human security can also be contextualised in terms of the state’s underpreparedness of the health emergency and infrastructure, its unsustainable policies to safeguard the weaker and marginalised sections. Even if one looks through the prism of the productivity of the state, the financial and the military productivity of the state would be directly proportional to the health condition of the citizens. Similarly, human security is oblivious to borders. For neo-realists, human security, especially health is the subject of the state as nation-states remain to be
the sole container of society. Moreover, the unbundling of territory for the sake of prioritising human security would mean also opening the Pandora’s Box. The states believe in inviolability of borders and territorial citizenship for the creation of ‘us’ and ‘them’ in constructing and consolidating the projects of nation-state building. Similarly, for the neo-liberals, the hard task is to bridge the gap between ‘high’ and ‘low’ politics, neutralise the discrepancies across the globe in terms of capability and increase confidence of absolute gains.

Conclusion

What has this pandemic done in the case of both the issues? While the debates would remain and international cooperation would be shaky, vulnerable and hesitant once the exigency passes, the pandemic has been successful in implanting deep rooted questions.

The pandemic has posed very bluntly that the states need to come to a consensus regarding these issues when it comes to global cooperation not because these positions are normative and desirable but because they are essential and primary. The indispensability of cooperation is for the survival of the states itself. It would be prudent to argue that the nature and form of such cooperation would be represented by the distribution of power and order of global relations. However, that is a different story and requires a different assessment which is also subject to time.

Udayan Das is Assistant Professor, Department of Political Science, St. Xavier’s College (Autonomous), Kolkata. He is a Doctoral Candidate at the Department of International Relations, Jadavpur University, Kolkata.

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COVID-19 Lockdown phase: A boon for the River Ganga water quality along the city of Kolkata

Indrani Dhar, Sujoy Biswas, Ankita Mitra, Prosenjit Pramanick and Abhijit Mitra

Abstract
We analysed the dissolved oxygen (DO) in 6 sites along the stretch of River Ganga during 2nd, 9th, 16th and 23rd April 2020 (COVID-19 lockdown period) and compared with the previous data of 2015 to 2019 during the same time (April). The normal decreasing trend of DO suddenly exhibited a sharp turn during COVID-19 lockdown phase. The DO values hiked significantly in all the stations with the spatial trend 2nd Hooghly Bridge (6.90 mg/l) > Botanical Garden (6.78 mg/l) > Ramkrishna Ghat (6.65 mg/l) > Shibpur Ghat (6.51 mg/l) > Princep Ghat (6.35 mg/l) > Babughat (6.24 mg/l). The data clearly confirms an improvement in water quality in context to DO level, which is congenial for aquatic biodiversity.

Keywords: Dissolved Oxygen (DO), River Ganga, COVID-19, Water quality

Introduction
The DO level, which supports the aquatic biodiversity, is a function of several physical, chemical and biological factors. In the rivers, the physical factor encompasses ripples, tides, wind generated waves etc. through which diffusion of atmospheric oxygen occurs at the air-water interface. The chemical factor encompasses release of waste from industrial and urban sources, leakage of oil from tankers, shipwrecks etc. The biological factor primarily includes the standing stock of phytoplankton community in the estuarine water. The rate of photosynthesis, respiration and decomposition by microbes regulate the DO level in the aquatic system.

The present study area receives wastes from industries (mainly concentrated along the bank of River Ganga) and municipal and domestic wastes from the city of Kolkata and Howrah. The oscillation of DO level has a far-reaching impact on the biotic community and hence a baseline data of DO is essential to evaluate the water quality in context to biodiversity of the area, which has been provided by the lockdown effect associated with COVID-19. The lockdown effect, in real sense, started from 25th March 2020 to combat the spreading of the pandemics COVID-19.

The present paper is an approach to acquire an insight on the water quality depending on the DO values of six sites along the River Ganga.

Materials and methods
Site selection
Six ghats/sites were selected for the present study, which are basically the zones of anthropogenic
influence. Coordinates of all the study sites in the River Ganga are highlighted in Table 1.

Table 1: Coordinates of all the selected sites/ghats along the River Ganga

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Coordinates</th>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramkrishna Ghat</td>
<td>22°34′19.8″N 88°20′17.0″E</td>
<td></td>
</tr>
<tr>
<td>Shibpur Ghat</td>
<td>22°33′41.2″N 88°19′40.4″E</td>
<td></td>
</tr>
<tr>
<td>Princep Ghat</td>
<td>22°33′30.9″N 88°19′52.5″E</td>
<td></td>
</tr>
<tr>
<td>Botanical Garden</td>
<td>22°33′06.4″N 88°18′06.6″E</td>
<td></td>
</tr>
<tr>
<td>Babughat</td>
<td>22°34′10.3″N 88°20′28.5″E</td>
<td></td>
</tr>
<tr>
<td>2nd Hooghly Bridge</td>
<td>22°33′31.4″N 88°19′38.5″E</td>
<td></td>
</tr>
</tbody>
</table>

Analysis of DO

The analysis of DO was carried out in the selected sampling stations during the COVID-19 lockdown phase in four different dates (2nd, 9th, 16th and 23rd April 2020). For each observation, at least five samples were collected from the study site during high tide condition. Glass bottles of 125 ml were filled to overflow the collected water samples and Winkler titration was performed for the determination of DO. The sampling method did not change since 2015 when DO was estimated by Winkler’s method in the same site.

Results

The spatial variation of DO exhibits a unique trend as per the order 2nd Hooghly Bridge (5.42 mg/l) > Botanical Garden (5.31 mg/l) > Ramkrishna Ghat (5.19 mg/l) > Shibpur Ghat (5.10 mg/l) > Princep Ghat (5.01 mg/l) > Babughat (4.87 mg/l) (Fig. 1). The values within the brackets indicate the mean values of DO during 2015 – 2020.

Fig. 1. Spatial variation of DO level (in mg/l) in River Ganga
It is interesting to note that the DO values have hiked up during the COVID-19 lockdown phase and this rising trend is observed with the passage of time (Fig. 2).

![Fig. 2. DO level (in mg/l) in the study sites during lockdown phase](image)

**Discussion**

It is clear from the data sets that there has been considerable increase in the levels of DO after the implementation of strict lockdown in the city of Kolkata (Mitra et al., 2020). Compared to the earlier DO levels (mean of 2015 to 2019), the value has increased by 35.71%, 35.06%, 33.97%, 35.06%, 35.65% and 34.50% at Ramakrishna Ghat, Shibpur Ghat, Princep Ghat, Botanical Ghat, Babughat and 2nd Hooghly Bridge respectively during April, 2020 (mean of four sampling dates). Almost similar type of works in the same sampling sites were also carried out by earlier workers (Zaman et al., 2018) on heavy metals Pb, Cr and Cd, which also exhibited similar spatial trend. Owing to the presence of several industries coupled with movements of vessels and trawlers, the Gangetic stretch is basically a stressed zone (Mitra, 2013; Mitra and Zaman, 2014; Mitra and Zaman, 2016; Mitra, 2019) hence DO values were not up to the mark during 2015 to 2019. The lockdown associated with COVID-19, however, brought a radical change in water quality, preferably with respect to DO as reflected through the data sets of 2nd April to 23rd April, 2020. This upgradation of water quality is congenial for the survival and growth of aquatic lives preferably fishes (Butler et al., 2010; Tran-Duy et al., 2012; Abdel-Tawwab et al., 2015; Makori et al., 2017; Nyanti et al. 2018).

ANOVA carried out with the DO data showed significant spatio-temporal variations between two periods (pre-COVID-19 and COVID-19 periods) at $p < 0.05$, which clearly points towards the upgradation of Ganga water quality along the city of Kolkata due to almost zero anthropogenic disturbances during the COVID-19 lockdown phase (Table 2).

**Table 2: ANOVA for DO between stations and between pre-COVID-19 and COVID-19**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
<th>F crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Stations</td>
<td>0.4922</td>
<td>5</td>
<td>0.09844</td>
<td>43.3020</td>
<td>0.00040</td>
<td>5.05032</td>
</tr>
<tr>
<td>Between pre-COVID-19 and COVID-19 phase</td>
<td>8.70403</td>
<td>3</td>
<td>1</td>
<td>3828.75</td>
<td>2.09E-08</td>
<td>6.60789</td>
</tr>
<tr>
<td>Error</td>
<td>0.01136</td>
<td>7</td>
<td>5</td>
<td>0.00227</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9.2076</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It is a fact that with the number of COVID-19 cases
leaning dangerously more than 3,059,081 and the
worldwide death toll crossing more than 2,11,202,
(http://www.worldometers.info/coronavirus/?utm_ 
campaign=homeAdvegas1?%22%20%5Cl%20%22 
countries; data downloaded on 28th April 2020), the
World Health Organization (WHO) declared the
virus outbreak a pandemic in the second week of
March 2020, four months after the novel virus first
made headlines. Nearly 162 countries have steadily
gone to lockdown, and businesses across the globe
are presently operating in fear of an impending
collapse of global financial markets. This situation,
cubbed with sluggish economic growth in the
previous year, especially in a developing country
like India, the pandemic is leading to an extremely
volatile market condition. With major cities on
lockdown, organizations have no choice but to dig
into their business continuity and contingency plans.

Ever since the first COVID-19 case was confirmed
in India, numerous companies have instituted a
‘work from home’ drill using critical resources to
understand whether remote working conditions are
feasible. We have observed that remote working
also has its limitations and cannot be carried out by
other sectors like agriculture, fishery, retail,
hospitality, or manufacturing, leaving them no
choice but to face business/occupation interruption,
leading to an adverse impact on the economy
spinning around these sectors.

However, “every crisis has a silver lining around
the dark cloud and serves as a learning
opportunity”, and this silver lining is definitely the
upgradation of environment as observed in the
present study. The authors feel that the COVID-19
lockdown phase has great probability to meet the
objectives of Namami Ganga Programme that is an
Integrated Conservation Mission, approved as
“Flagship Programme” by the Government of
India in June 2014 with budget outlay of Rs. 20,000
Crore to accomplish the twin objectives of effective
abatement of pollution, conservation and
rejuvenation of the National River Ganga
(http://nmcg.nic.in/NamamiGanga.aspx).

Indrani Dhar is from Department of Architecture,
Techno India University, West Bengal.

Dr. Sujoy Biswas is the Director and Chief
Executive Officer at Techno India University and
Techno India Group.

Ankita Mitra is from Department of Evolutionary
Biology, University of Haifa, Israel.

Prosenjit Pramanick is from Department of
Oceanography, Techno India University, West
Bengal.

Abhijit Mitra is the Associate Professor and
former Head of the Dept. of Marine Science,
University of Calcutta.

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Alteration of dissolved Zinc concentration during COVID-19 lockdown phase in coastal West Bengal

Sangita Agarwal, Prosenjit Pramanick and Abhijit Mitra

Abstract
The coastal water of the maritime state of West Bengal is highly stressed due to anthropogenic activities like discharges from tourism units, industrial operations, repairing of fishing vessels and trawlers, fish landing etc. All these activities release variety of heavy metals in the coastal waters. This paper highlights a sudden dip in the rising trend of dissolved Zn in three selected stations (342.47 ppb in Kakdwip, 362.86 ppb in Shankarpur, 153.44 ppb in Bony Camp) during the COVID-19 lockdown phase. Considering the previous data (1984-2019), it is observed that there has been a decrease in dissolved Zn level by 4.96%, 9.92% and 13.72% at Kakdwip, Shankarpur and Bony Camp respectively when compared to the COVID-19 lockdown phase during April 2020.

Keywords: Dissolved Zn, COVID-19, Kakdwip, Shankarpur, Bony Camp

Introduction
River and estuarine systems have facilitated human settlements on their banks since the beginning of human civilization. The Hooghly estuarine system which is constituted by the first offshoot of the River Ganga – Bhagirathi system, flows southwards through the lower Ganga deltaic plane and joins the Bay of Bengal in Sundarbans. It is one of the most important estuarine systems of the country because of (1) its origin from the largest mountain river, (2) heavy monsoonal discharge from a very vast basin and (3) very long tidal zone. Being a very active tidal estuary, it has physico-chemical and biological characteristics of its own.

The varied and increasingly complex problems created by humans have affected the health of these coastal and estuarine systems leading to rapid depletion of estuarine resources. The anthropogenic activities in and around the estuaries like the discharges from tourism units, industrial operations, repairing of fishing vessels and trawlers, fish landing etc. are leading the estuaries and coastal zone to stressful condition. The extent of this stress is not only dependent on the amount of sewage generated by the residents living around the estuaries, but also on the disposals by the industries situated in the neighborhood. The sewage load in the River Ganga accounts for 70% of the total pollution load. Not only the sewage but discharging effluents from the industrial units also find their way into the nearby water bodies. As the population is growing, the agricultural activities are also increasing causing a burden on the environment. To sustain increased agricultural output, the consumption of fertilizers and pesticides has increased over the years. The agricultural run-offs in the water bodies are escalating the already
polluted water bodies which are also leading to eutrophication.
Thus unplanned proliferation of urban and industrial set-ups leads to escalation in marine discharges and total load of pollutants being dispensed into the sea (Knauer, 1977; Stoffers et al., 1986; Gbem et al., 2001; Al-Masri et al., 2002; Khare and Singh, 2002; Duzgoren-Aydin et al., 2006; Florea and Busselberg, 2006; Jadeja et al., 2006). These discharges may contain heavy metals which can bioaccumulate and bio-magnify as they get transferred in the food chain.
We have selected three sampling stations namely Kakdwip, Shankarpur and Bony Camp situated in the Hooghly-Matla estuarine complex in West Bengal at the apex of Bay of Bengal. The effluents released by the industrial units into the bay contain appreciable amount of Zn, Cu and Pb. The antifouling paints used for conditioning fishing vessels and trawlers also contribute to the heavy metal load. In addition, the sewage from shrimp farms along the estuarine stretch and untreated wastes from Haldia port-cum-industrial complex also add substantially to the existing load of heavy metals (Mitra and Bhattacharyya, 2003; Mitra et al., 2010; Mitra, 2013; Mitra and Zaman, 2016; Mitra, 2019).
The outbreak of Coronavirus disease 2019 (COVID-19) has affected over 210 countries and territories around the world and has infected over 2 million people globally. This epidemic started in Wuhan, China and quickly spread its wings all over the world and is now a pandemic. A person infected by this novel corona virus can infect around 2.5 persons and so COVID-19 infections are more contagious than caused by other coronaviruses such as SARS or MERS-CoV.
This deadly virus has no cure till date and so as to curb and contain the spread of this highly contagious disease most parts of the world are under complete lockdown. In order to restrict the spread of this terrible virus, we need to minimize human to human contact as no proven treatment or vaccine is available presently. Moreover, COVID-19 can spread asymptomatically too. Hence, people all over the world are emphasizing on social distancing. Since novel coronavirus spreads rapidly, many countries have tried to bring down the transmission rate by calling social lockdown. This can help in minimizing the spread of infection and also would give some breather to the already overburdened healthcare systems.
To contain the spread of the novel coronavirus the Government of India also announced lockdown for 21 days starting from 25th March, which constituted phase 1 and this was further extended for another 19 days that is phase 2. During the lockdown phase all kinds of transport services were suspended except for essential goods, fire, police and emergency services. All schools and colleges, places of worship, commercial and private establishments and hospitality services were also closed.
This paper is an attempt to show how controlled human activities can bring a change in the water quality of coastal West Bengal preferably with respect to dissolved zinc, which is a very common heavy metal sourced from industries, painting units,
repairing and conditioning units of vessels and trawlers.

Materials & Methods

Study area
The total length of tidal Hooghly estuary is about 295 km and it lies between the latitude 21°31' N and 23°30' N and longitude 87°45' E and 88°45' E and covers the districts of Nadia, Hooghly, North and South 24-Parganas, Howrah and East Midnapur in the maritime state of West Bengal. The present sampling stations were selected at Kakdwip (21°52'22.69" N 88°11'58.61" E), Shankarpur (22°50'54.20" N 88°27'4.54" E) and Bony Camp (21°69.05' N, 88°56.83' E). Samplings were carried out in these stations since 1984 during the month of April, which is a pre-monsoon month in India, characterized by high salinity and minimum dilution factor in the coastal waters (Mitra, 2013; Mitra and Zaman, 2014; Mitra and Zaman, 2016; Mitra, 2019).

Sample collection

Pre-COVID PHASE
Water samples were collected during the month of April (pre-monsoon), for a period of 36 years (1984-2019) in the three selected sampling stations.

COVID PHASE
Water samples were collected during the month of April 2020 (weekly) in the three sampling stations chosen.

Analysis of dissolved Zinc
Water samples collected from all the three stations (during high tide) were analyzed to determine the content of dissolved heavy metal, Zn. Before analysis, each water sample was collected and stored in clean TARSON bottles and was filtered through a 0.45 µm Millipore membrane. The filtrate was treated with diethyl dithio-carbamate and extracted in carbon tetrachloride (Chakraborti et al., 1987). The extracted was evaporated to dryness and the residue was mineralized with 0.1 ml of concentrated nitric acid. The analytical blank was prepared and treated similarly using the same reagents. Analyses were done in triplicate by direct aspiration into AAS (Perkin-Elmer Model: 3030) equipped with a HGA-500 graphite furnace atomizer and a deuterium background corrector. The accuracy of the dissolved heavy metal determinations is indicated by good agreement between our values and reported for certified reference seawater materials (CASS 2) (Table 1).

Table 1. Analysis of reference material for near shore seawater (CASS 2)

<table>
<thead>
<tr>
<th>Element</th>
<th>Certified value (µg L⁻¹)</th>
<th>Laboratory results (µg L⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zn</td>
<td>1.97 ± 0.12</td>
<td>2.01 ± 0.14</td>
</tr>
<tr>
<td>Cu</td>
<td>0.675 ± 0.039</td>
<td>0.786 ± 0.058</td>
</tr>
<tr>
<td>Pb</td>
<td>0.019 ± 0.006</td>
<td>0.029 ± 0.009</td>
</tr>
</tbody>
</table>

Statistical analysis
Analysis of Variance was used as an exploratory tool to determine the significance of variation of dissolved Zn between the pre-COVID and COVID phases and also between stations (p < 0.01).

Results
The variation of dissolved Zn between the three sampling stations over a period of 37 years (1984-2020) is highlighted in Fig. 1. Maximum value of dissolved Zn was found to be 545.89 ppb, 566.18
ppb, 287.11 ppb at Kakdwip, Shankarpur and Bony Camp respectively over a period of 37 years and these values are for pre-monsoon season of the year 2019. The authors observed that there was a dip in increasing trend of dissolved Zn in three selected stations (342.47 ppb in Kakdwip, 362.86 ppb in Shankarpur, 153.44 ppb in Bony Camp) during COVID-19 lockdown phase in West Bengal (Fig. 2). The dissolved Zn content decreases from 1st week of April 2020 to 4th week of April 2020 and this trend is followed in all three sampling stations (Fig. 3).

ANOVA data showed pronounced variation in dissolved Zn concentration between stations and between pre-COVID-19 and COVID phase (p < 0.01) (Table 2).

Table 2. ANOVA of dissolved Zn between stations and between pre-COVID-19 and COVID-19 phase

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
<th>F crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Stations</td>
<td>55119.83</td>
<td>2</td>
<td>27559.92</td>
<td>428.5258</td>
<td>0.002328</td>
<td>19</td>
</tr>
<tr>
<td>Between pre-COVID-19 and COVID-19</td>
<td>1127.236</td>
<td>1</td>
<td>1127.236</td>
<td>19.52726</td>
<td>0.052593</td>
<td>18.51282</td>
</tr>
<tr>
<td>Error</td>
<td>128.6266</td>
<td>2</td>
<td>64.31332</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>56375.7</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The COVID-19 lockdown phase is the real witness of eco-restoration of environmental quality (Mitra et al., 2020), and coastal waters of West Bengal is no exception to this rule. Considering the previous data (1984-2019), it is observed that there has been a
decrease of dissolved Zn content by 4.96%, 9.92% and 13.72% at Kakdwip, Shankarpur and Bony Camp respectively when compared to the April 2020 data. It is observed that during COVID-19 lockdown there has been a gradual decrease of dissolved Zn content by 37.34%, 28.83%, and 21.23% at Kakdwip, Shankarpur and Bony Camp respectively over a period of four weeks. The entire discussion along with the results lead us to conclude that sharp decrease in dissolved Zn level in all the selected stations in coastal West Bengal during April 2020 is the direct outcome of COVID-19 lockdown in which the primary sources of Zn in the coastal zone of West Bengal like conditioning fishing boats, industrial discharges, fish landing etc. have been ceased, to abide by the rules of lockdown. Thus COVID-19 lockdown has brought out the positive face of coastal water quality without any major investment in the treatment process.

Sangita Agarwal is from Department of Applied Science, RCC Institute of Information Technology, West Bengal.

Prosenjit Pramanick is from Department of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.

References


Impact of COVID-19 Lockdown on the Ichthyoplankton community in and around Haldia Port-cum-Industrial complex

Ankita Mitra, Prosenjit Pramanick, Sufia Zaman and Abhijit Mitra

Abstract
We observed a sharp dip in the oil and grease level around Haldia port-cum-industrial complex during our monitoring on 2nd April 2020, the period characterized by complete stoppage of industrial activities/operations and movement of vessels in the region due to COVID-19 lockdown. Simultaneously we observed relatively higher value of Shannon Weiner species diversity index for the ichthyoplankton community inhabiting the estuarine water. We therefore conclude that estuarine water is enriched with ichthyoplankton diversity during the lockdown phase. This may be due to better water quality and total banning of fish and prawn seed collection during the COVID-19 lockdown phase.

Keywords: Ichthyoplankton, Shannon Weiner species diversity index, Haldia port-cum-industrial complex, COVID-19, Lockdown

Introduction
Oil pollution is a burning issue in the domain of environmental science and ecology and is almost an inevitable consequence of the dependence on the increasingly growing oil-based technology. Oil pollution mostly results from oil spills due to accidents of ships and oil tankers. Oil and grease concentrations are not evenly distributed throughout the entire ocean surface; they are more heavily concentrated along the continental shelves in coastal areas and in regions of upwelling waters, the areas of high productivity (Ryther, 1969). In recent years, there has been increasing awareness of potentially harmful effects of world-wide spillage of oils in the marine and estuarine ecosystems. Oil water from refineries, chemical plants and offshore drillings may contain toxic and carcinogenic hydrocarbons such as benzenes, polynuclear aromatics, amines and phenols (Kawahara, 1969; Kawahara and Fiutem, 1983). The toxicity of various oils and oil products (Ottway, 1970) as well as the mode by which they interfere with marine ecosystem varies widely depending on their composition, ambient environmental variables and the biological state of organisms at the time of contamination. Different species and different stages of life cycle of the same species have been found to have different susceptibilities to pollution (Baker, 1970; Crapp, 1970).

In the estuarine region of the lower Gangetic delta the waterbody are mostly contaminated with oil mainly because of regular plying of large number of
fishing vessels and trawlers and also the release of oily wastes from refineries in the Haldia region. However, due to lockdown associated with COVID-19 pandemic, all the activities like operations of oil refinery, movements of oil tankers, ships, fishing vessels and trawlers have stopped due to which a dramatic change has taken place in the water quality and the ichthyoplankton community surviving in this aquatic phase.

The present study aims to determine the COVID-19 lockdown effect of oil and grease on the juveniles of finfish (ichthyoplankton) in and around the Haldia port-cum-industrial complex of the Hooghly estuary, 104 km downstream from the city of Kolkata.

Ichthyoplankton, being a major component of the planktonic community of the Hooghly estuarine complex, are passively floating and drifting in nature. The thin film of oil on the aquatic phase, may not only pose an adverse effect on them by reducing the concentrations of dissolved oxygen, but may also be lethal in extreme case. Hence, a study has been conducted on the oil/grease level and the ichthyoplankton community in the port area during April 2020, the period characterized with complete closure of industrial activities and aquatic transport systems due to COVID-19 lockdown and compare with the past data since 2011 so as to evaluate the effect of lockdown in the study area.

Materials and Methods
The entire network of the present programme consists of the sampling of surface water around Haldia oil jetties during April 2020 for analyzing the oil and grease level. The oil and grease present in the sampling water were extracted in petroleum ether and finally evaporated on a water bath to get the concentration in mg/L (also expressed as ppm) unit through weight difference method. Ichthyoplankton around oil jetties were also collected simultaneously during high tide by fixing nets in the intertidal mudflats for a span of 6 hrs. The collections were randomly mixed to achieve the uniformity of data and finally the number of finfish juveniles for every species from the 100 grams pooled sample was recorded. These data were then used to enumerate the species diversity index (Shannon and Weiner, 1949) for the ichthyoplankton community in and around the Haldia oil jetties using the standard expression:

$$H = - \sum \frac{n}{N} \log_{e} \frac{n}{N}$$

where,

$H = \text{Shannon Weiner Species Diversity Index}$

$n = \text{No. of individuals per species}$

$N = \text{Total number of individuals of all species}$

The data obtained were compared with the past data since 2011 on similar abiotic and biotic parameters obtained from the cited works of previous researchers in the same region (Mitra, 2013; Mitra and Zaman, 2014; Mitra and Zaman, 2016; Mitra, 2019).
Results and Discussion

Decadal picture of oil and grease levels along with ichthyoplankton community structure (represented through Shannon Weiner Species Diversity Index) shows significant change in the values during April, 2020 (Fig. 1 and 2), when compared with the previous data sets.

In general, high concentrations of oil and grease level were recorded during 2011 to 2019 - the period characterized by regular and normal industrial activities and movement of fishing vessels, trawlers, oil tankers and ships along the estuaries of the maritime state of West Bengal. The high levels of oil and grease in the water bodies may be attributed to huge run off from the adjacent Haldia industrial belt. In fact, oil in the water bodies around Haldia port-cum-industrial complex, enters through several sources like tanker operations dry docking, marine terminals, refineries, municipal and industrial wastes, urban and river run off etc. The green belt channel adjacent to Indian Oil Corporation (IOC) also contributes appreciable amount of oil in the water bodies.

The Shannon Weiner species diversity index value for ichthyoplankton also showed strong temporal variability with relatively lower values during 2011 to 2019 and highest during 2020 (Fig. 2). This picture depicts two important findings namely (i) oil and grease level has adverse impact on the ichthyoplankton community of this mangrove dominated estuarine complex, and (ii) Lockdown effect associated with COVID-19 helped to eco-restore the situation in terms of biodiversity (more specifically ichthyoplankton diversity).

To sum up it can be stated that oil and grease level has a negative impact on the ichthyoplankton community of the estuary as revealed from the significant negative correlation value computed considering the data sets of 2011 to 2019 (r = -
0.9098; p < 0.01), and the aquatic health can be improved if proper treatment is carried out before releasing the oil in the ambient aquatic phase. The COVID-19 lockdown phase is a litmus test that confirms the adverse impact of pollutants (mostly released from point sources) on the planktonic community of the estuaries and coastal waterbody.

Ankita Mitra is from Department of Evolutionary Biology, University of Haifa, Israel.

Prosenjit Pramanick is from Department of Oceanography, Techno India University, West Bengal.

Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.

References

Scanning the water quality of lower Gangetic delta during COVID-19 lockdown phase using Dissolved Oxygen (DO) as proxy

Sondipon Chakraborty, Ankita Mitra, Prosenjit Pramanick, Sufia Zaman and Abhijit Mitra

Abstract
Dissolved Oxygen (DO) is the life line of aquatic lives. Wastes disposed from various sources when enriched with organic load deplete the DO level causing an adverse impact on aquatic biodiversity. In this paper we have initiated a first order analysis to scan the water quality of three stations in the lower Gangetic delta region (Diamond Harbour, Namkhana and Ajmalmari) using DO as proxy. We observed significant increase in DO during the COVID-19 lockdown phase (38.54%, 31.73% and 12.40% increase at Diamond Harbour, Namkhana and Ajmalmari respectively), when compared with the mean DO values of each station since the last three decades (1984-2019). The increasing trend of DO from 2nd April, 2020 to 23rd April, 2020 speaks in favour of the positive role of COVID-19 lockdown phase in terms water quality, which may be due to complete closure of industrial operations, vessel movements, fish landing and tourism activities at these sites.

Keywords: Dissolved Oxygen (DO), water quality, lower Gangetic delta, COVID-19

Introduction
Pollution of water is a major threat in the Gangetic delta region of West Bengal. The reasons behind water pollution are release of organic wastes and heavy metals in water. Industrial wastes, factory discharges, agricultural runoffs, wastes from shrimp farms are some of the major pollutants discharged from these point sources (Mitra, 2018). Deposition of organic wastes results in the increase of Biological Oxygen Demand (BOD) in water. Relation between BOD and Dissolved Oxygen (DO) is inversely proportional. Dissolved oxygen (DO) concentration in water is essential for aquatic life (Banerjee, 2018). Concentration of DO is reciprocally correlated with the temperature of water bodies. Respiration by aquatic animal, decomposition of organic pollutant and several chemical reactions consume oxygen and increase the biological oxygen demand (BOD) of waterbody. Now a days’ river pollution is an emerging issue in several developing countries due to rapid industrial development (Kan, 2009). Industrial effluents and sewage entering the water bodies are one of the prime sources of environmental toxicity, which endangers aquatic biota and deteriorates water quality. Quality of water is essential for mankind as
it is directly linked with human life and associated aquatic biota (Abdel-Tawwab et al. 2015; Butler et al., 2010).

In India, people have great dependency on the River Ganga (Paul, 2017). River Ganga is the resources of 25.2% water bodies in the country (Paul, 2017). Historical evidence says that the modern civilization in India have been initiated on the bank of River Ganga. In India, Ganga passes through 29 class I cities, 23 class II cities and approximately 50 towns (Paul, 2017). The River Ganga ends at Bengal and has formed the largest deltaic complex at the apex of the bay. The Hooghly-Matla estuarine complex envisages a wide spectrum of aquatic flora and fauna along with the dense mangrove ecosystem. The deltaic complex sustains 112 islands of which only 48 are inhabited by human. Sundarban is noted for its unique biodiversity (Mitra, 2013; Mitra and Zaman, 2014; Mitra and Zaman, 2016; Mitra, 2019). Sundarban also harboirs a good number of rare and globally threatened animals including Estuarine Crocodile (*Crocodilus porosus*), Fishing Cat (*Felis viverrina* Bennett), Salvatore Lizard / Water Monitor (*Varanus salvator*), Gangetic Dolphin (*Platinista gangetica*), River Terrapin (*Batagur Baska*), marine turtles like Olive Ridley (*Lepidochelys olivacea*), Ground Turtle, Hawksbill Turtle and King Crab (Horse Shoe). It is the homeland for several endemic species also. It is no exaggeration to say that the lower Gangetic delta region supports the most diverse group of fauna and flora which sustains their life with immense tenacity in this dynamic ecosystem.

The pandemic COVID-19 has made Government/ruling bodies all over the World to go for lockdown phase. The lockdown phase has immense effect on the biodiversity of the aquatic water bodies due to less anthropogenic waste discharges. In this present scenario a study was undertaken in three stations of the lower Gangetic delta (with the data bank of pre-COVID-19 lockdown and COVID-19 lockdown phases) to scan the DO level. DO have immense role in controlling the metabolic activities and sustaining the life of most aquatic flora and fauna. The primary production of the aquatic phase is greatly dependent on the DO level, which in turn regulates the secondary productivity (zooplankton and fishes). Thus DO play a vital role in maintaining the food chain of the aquatic ecosystem and promote the fishery sector of the coastal and estuarine waters.

**Materials and Methods**

**Study site**

The present study is an approach to estimate the variation of DO between pre-COVID-19 and COVID-19 lock down phases at Hooghly-Matla estuarine complex, West Bengal. Entire study has conducted in three distinct geographical locations of the lower Gangetic delta namely, Diamond Harbour (22°11'4.2"N; 88°11'22.2"E), Namkhana (21°45'53.7"N; 88°13'51.5"E) and Ajmalmari (21°49'42.9"N; 88°37'13.7"E) (Fig. 1).
Analysis
The entire network of the present study consists of random sampling of water at each station for estimating the DO during the COVID-19 lock down phase. Estimation of DO was carried out by Winkler’s Method as per the standard protocol (Mitra and Zaman, 2015). Our analytical method did not change since the last 3 decades and the results are the mean of triplicate analysis. For the purpose of scanning the effect of COVID-19 lockdown phase, we segregated our data into two distinct sets, one considering DO level during COVID-19 lock down phase (2nd April to 23rd April) and the other comprising the DO values during pre-COVID-19 phase (pre-monsoon, 1984-2019). Necessary statistical model was developed by using ‘Sigma Plot 11.0.’

Results
Data evaluated from three different sampling sites at Hooghly-Matla estuarine complex have revealed a significant variation of dissolved oxygen (DO) concentration between pre-COVID and COVID-19 lockdown phase (Fig. 2).

Fig. 2. Spatio-temporal variation of DO (in ppm) during between the pre-COVID-19 (1984-2019) and Covid-19 lockdown (April, 2020) phases (* = p< 0.05)

The percentage of DO increased during the month of COVID-19 lockdown than pre-COVID-19 phase years (Fig. 3). Among three different study sites, percentages of DO increased maximum at Diamond Harbour (38.54%) and minimum at Ajmalmari (12.40%) adjacent to the core area of Sunderban Biosphere Reserve (Fig. 3).

Fig. 3. Percentage increase of DO in three selected stations during lockdown period
DO values were highest near Ajmalmari (5.79 ± 0.40 ppm) whereas no statistical significant difference was observed in DO values between Diamond Harbour and Namkhana (p < 0.05) during pre-COVID-19 years (Fig. 4A). Notably, no significant difference in DO concentration has been observed among three different sites during COVID-19 lock down period (Fig. 4B).

During the lockdown phase, the DO level has increased day by day and similar trend is observed in all the selected stations (Fig. 6). These values are comparatively higher than the predicted values (means if no lockdown would have occurred) during this period (Fig. 7).

Fig. 4 Variation of DO among three different study sites at Hooghly-Matla estuarine complex, in the lower Gangetic delta, West Bengal, A. pre-COVID-19 Outbreak (1984-2019), B. Covid-19 Outbreak lock down phase (* = p < 0.05; * = p < 0.05)

Fig. 5 Year wise trends of Dissolved Oxygen (DO) concentration at three stations in the Hooghly-Matla estuarine complex during pre-COVID (1984-2019) have shown a decreasing trend (Fig. 5).

Fig. 6. Trends of Dissolved Oxygen (DO) concentration at three stations in the Hooghly-Matla estuarine complex during COVID-19 lock down phase

Fig. 7. Difference between the observed and predicted values of DO at Hooghly-Matla estuarine water during COVID-19 Out break period, April, 2020
Discussion
COVID-19 lockdown phase turned the chapter of environment to a great extent (Mitra et al., 2020). The aquatic ecosystem in and around Indian Sundarbans is no exception to this rule. The DO level has exhibited two peaks during the entire data sets (i) 2009 peak due to super cyclone AILA (Mitra et al., 2011) and (ii) 2020 peak during COVID-19 lockdown phase. The second peak is the issue of the present article, which may be due to negligible input of wastes from several anthropogenic sources that arise from industrial and domestic activities. The lockdown phase, initiated on and from 25th March, 2020 completely ceased all the industrial operations and movements of water transports that ultimately upgraded the estuarine water quality as revealed by the hike in DO values. The increase of DO level has several positive implications particularly in the domain of sustaining the fish resources of the estuarine system.

Sondipon Chakrabarty is from Kingston College of Science, Kingston Educational Institute, Berunanpukuria, Mallikapur.

Ankita Mitra is a PhD Scholar at Department of Evolutionary Biology, University of Haifa, Israel.

Prosenjit Pramanick is from Department of Oceanography, Techno India University, West Bengal.

Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.

References


Eco-restoration of River Ganga water quality during COVID-19 lockdown period using Total Coliform (TC) as proxy

Pritam Mukherjee, Prosenjit Pramanick, Sufia Zaman and Abhijit Mitra

Abstract

In the recent past, rapid urbanization and industrialization induced environmental contamination especially in the water bodies including river waters has posed a severe challenge to the aquatic fauna as well as to the rural and urban populace whose life depends on these river ecosystems. However, owing to the Coronavirus induced global pandemic and the concomitant lockdown in nearly all parts of the World, the situation has changed significantly. The present study is a time series analysis of the coliform bacterial load at two sites (2nd Hooghly Bridge and Babughat) in the River Ganges along the city of Kolkata, the capital of the state of West Bengal, India. The river water samples were collected during the pre-monsoon season from April 2008 – April 2020 for analyzing the Total Coliform (TC) load in the selected sites. A significant spatial difference was observed in the TC matrix of the study site with relatively higher value in Babughat (10,271.92 ± 3050.35 MPN/100 ml) compared to second Hooghly Bridge (8,485.58 ± 2589.40 MPN/100 ml), with a p value of < 0.1. Interestingly, it was also observed that there was an abrupt decrease in TC values during the COVID-19 lockdown period (in the month of April 2020) irrespective of the study site (i.e., from 10,942.50 ± 1942.50 to 2,225 ± 754.43; p < 0.01 in case of Babughat and from 9,045.00 ± 1695.97 to 1,772.50 ± 477.87; p < 0.01 in case of second Hooghly Bridge). This sudden drop in coliform bacterial load may be due to non-functioning of the industrial units, tourism, traffic movements together with reduced waste disposal and fishing activities, absence of bathing activities and religious rituals along the bank of the River Ganges amidst the COVID-19 induced lockdown phase.

Keywords: Total Coliform, Multiple-tube fermentation technique, Most Probable Number, River Ganges water, COVID-19 lockdown period

Introduction

Like many other metropolitan cities, the city of Kolkata (the former capital of British India and the capital of the state of West Bengal, India) is located on the bank of the River Ganges or Ganga. This 2,601 km long river primarily originates in the Gangotri Glacier situated in the western Himalayas of Uttarakhand, India and flows south-east along the Gangetic Plains of India and Bangladesh, and eventually empties into the Bay of Bengal. The
River Ganges is a lifeline to millions of people living along its course of flow. It is considered as a sacred river by the Hindus and worshiped as the goddess Ganga in Hinduism. However, over the past several decades the Ganges is threatened by severe pollution mostly owing to the rapid industrialization, urbanization and various other increased anthropogenic actions including but not limited to tourism and fishing. Various rituals (such as cremation, religious offerings of burnt ashes of the dead bodies, fruits and flowers, immersion of mud idols of the Hindu Gods and Goddesses), and bathing activities are performed round the year by thousands of worshippers along its banks, which together with laundry (by the domestic and launderer’s community), fishing activities (by the fishermen), tourism ventures, ferry and freight services contaminate the river water with numerous organic and inorganic wastes including detergents, heavy metals and hydrocarbons like polycyclic aromatic hydrocarbons (PAHs) (Goswami and Mazumdar, 2016; Rakshit and Sarkar, 2018). Moreover, the various industries including jute mills, brick kilns, tanneries, battery industries, fertilizers and soap factories, oil refineries, thermal power plants, fishery and shrimp farming units etc. located on the fringes of this river along with the sewage canals connected with this river (and untreated sewage discharge) are the additional point sources of coliform bacteria, heavy metals and hydrocarbons (Mitra, 1998; Mitra, 2013). Together, these river water pollutants pose a danger not only to humans, but also to endemic faunal community as the Ganges is home to ~140 species of fishes and ~90 species of amphibians. The river also harbors reptiles and mammals, including the critically endangered species like the gharials and the South Asian river dolphins. In addition, the environmental health especially that of river water has significant influence on the microbial flora since the microbes derive their nutrition from the ambient water and pollutants that stimulate microbial growth and proliferation. The levels of fecal coliform bacteria from human wastes in the river in specific locations are hundred times higher than the Indian government's official permissible limit. The Ganga Action Plan, an environmental initiative to clean up the river, is yet to see the light of success, due to various reasons including poor technical expertise and environmental planning, and a lack of awareness amongst the mass on the ecosystem services of this mighty river of the sub-continent.

Coliform bacteria are a group of aerobic and facultative anaerobic, Gram-negative, non-spore forming, rod-shaped, motile or non-motile microorganisms, which ferment lactose with the production of acid and gas within 48 hours when kept under 35°C – 37°C (Li and Liu, 2018). Besides being present in the environment, these special groups of bacteria typically comprise the microflora of the fecal matter of all warm-blooded animals including humans (Martin et al., 2016). Although, the coliforms generally do not cause serious illness or disease, however, their presence either in
drinking water (ground and surface water) or food is a strong indicator of the presence of pathogenic organisms of fecal origin in the system under study (Li and Liu, 2018). The complete coliform bacterial population is termed Total Coliform (TC) out of which a subset is referred to as the Fecal Coliform (FC) and *E. coli* bacteria comprise a fraction of this FC population (Brackett et al., 1993). Presence of TC in water is indicative of environmental contamination while presence of FC and *E. coli* indicate fecal contamination. However, determination of the adverse impacts of anthropogenic activities on the environmental health is not always easy unless one carries out a comparative analysis of the same under two contrasting conditions i.e., both in presence and absence of human activities to fully understand or pin point the parameters of eco-restoration of river water quality. The Coronavirus induced global pandemic (https://www.coronavirus.gov/) and subsequent lockdown phase for maintaining adequate social distancing measures provided the perfect opportunity to study the comparative health of the River Ganges flowing through this densely-populated city of Kolkata with industries. Therefore, the overall objective of the present study is to compare the Total Coliform (TC) load of the River Ganges at two sites of the Kolkata metropolis prior to global COVID-19 pandemic and during COVID-19 induced lockdown period through a time-series analysis.

### Materials and Methods

#### Sampling of the river water

Water samples from the River Ganges were collected aseptically in sterilized glass container (autoclaved) on a yearly basis with utmost care from two selected study sites namely second Hooghly Bridge (22°33'31.4"N; 88°19'38.5"E) and Babughat (22°34'10.3"N; 88°20'28.5"E) located in Kolkata district of West Bengal, India for a period of 12 years during 2008-2019 in the pre-monsoon seasons prior to the Coronavirus pandemic. However, during the phase of COVID-19 induced lockdown, weekly water samples were collected during April 2020 for a period of one month. The collected samples were immediately transferred in ice-box and brought to the laboratory for further analysis.

#### Determination of Total Coliform (TC) from water

The total coliform of water was determined by multiple-tube fermentation technique (APHA, 1998). The multiple-tube fermentation technique is a three-stage procedure in which the results are statistically expressed in terms of the Most Probable Number (MPN) (https://www.epa.gov/sites/production/files/2015-12/documents/9131.pdf).

The technique involves inoculating the sampled water in a liquid medium of lauryl tryptose broth, a selective media used for the detection of coli-
aerogenes bacteria in water (Corry et al., 2003). After completion of the incubation period, the tubes were examined for growth, acid and gas production by the coliform organisms. This test is known as presumptive test. Since the organisms other than the coliform may also produce this reaction, the positive tubes from the presumptive test were subjected to a confirmatory test. The density of bacteria was calculated based on positive and negative combination of the tubes. The results were expressed in MPN/100 ml (APHA, 1998). The total coliform was determined using lauryl tryptose broth and Brilliant Green Lactose Bile (BGLB) broth.

Preparation of the lauryl tryptose broth for presumptive test

To prepare lauryl tryptose broth (tryptose - 20.0 g/l; lactose - 5.0 g/l; K₂HPO₄ - 2.75 g/l; KH₂PO₄ - 2.75 g/l; NaCl - 5.0 g/l; sodium lauryl sulfate - 0.1 g/l), at first the required amounts of dehydrated ingredients for single strength (SS) and double strength (DS) were dissolved separately in each 1 l of sterilized distilled water and it was thoroughly mixed and slightly heated by proper swirling. The pH was adjusted to 6.8±0.2. After that, it was distributed as required (10 ml DS and 10 ml SS) in test tubes containing inverted Durham's tubes and then placed in the autoclave for sterilization at 121°C and 15 lb for 15 minutes.

Preparation of the Brilliant Green Lactose Bile broth for confirmed test

For preparation of Brilliant Green Lactose Bile broth (peptone - 10.0 g/l; lactose - 10.0 g/l; oxgall - 20.0 g/l; brilliant green - 0.0133 g/l), firstly the required amounts of dehydrated ingredients were dissolved in 1 litre of sterilized distilled water, which was thoroughly mixed and slightly heated by proper swirling and then pH was adjusted to 6.8±0.2. After that, the broth was distributed in the test tubes (10 ml each) containing inverted Durham's tubes and then placed in the autoclave for sterilization at 121°C and 15 lb for 15 minutes.

Presumptive test for Total Coliform of water

For the presumptive total coliform test, Lauryl Tryptose Broth was used as culture medium. For analysis of water, five test tubes each of 10 ml, 1 ml and 0.1 ml sample portion were used for the presumptive test. The first set containing five numbers of 10 ml DS broth tubes. Second and third sets containing ten numbers of 10 ml SS broth tubes. Each tube in a set of five containing 10 ml, 1 ml and 0.1 ml of water samples were inoculated in the first, second and third sets of media tubes respectively and mixed thoroughly. In each case, a control set was also run parallel. The inoculated test tubes were incubated at 36±1°C. After 24 hours examined for growth, gas and acidic reaction. If there was no gas and acid production then the tubes were incubated and examined again at the end of 48 hours. Within each tube, Durham's tube was placed
in an inverted position to show the bacterial growth with emission of gas. Production of gas bubbles and acids with growth was shown in the tubes within 48 hours contributes a presumptive reaction. After the incubation period of 48 hours, the numbers of positive tubes were counted and proceeded for confirmatory test.

**Confirmatory test for Total Coliform of water**

For confirmatory test for Total Coliform, culture medium used was Brilliant Green Lactose Bile broth. The positive presumptive tubes were gently shaken and with a sterile loop (3.0 - 3.5 mm in diameter), one or two loop full of culture was transferred to a test tube containing 10 ml Brilliant Green Lactose Bile broth with an inverted Durham's tube. The inoculated Brilliant Green Lactose Bile broth tubes were incubated at 36±1°C. Formation of any gas with growth within 48 hours constituted the confirmed test. The results were obtained in MPN/100 ml by comparing with standard MPN table.

**Statistical analysis**

Analysis of statistical significance was performed using One-Way ANOVA. All statistical analyses were done using SPSS 12.0 for Windows (SPSS Inc., USA).

**Results**

The river water samples were collected from two different study sites namely 2nd Hooghly Bridge (site A) and Babughat (site B) during the pre-monsoon season from April 2008 – April 2020 for comparative analysis of Total Coliform (TC) load in the River Ganges flowing through the metropolitan city of Kolkata and the result is represented in Fig. 1. For site A, the TC values in the river water sample ranged from $1.773 \times 10^3$ MPN/100 ml to $11.940 \times 10^3$ MPN/100 ml whereas in case of site B, the TC values ranged from $2.225 \times 10^3$ MPN/100 ml to $14.810 \times 10^3$ MPN/100 ml (Fig. 1).

![Fig. 1. A comparative time-series analysis of Total Coliform (TC) in the water of the River Ganges at two different sites (2nd Hooghly Bridge, closed triangles; Babughat, closed circles) collected during pre-monsoon season. Each symbol represents the mean of triplicate values](image)
COVID-19 lockdown period (in the month of April 2020) irrespective of the study site (i.e., from 10,942.50 ± 1942.50 to 2,225 ± 754.43; p < 0.01 in case of Babughat and from 9,045.00 ± 1695.97 to 1,772.50 ± 477.87; p < 0.01 in case of Second Hooghly Bridge) compared to pre-COVID-19 period (Fig. 2).

Moreover, the weekly data set from both site A and B for the month of April, 2020 during the COVID-19 lockdown phase showed that the TC values in the water samples ranged from $1.25 \times 10^3$ MPN/100 ml to $2.40 \times 10^3$ MPN/100 ml and $1.50 \times 10^3$ MPN/100 ml to $3.10 \times 10^3$ MPN/100 ml for site A and site B respectively with highest value in the first week of April 2020 and lowest value in the last week of April 2020 irrespective of the study sites (Fig. 3).

Discussion

The River Ganges flowing through this capital city of the Indian state of West Bengal is an integral part of the city’s urban life and many industries and domestic lives are dependent on its water. At the same time, various industrial and anthropogenic activities are the constant sources of the river water contamination including coliform bacteria (Mitra, 2019).

Although, the rise of industries and human interventions over a period of time has an adverse impact on environmental health, it is congenial for the growth and multiplication of microbes as the latter obtain various nutrition from these industrial effluents and sewage wastes. In developing
countries like India where discharge of sewage water is not always adequately controlled, the river water receiving the untreated discharges from the sewage canals connected with the river are often threatened with the problem of fecal contamination (Strauss, 1996). Reports of the multiplication of microbes in the scenario of increasing pollution is available throughout the World (https://www.coronavirus.gov/) and the present study area with a huge quantum of solid and liquid effluents is an ideal premise for rapid proliferation of the microbes (especially the coliform bacteria).

The Coronavirus mediated global pandemic has resulted in lockdown throughout the World. The metropolis of India such as Kolkata is no exception. Interestingly, the global pandemic mediated lockdown improves river water quality to a great extent. The sharp decline in the TC load during the lockdown phase may be attributed to non-functioning of the industrial units, traffic movements, tourism together with reduction in waste disposal and fishing maneuvers, lack of community bathing activities and various religious rituals along the banks of the River Ganges. The results of the present study shed light on the importance of lockdown induced reduction of human intervention of the surrounding environments (Ganges in this case), thereby drastically improving the microbiological quality of the River Ganges water.

Few mitigating measures that could be undertaken to control the contamination of the River Ganges water include a) controlled industrial waste disposal, b) treatment of sewage wastes prior to their discharge in the river water, c) prohibition of community bathing, d) control of religious rituals, e) controlled anthropogenic ventures, f) periodic monitoring of water quality, g) routine microbial analysis (coliform load) of river water, and h) introduction of probiotic strains or coliphages (bacteriophages that could kill coliforms such as E. coli) with proper EIA.

Pritam Mukherjee is a post-doctoral researcher in the Department of Oceanography at Techno India University, West Bengal.

Prosenjit Pramanick is from Department of Oceanography, Techno India University, West Bengal.

Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.

References


Status of brackish water phytoplankton during COVID-19 lockdown phase

Nabonita Pal, Prabir Barman, Sujit Das, Sufia Zaman and Abhijit Mitra

Abstract

Phytoplankton act as the energy source for maintaining the aquatic food web. Threats like high suspended particulate matter, oil film, heavy metals, POPs etc. pose a negative effect on this primary producer community which have far reaching adverse impact on aquatic food web. However, during COVID-19 lockdown phase, the major sources of pollution have been cut-off resulting in the restoration of phytoplankton standing stock as evidenced from the data of Diamond Harbour station along the Hooghly estuary during 2018 (219.03×10^5/L), 2019 (226.75 ×10^5/L), and 2020 (430.63 ×10^5/L).

Keywords: Phytoplankton, COVID-19, Diamond Harbour, Hooghly estuary

Introduction

Phytoplankton are free floating, microscopic floral entities that thrive luxuriantly within the photic zone of the ocean, estuaries and different aquatic systems. They are the key players in maintaining the nutrient and energy flow through marine and estuarine food webs. The phytoplankton community encompasses both prokaryotic and eukaryotic species. One of the major challenges for aquatic ecologists is to understand the natural processes and anthropogenic factors, which regulate the standing biomass of phytoplankton in pelagic ecosystems. Understanding these processes would improve our ability to regulate/control nuisance and toxic algal blooms, maintain the aesthetics of surface water bodies, protect drinking water supplies, and improve fisheries production (Vollenweider, 1976; Carpenter et al., 1985; McQueen et al., 1986; Carmichael, 1994; Pauly and Christensen, 1995; Brett and Goldman, 1996; Brett and Goldman, 1997; Falconer, 1999; Micheli, 1999). Phytoplankton is the foundation of the aquatic food cycle, meaning that they are the primary producers (Vargas et al., 2006).

The fish resources of the nation that is directly linked with the economic profile of the country is dependent on the phytoplankton stock as they are primary producers of aquatic system and transfer the energy to members of higher trophic levels like fishes and other commercially important aquatic species by serving as their major food sources. The present paper is, therefore, an attempt to assess their status during the COVID-19 lockdown phase, when all the pollution sources have been cut-off with
upgradation of environmental quality (Mitra et al., 2020).

**Materials & Methods**

Phytoplankton samples were collected during April 2018, 2019 and 2020 through a vertical tow of a plankton net (20 µm effective mesh size) at Diamond Harbour station along the Hooghly estuary. The plankton net was approximately 50 cm long, with a 26 cm diameter mouth and a 10 cm diameter opening at the cod end, which was tied to a 125 ml TARSON collection bottle. The samples collected were preserved by using 1 ml of 37% formaldehyde (~2% final concentration) to identify the phytoplankton species. Phytoplankton cell identifications were based on standard taxonomic keys (Verlencar, 2004; Botes, 2003).

**Enumeration of phytoplankton density and diversity**

The water samples collected within bucket of a known volume was filtered through the bolting silk cloth and the plankton was concentrated. Centrifugation was carried out to concentrate the sample. The final volume of plankton concentrate was recorded to achieve the result of plankton density in terms of cells/litre or cells/m³. This step involved the counting of plankton through Sedgwick Rafter. 1 ml of plankton sample obtained from the stock through the pipette was transferred to the Sedgwick Rafter counting cell. The sample for counting in this chamber was spread evenly in the form of a thin layer and this was done by placing a cover slip diagonally across the counting cell and the sample was then introduced at one of its corner. The total number of plankton (standing stock) present in a litre of water sample was calculated using the formula:

\[ N = \frac{n \times v}{V} \]

Where,

N = total number plankton cells per litre of water filtered.

n = average number of plankton cells in 1ml of plankton sample.

v = volume of plankton concentrate (ml)

V= volume of total water filtered (l)

The units of standing crop are N/l or N×10^3 /m³

**Results**

The analytical results show that the standing stock of phytoplankton in the selected station is highest in April, 2020 compared to the April, 2019 and April, 2020 as highlighted in Fig. 1.
Fig. 1 Standing stock of phytoplankton in Diamond Harbour along the Hooghly estuary

Discussion
The phytoplankton at the base of aquatic food pyramid are exposed to threats of various categories arising from industrial and domestic discharges. The suspended particulate matter and oil film associated with aquatic ecosystem inhibits the solar energy to penetrate the water column thereby posing a negative impact on phytoplankton. This type of stress is common in the estuarine water of Indian Sundarbans due to continuous movement of passenger’s vessels, fishing trawlers, ships, oil tankers along the navigation route. In addition to this, the industries situated along the Hooghly estuary also add substantial amount of suspended particles in the water body thus retarding the growth of the tiny producer community (Mitra, 2013; Mitra and Zaman, 2014; Mitra and Zaman, 2015; Mitra and Zaman, 2016; Mitra, 2019). The COVID-19 phase, however, turned the picture of the environment (Mitra et al., 2020). Due to lockdown imposed by the Central and State Government, the discharges from industries, tourism units have been cut-off. In addition, the water transport system has also ceased due to which the stress on this tiny producer community has been withdrawn. This is reflected through higher standing stock of phytoplankton during April, 2020 (430.63 ×10^5/L), compared to April, 2019 (226.75 ×10^5/L) and April, 2018 (219.03 ×10^5/L) as shown in Fig. 1 This increase in standing stock has high probability to accelerate the estuarine fish resources in the years to come.

In conclusion it can be advocated that COVID-19 lockdown phase has accelerated the growth of phytoplankton species in the brackish water system along the Hooghly estuary, probably due to complete removal of stress from posed by pollution from point and non-point sources. Thus the COVID-19 lockdown process, in other way, has exposed the biodiversity face of the aquatic ecosystem in a positive direction.

Nabonita Pal is from Department of Oceanography, Techno India University, West Bengal.

Prabir Barman is from Department of Forestry and Biodiversity, Tripura University, Tripura.

Sujit Das is from Department of Forestry and Biodiversity, Tripura University, Tripura.

Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.
References


Nutrient load in the River Ganges during the COVID-19 lockdown phase: A Ground Zero observation

Tapti Sengupta, Prosenjit Pramanick and Abhijit Mitra

Abstract
We conducted a field level analysis during COVID-19 lockdown phase from 3rd April to 24th April, 2020 to scan the water quality of the River Ganges with respect to nitrate and phosphate load at three selected sites namely Botanical Garden, Babughat and 2nd Hooghly Bridge. The data generated were compared with the previous data sets in the study area. We observed a sharp decline in the nutrient level during the lockdown phase, irrespective of stations/sites confirming the positive role of lockdown on the aquatic system of the River Ganges. Minimum anthropogenic pollution can be the reason behind the decrease of these nutrients, leading to a balanced ecosystem in the River Ganges. The lockdown phase has allowed the aquatic ecosystem to revive its balance and has reduced the stress on the aquatic flora and fauna.

Keywords: COVID-19, River Ganges, nitrate, phosphate

Introduction
The Coronavirus infection that is causing a worldwide havoc is said to initiate in the Wuhan province of China during December 2019. The disease is presumed to be caused by eating under-processed animals especially bats, although various views exist behind the cause of the pandemics. The virus belongs to the SARS and MERS family and causes pneumonia-like symptoms. Until recently, it was not known to spread from human to humans. The virus seems to have morphed in the past few months causing mass mortalities worldwide and causing casualties in all the continents. This deadly virus has been named COVID-19 and WHO declared it as a pandemic. Since then, speculations and research is going on to find a suitable vaccine for the same. Since the disease spreads from one person to another, and also from contaminated surfaces, social distancing has been cited as a potential measure to contain this infection. Keeping this in view majority of the countries have imposed lockdown to slow down the rate of infection. In India, Maharashtra is the state with highest rate of infection and mortality followed by Delhi and Gujarat. Kolkata too has been facing cases of Coronavirus infection with about 22 deaths as of 28th April, 2020 as informed by Health and Family Welfare Department of Government of West Bengal (https://en.m.wikipedia.org/wiki/2020_coronavirus_pandemic_in_West_Bengal). Lockdown was imposed to slow the spread of this virus and to make people aware of its magnitude of devastation.
The city of Kolkata at present has a total population of 1,48,50,066 with a population density of 24000 people/km$^2$ (https://worldpopulationreview.com/world-cities/kolkata-population/). The sewage released from this huge population is the primary source of nitrate and phosphate in the aquatic system of the River Ganges. Apart from this, the chain of factories situated along the bank of the River Ganges, the regular bathing in the river, the movements of vessels also contribute appreciable amount of nutrients in the aquatic phase. The COVID-19 pandemic, however, has put a pause to all these activities and hence there is a high chance of alteration of nutrient budget in the Ganges River, along the banks of the city of Kolkata. The present paper is a snapshot of the nitrate and phosphate levels at three stations (Botanical Garden (22°33'06.4''N; 88°18'06.6''E), Babughat (22°34'10.3''N; 88°20'28.5''E) and 2nd Hooghly Bridge (22°33'31.4''N; 88°19'38.5''E)) in the study area during the COVID-19 lockdown phase (3rd April, 2020 to 24th April, 2020) and pre-COVID-19 period (2015-2019).

Methodology

Surface waters for nutrient (nitrate and phosphate) analyses were collected in clean TARSON bottles and transported to the laboratory in ice-freeze condition. Triplicate samples were collected from the same sites to maintain the quality of the data. The standard spectrophotometric method of Strickland and Parsons (1972) was adopted to determine the nutrient concentration in surface water. Nitrate was analysed by reducing it to nitrite by passing the sample with ammonium chloride buffer through a glass column packed with amalgamated cadmium filings and finally treating the solution with sulphanilamide. The resultant diazonium ion was coupled with N-(1-napthyl)-ethylene diamine to give an intensely pink azo dye. Determination of the phosphate was carried out by treatment of an aliquot of the sample with an acidic molybdate reagent containing ascorbic acid and a small proportion of potassium antimony tartarate. The reading was finally taken through UV-spectrophotometer.

Result

The variation of dissolved nitrate and phosphate in all the selected stations over a period of 6 years including the lockdown phase (2015-2020) is highlighted in Figs. 1 and 2 respectively.
Weekly observation of the dissolved nitrate and phosphate in the selected stations during the lockdown phase shows a decreasing trend (Figs. 3 and 4).

The concentrations of dissolved nitrate and phosphate in three sites were comparatively lower in the period of lockdown than the pre-COVID-19 period (Figs. 5 and 6).
Fig. 6. Variation of dissolved nitrate (µgm-at/l) in three sites during pre-COVID-19 and COVID-19 period

Discussion

COVID-19 pandemic has created a massive devastation in every sector of human life starting from industry to agriculture. The on-line education system in the educational sector is still under testing process. However, the pandemic has opened a positive horizon in the environmental sector (Mitra et al., 2020) due to shut down of the point and non-point sources of pollution. In this study also, it is observed that both nitrate and phosphate exhibited a sharp decline during this lockdown phase (3rd April, 2020 to 24th April, 2020) which may be due to less discharge of anthropogenic wastes from the outfalls and industrial effluents from the plants. A significant spatial variation is observed in the study zone, with highest value at Babughat (62.56 µgm-at/l for dissolved nitrate and 14.59 µgm-at/l for dissolved phosphate) and lowest at 2nd Hooghly bridge (49.18 µgm-at/l for dissolved nitrate and 11.27 µgm-at/l for dissolved phosphate). This spatial variation may be related to difference in the magnitude of anthropogenic activities at the sites concerned. Babughat is highly congested area with a large bus terminus, market places, public toilets, hotels and food stalls. The nutrients released from these point sources without any treatment have made the adjacent Ganges water rich in nutrients compared to other two sites. The lockdown period, however, made these units mostly non-functional due to which the nutrient load has decreased gradually as revealed from the weekly data of April, 2020. Previous studies have documented the phenomenon of eutrophication in these areas (Tiwari et al., 2016) which can lower the level of dissolved oxygen and pose adverse impact on aquatic lives. Low nutrients in the aquatic phase (as witnessed during the COVID-19 lockdown phase) is congenial for aquatic ecosystem and has the ability to prevent eutrophication leading to better water quality of the River Ganges in terms of nutrient load and harmful microbial population. Lesser anthropogenic pollution may also lead to a decrease in pathogenic microbes and coliforms, making the water cleaner and healthier.

Dr Tapti Sengupta is from the Department of Microbiology, West Bengal State University, Kolkata.

Prosenjit Pramanick is from the Department of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.
References

Decreasing trend of near surface atmospheric CO$_2$ level in the city of Kolkata during COVID-19 lockdown phase

Arpita Saha, Indra Narayan Sardar, Prosenjit Pramanick, Sufia Zaman and Abhijit Mitra

Abstract
The lockdown phase associated with COVID-19 pandemic started in full swing on and from 25$^{th}$ March, 2020 with the aim to retard the spreading of the virus. We made an in-depth study on the near surface atmospheric CO$_2$ level at three different sites in the city of Kolkata before and during the lockdown phase from 20.03.2020 to 26.04.2020. A significant decrease in the CO$_2$ level is observed in all the three selected sites (42.18% at Ramkrishna Ghat, 43.47% at Botanical Garden and 42.48% at Babughat), which may be due to absence of transport systems, industrial operations and other human activities in the megacity.

Keywords: COVID-19, Lockdown, Atmospheric CO$_2$, Kolkata

Introduction
The whole world is under the appalling shadow of COVID-19 pandemics and the city of Kolkata is no exception to this event. With a population of 1,48,50,066 and a population density of 24,000/sq km (https://worldpopulationreview.com/world-cities/kolkata-population/), the city has initiated a total lockdown of all activities on and from 25$^{th}$ March, 2020. Our team was in the process of monitoring the near surface atmospheric CO$_2$ since 20$^{th}$ March, when the lockdown was not in full swing in the megacity. We therefore got a scope to compare the level of atmospheric CO$_2$ just before the lockdown and during the complete lockdown phase associated with COVID-19. The present paper, thus, aims to assess the effects of non-functioning of all human activities on the atmosphere CO$_2$ level during the complete lockdown phase as ordered by the Central and State Governments of the country. In this paper, we made a time series analysis of atmospheric CO$_2$ for 10 days (20$^{th}$ March, 2020 to 26$^{th}$ April, 2020) at three sites of the megacity of Kolkata having anthropogenic activities of varied nature.

Materials and Methods

Study site
The megacity of Kolkata is the third largest city in India and situated in the east bank of the Hooghly River with an area of 187.33 km$^2$ in the state of West Bengal. Three sites along the bank of the River Ganga were selected for the present study namely Ramkrishna Ghat (22°34'19.8"N; 88°20'17.0"E), Botanical Garden (22°33'06.4"N; 88°18'06.6"E) and Babughat (22°34'10.3"N; 88°20'28.5"E).
Analysis
The near surface atmospheric carbon dioxide concentrations at three selected sites were measured with a portable CO$_2$ analyzer (Lutron CO$_2$ meter, GCH-2018) during 20$^{th}$ March, 2020 to 26$^{th}$ April, 2020 during the afternoon hours. 10 readings were taken from each site at a distance of 8 meter apart and the mean values were considered for statistical analysis. The results obtained from these dates of observation were subject to ANOVA using SYSTAT.

Results
The lockdown phase exhibited significant decrease in CO$_2$ level in all the selected sites (Fig. 1). The decrease percentage ranged from 42.18 at Ramkrishna Ghat to 43.47 at Botanical Garden, which may be attributed to different anthropogenic activities in the respective sites (Figs. 2 and 3). The maximum decrease in the site of the Botanical garden may be attributed to the presence of a large chunk of producer, which includes trees of various types. The role of urban vegetation in storing carbon was already cited by several researchers in and around the present study area (Mitra et al., 2012; Mitra and Zaman, 2014; Banerjee et al., 2015; Mitra et al., 2015; Mitra and Zaman, 2015; Mitra et al., 2016; Mitra and Zaman, 2016; Agarwal et al., 2017a,b; Banerjee et al., 2017; Mitra, 2019; Pal et al., 2019). The overall results strongly speak in favor of the regulatory influence of COVID-19 connected lockdown in slashing down the CO$_2$ level in the urban atmosphere.
ANOVA data highlight significant variations in near surface atmospheric CO\textsubscript{2} between stations and days (p < 0.01) (Table 1).

**Table 1. ANOVA for the atmospheric CO\textsubscript{2} between stations and between days**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
<th>F crit</th>
</tr>
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<tbody>
<tr>
<td>Between days</td>
<td>135427.9</td>
<td>9</td>
<td>15047.54</td>
<td>65.94764</td>
<td>6.12E-12</td>
<td>2.456281</td>
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<td>Between stations</td>
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<td>2</td>
<td>1879.433</td>
<td>8.36384</td>
<td>0.002884</td>
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<td>18</td>
<td>228.1741</td>
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<td></td>
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**Discussion**

The city of Kolkata is noted for its crowd in shopping malls, markets, busy office zones, small scale industries, educational hubs, traffic, recreational centers etc. In all these units, probability of spreading virus is almost near to unity as social distancing is practically a dream in these areas/units. To prevent the rapid spread of the virus, these units were completely shut down on and from 25\textsuperscript{th} March, 2020 that resulted in the reduction of CO\textsubscript{2} emission (Mitra et al., 2020). The city of Kolkata is almost near to the World average CO\textsubscript{2} level of 417.31 ppm (https://www.co2.earth/ as per the record of 30\textsuperscript{th} April, 2020). The increasing trend of CO\textsubscript{2} as highlighted in Fig. 4 since 1960 in the result of intense industrial activities and urban developments at the cost of forests and wetlands. The city of Kolkata also followed similar footsteps since last few decades, which has pushed the city to touch 403 ppm, 398 ppm and 412 ppm atmospheric CO\textsubscript{2} at Ramakrishna Ghat, Botanical Garden and Babughat respectively as recorded on 20\textsuperscript{th} March, 2020. However, the air quality increased a lot with a decrease of 42.18%, 43.47% and 42.48% at Ramkrishna Ghat, Botanical Garden and Babughat respectively during the COVID-19 lockdown phase.

The improvement of air quality in the megalcity of Kolkata is thus an eye opener to the magnitude of damage caused by unregulated anthropogenic activities in the city. Strict implementation of environmental related laws along with mass awareness is of utmost importance to eco- restore the city atmosphere.

![Fig. 4. Continuous yearly data of atmospheric CO\textsubscript{2} for six decades (1960-2019) according to Mauna Loa Observatory (MLO), NOAA (https://www.co2.earth/monthly-co2)](image)

**Fig. 4. Continuous yearly data of atmospheric CO\textsubscript{2} for six decades (1960-2019) according to Mauna Loa Observatory (MLO), NOAA (https://www.co2.earth/monthly-co2)**

*Arpita Saha is from Department of Oceanography, Techno India University, West Bengal.*

*Indra Narayan Sardar is from Laksmi Narayanpur Patna Vidyasagar Sevakendra Sisutirtha, West Bengal.*

*Prosenjit Pramanick is from Department of Oceanography, Techno India University, West Bengal.*
Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.

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5. https://www.co2.earth/


Reversing the phenomenon of acidification in the River Ganges: A Ground Zero observation

Pallavi Dutta, Prosenjit Pramanick, Pavel Biswas, Sufia Zaman and Abhijit Mitra

Abstract

The phenomenon of climate change has spread its arm in the aquatic ecosystem by reducing the pH value as a result of increased dissolution of atmospheric CO$_2$. The River Ganges along the city of Kolkata is no exception to this rule. The average pH of selected sites during the pre-COVID-19 period (18.3.2020 to 22.3.2020) was 6.69 in Ramakrishna Ghat, 6.63 in Botanical Garden, 6.41 in Babughat. However, with the passage of time since 25$^{th}$ March, 2020, there has been a steady increase of pH in all the sites confirming the reversal of the process of acidification.

Keywords: River Ganges, Acidification, Aquatic pH, Pre-COVID-19, COVID-19 lockdown phase

Introduction

The mighty River Ganges flowing through the city of Kolkata serves as the life line of the people of the megacity. The River provides several ecosystem services like production of fishes, mode of transportation, recreational activities, sports, performance of religious rituals etc. (Mitra, 2019). However, the river is still treated as the bin of all the wastes arising from domestic and industrial activities. In addition to this, wastes from automobile repairing units, emission of Green House Gases (GHGs) from industrial units and air-condition machines have made the city atmosphere highly polluted. Increased emission of CO$_2$ from anthropogenic sources (Mitra et al., 2020) has enhanced the entry of atmospheric CO$_2$ to the river water resulting in the formation of carbonic acid, thereby shifting the pH to a lower value. This is commonly referred as acidification and has been reported in several estuaries in the state of West Bengal (Mitra, 2013; Mitra and Zaman, 2014; Mitra and Zaman, 2016; Mitra, 2019). In this study, we have carried out a comparative analysis on surface water pH of the River Ganges between the pre-COVID-19 (18$^{th}$ March to 22$^{nd}$ March, 2020) and COVID-19 lockdown phase (25$^{th}$ March to 30$^{th}$ April, 2020). The COVID-19 pandemic provided an unique opportunity to venture in to such comparative picture as there is no movements of vessels, boats and trawlers in the river and also all the industrial operations have been ceased during the lockdown phase of the state- a condition of retrieving the natural parameters with the withdrawal of anthropogenic influences. This paper, therefore, can be treated as a comparative account of natural vs. human induced factors using River Ganges as the test bed.
Materials and Methods

Study site

Kolkata, Capital city of the maritime state of West Bengal, is the third largest city in India and situated in the east bank of the Hooghly River with an area of 187.33 km². Three sites along the bank of the River Ganges were selected for the present study namely Ramakrishna Ghat (22°34’19.8’’N; 88°20’17.0’’E), Botanical Garden (22°33’06.4’’N; 88°18’06.6’’E) and Babughat (22°34’10.3’’N; 88°20’28.5’’E).

Measurement of aquatic pH

pH of the surface water in the selected sampling station was measured during high tide condition with a portable pH meter (sensitivity = ±0.02). The measurement was carried out during pre-COVID-19 lockdown (18th-22nd March, 2020) and COVID-19 lockdown phases (26th March – 30th April, 2020).

Statistical Analysis

ANOVA was carried out to know whether significant variation of aquatic pH exists between sites and time phase (pre-COVID-19 and COVID-19 lockdown phases).

Results

The spatio-temporal variations of aquatic pH in the three study sites are highlighted in Fig. 1. In the lockdown phase due to COVID-19, the pH value increases in three selective sites (Fig. 2).

Fig. 1. Spatio-temporal variation of pH during the study period

Fig. 2. pH variation in the three selected sampling sites between pre-COVID-19 and COVID-19 lockdown period

Results of ANOVA show significant variations between stations and between pre-COVID-19 and COVID-19 lockdown phases (p < 0.01) (Table 1).
Table 1. ANOVA of the pH value between sites and between pre-COVID-19 and COVID-19 period

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<th>Source of Variation</th>
<th>SS</th>
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<th>MS</th>
<th>F</th>
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<td>0.003445</td>
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Discussion

The increase of atmospheric carbon dioxide in West Bengal, a maritime state in northeast coast of India has touched almost 51% since 1980 (Mitra, 2019). The gradual increase of carbon dioxide coupled with unplanned expansion of shrimp culture in places like Sundarbans (adjacent to the city), unplanned urban development and industrial activities has lowered the aquatic pH considerably (Mitra and Zaman, 2016). It is interesting to note that in all the sampling stations selected in the present study, the pH has increased by 2.84%, 3.46% and 4.99% at Ramakrishna Ghat, Botanical garden and Babughat respectively. This may be due to complete closure of all industrial operations along the bank of the River Ganges. Also the movements of vessels, flotels (a boat or ship that serves as a hotel, sometimes permanently moored to a dock) and other recreational activities have also been ceased to abide by the rules of mass gathering and social distancing during the COVID-19 lockdown phase. The CO₂ level of the atmosphere also showed a considerable dip in the value (Mitra.et.al, 2020). All these have posed a joint impact on pH level of the aquatic phase (synergistic effect) due to which a sudden turn in the trend of acidification has taken place.

The phenomenon of acidification due to climate change is never supportive and congenial for the aquatic organisms preferably for the survival of molluscs and other aquatic organisms with calcareous shell. Thus COVID-19 lockdown phase served as a boon to these faunal community by providing a reverse swing in the process of acidification.

Pallavi Dutta is from Department of Oceanography, Techno India University, West Bengal.

Prosenjit Pramanick is from Department of Oceanography, Techno India University, West Bengal.

Pavel Biswas is from Department of Oceanography, Techno India University, West Bengal.

Sufia Zaman is the Associate Professor and Head of the Dept. of Oceanography, Techno India University, West Bengal.

Abhijit Mitra is the Associate Professor and former Head of the Dept. of Marine Science, University of Calcutta.
References


Coping up with the economic conditions amidst COVID-19

Rites Goel and Tanvi Luhariwala

"Necessity is a mother of all invention"
-Sir Albert Einstein

COVID-19 pandemic has led many to learn important elements of life which was crucial in present age. More number of people have started working from home and adhering to the use of technology which if implemented in the normal course will not only save money and time but also create oneness within the family. Food habits of various individuals have changed on the positive scale. People who used to have junk food have incorporated healthy diet in their lifestyle. Nature has pressed a pause button and seems to breathe. People have realised the true sense of happiness which was being eliminated due to the speed of life.

The entire world has recognised and adopted the "jugaad" approach, a concept common in India, wherein railway coaches are being turned into quarantine centres and Intensive Care Units (ICU). Various courts throughout India has been conducting hearing through online mechanism however like every coin has two sides COVID-19 pandemic will impact India's economic growth "severely".

Daily wage labourers form an important pillar for running an informal economy. Certain labourers work on a leverage of 2 to 3 days savings therefore it is important at this crucial time to provide funds to these labourers directly which will stabilize this sector of the economy to a greater extent. Government has already asked States and Union Territories to transfer funds through the direct benefit transfer mode from the cess fund collected by welfare boards to which some of the State governments have already implemented.

MSME fuels the growth of the economy in any country. At this crucial time the MSMEs are facing liquidity crunch. Assistance to facilitate emergency response by granting loans to MSMEs is of a prime importance. Regulatory authorities are required to shoulder the responsibilities in assistance of MSME sector primarily. RBI has provided a regulatory package where certain regulatory measures announce to mitigate the burden of debt servicing brought by disruptions on account of COVID-19 and to ensure the continuity of viable businesses. It has been permitted to grant a moratorium of 3 months on payment of all instalments falling due between 1st March 2020 to 31st May 2020. Small industries development Bank of India (SIDBI) has also launched a scheme where in loan up to 50 lakh rupees is available at 5% interest rate to MSMEs.
engaged in manufacturing of products or offers services related to fighting the novel coronavirus which has been declared a pandemic.  

Government should implement more of such measures to provide liquidity in the best possible manner in order to save the economy effectively and efficiently. Fiscal and monetary policies should be addressed at a go and not in a fragmented manner to provide security within the country. Most of the procedural penalties interest has been waived off. However, government’s heavy duties and charges including commercial electricity should be curbed in a manner which may provide relief to the business concerns. The objective of the above measures will help to safeguard the credit line in a greater way.

Unemployment problems may erupt within the country because of which certain measures should be launched soon by the government in order to provide job security. Policy decisions have been implemented by the government in relation to protecting companies from getting liquidated at this tough time. As per section 4 of the Insolvency and Bankruptcy Code, 2016 an eligible person can apply for insolvency and liquidation of corporate debtors where the minimum amount of default is Rs 1 lakh however considering the present scenario it is much likely that the companies may default every now and then therefore the amount of default has been increased to rupees 1 crore. Furthermore, the government is also considering to suspend certain provisions of the Insolvency and Bankruptcy Code, 2016 including Section 7, Section 9 and Section 10 which lays the foundation for initiating the insolvency proceedings against a corporate body for a period of six months. The same was hinted at by our Finance Minister, Ms. Nirmala Sitharaman during her speech on 24th March, 2020. Therefore, government may provide relief from insolvency in totality for the next few months which would be a great step towards protection of the economy at large.

Furthermore, companies who are contributing towards the noble cause of combatting COVID-19 are also getting certain benefits under the CSR provisions. Corporate Social Responsibility (CSR) as we all know is a company’s responsibility towards the community, environment and society at large in which it operates. It has been well established in the Indian laws which makes it mandatory for companies to fulfil their CSR. It has been clarified that spending of CSR funds for COVID-19 is eligible CSR activity. The general circular further mentions that the funds may be spent for various activities related to COVID 19 under the item nos. (i) to (xii) of Schedule VII. Accordingly, it was further clarified that the contribution made to ‘PM CARES Fund’ (Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund) shall qualify as CSR expenditure under item no (viii) of Schedule VII of the Companies Act, 2013. Furthermore, a set of FAQs released by the ministry has also stated that
Contribution made to State Disaster Management Authority to combat COVID-19 shall qualify as CSR expenditure under item no (xii) of Schedule VII and any ex-gratia payment to temporary or casual or daily wage workers over and above the disbursement of wages, specifically for fighting COVID-19, can be classified as CSR. However, the FAQ’s also clearly mention that contributions made towards ‘Chief Minister’s Relief Fund’ or ‘State Relief Fund for COVID-19’ shall not be qualified as admissible CSR expenditure.

It should not be unnoticed that government is also trying its best for survival of the people particularly the lower sections who work on daily basis for their living. On 31st of March 2020 the Centre announced that donations to the PM CARES fund will get tax breaks under various Sections of the Income Tax Act, 1961 which would help galvanise contributions to the fund that has been set up to provide relief to the persons affected by the coronavirus outbreak. It was further clarified by the Income Tax department that employees are also entitled to claim tax deductions for donations to PM CARES fund and would qualify for Section 80G benefits for hundred percent exemption under the Income Tax Act, 1961. This fund not only caters to the present situation but also deals with any kind of emergency or distress situation like the one posed by the COVID-19 pandemic and to provide relief to the affected.

Meanwhile, where we have answers to some questions, there are many questions that remain unanswered. One of which is the “Force Majeure” clause, which gives rise to a plethora of questions amidst the broken supply chain due to the pandemic COVID-19. The term ‘Force Majeure’ comes from the French language meaning ‘greater force’. Force Majeure clause purely arises out of contractual obligation agreed upon by and between the parties. In simple words there is no specific provision in the Indian Contract Act, 1872 that explicitly mentions or speaks of the Force Majeure clause. The Force Majeure clauses are contractual clauses which typically include events that are acts of god or beyond human control. It includes such extraordinary events and circumstance which are beyond the control of the parties to the contract and thus prevents one or all of them from fulfilling their contractual obligation. Therefore, when the events occur as mentioned in the clause, it excuses the parties from performance of the contract. Force Majeure clauses is an expressed clause under the contract and hence language of the said clause and the events covered under the same plays a vital role in its interpretation. Now, the primary concern in the current situation is whether the pandemic COVID-19 would be covered under the force majeure clause or not? Due to the lock down, the economy has come to a standstill with people having little or no flow of income, moreover the said circumstance has rendered parties to the contract incapable of performing their contractual
obligation. This itself gives rise to innumerable questions, whether the employers can use the Force Majeure clause to avoid payment of wages to workers, since the industries are not operational at the moment? can the lessee refuse to make payment towards the leased property? Will the persons involved in the tourism industry like travel agents, hotels etc. be compelled to refund the advance? Will one be held liable to make payment due to cancellation of consignment or failure to supply goods or services? The questions are infinite and the answers limited.

However, there can also be a situation where the force majeure clause does not exist in the contract at all or does not cover a pandemic or situation like COVID-19 outbreak in its ambit. In such situation the provisions of the Indian Contract Act, 1872 being Section 56 comes to our rescue. Section 56 provides relief under “Doctrine of Frustration”. Therefore, in order to invoke this provision, it is essential to establish that the performance of the contractual obligation has become impossible by reason of some event which could not be prevented by the parties and that the parties invoking this section has not induced this impossibility.

Despite having some significant case laws, where the judiciary has beautifully defined and applied the above-mentioned concepts of “force majeure” and “doctrine of frustration”, there still exists a lot of open ends and factual differences making the said case laws easily distinguishable. Thus, only time will tell, how these relevant questions arising out of this crucial economic situation, would be dealt with by the people and the judiciary.

The government and citizens are trying their best to deal with the fatal virus, COVID-19. Everyone in the country is eagerly awaiting the end of it, and the lifting of the lockdown so that they can go back to their normal lifestyle. However, amidst this hope, there is still an industry that is uncertain about its fate, the tourism and hospitality industry. There are so many people and entities involved in this tourism and hospitality industry including the travel agents, tour operators, people involved in adventure activities, tourist transporters, restaurants, etc who are still unsure as to when their industry will begin to function. Therefore, several associations from the industry like the Federation of Associations in Indian Tourism and Hospitality (FAITH) etc. have approached the Ministry of Tourism seeking some reliefs. The associations have requested that the Goods and Services Tax (GST) and income tax be completely waived for tourism, travel and hospitality industry for a year, a moratorium be declared for payment of EMIs (principal and interest) for term loans for a period of 12 months, the working capital limits be enhanced at interest-free rates, and a support fund be created for salaries and establishment costs. The associations also demanded that provident fund (PF) contributions and Employees’ State Insurance (ESI) be waived off for a year and that GST liability, advance tax, custom duties, excise duties, VAT, and TDS be
deferred for a year. The reliefs that have been extended to all industries in general have been granted to the tourism and hospitality industry as well. However, till now no significant relief has been extended to the tourism industry specifically. The tourism and hospitality industry is the most affected and the last to recover and will most likely continue to face huge losses even after the pandemic ends. These industries contribute to the major percentage of GDP and thus require immediate attention by the Government.

A situation like this both economically and medically has not been experienced in many years, and therefore not just the citizens but also the government is struggling to cope with the current situation. However, everyone is trying to contribute by doing their part to combat the widespread of this fatal virus, COVID-19, especially the Medical practitioner and the frontline workers who are keeping their life at stake to protect and save the others. Even the government is leaving no stones unturned to provide reliefs to the people, especially the poor and needy, by providing them with food and shelter where needed and even by extending monetary help. The economic condition of India and all the other countries of the world that are hit by this pandemic, is no doubt going be gravely affected, so much so, that it might take years to recover from the same. But that is where the important message lies, the economic conditions can still be restored but not the lives of those who have departed. Therefore, we hope that we all come out from this pandemic safe and healthy, and then together help the economy to heal.

**Rites Goel** is an Advocate at Calcutta High Court and a guest faculty at WBNUJS.

**Tanvi Luhariwala** is an Advocate at Calcutta High Court.

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1. [https://m.rbi.org.in/scripts/BS_CircularIndexDisplay.aspx?Id=11835](https://m.rbi.org.in/scripts/BS_CircularIndexDisplay.aspx?Id=11835)
4. Section 135 of the Companies Act, 2013, corresponding Companies (Corporate Social Responsibility) Rules, 2014 and Schedule VII
5. The Ministry of Corporate Affairs has released a general circular being no. 10/2020, dated 23rd March, 2020
6. Office memorandum F. No. CSR-05/1/2020-CSR-MCA dated 28th March, 2020
COVID 19: An Overview of the Preliminary Regulatory Responses to the Pandemic in the Indian Corporate Sector

Shouvik Kumar Guha

Introduction

While the impact of the pandemic caused by COVID-19 has been deeply felt across all the aspects of human life across the world over the past couple of months, the commercial, corporate and business sectors in particular are considered to be one of the most affected areas in terms of the severity of the changes and regulatory responses relating thereto. A human and social crisis of unprecedented scale, the pandemic has caused and is still continuing to cause markets and institutions around the globe to reconsider their short-term as well as long-term strategies, expectations and capacity to absorb the regulatory turbulence and shocks felt on both the demand and supply sides of the equation, the extent of which is still being gauged as of now. In course of this paper, the author would like to spend some time delineating and reviewing certain specific regulatory responses that have been made by three of the biggest sectoral regulators and ministries in India, viz. the Ministry of Corporate Affairs (hereinafter “MCA”), the Securities and Exchange Board of India (hereinafter “SEBI”), and the Competition Commission of India (hereinafter “CCI”). It is to be noted that all the sectors and industries governed and regulated by the aforesaid bodies are currently in a state of flux, and therefore these regulatory responses are also prone to periodic and regular modifications depending on situational analysis and requirements.

Regulatory Responses from the Ministry of Corporate Affairs

In the light of the social distancing measures and lockdown that are in force during the pandemic, the MCA has recognized the difficulties involved in holding statutory corporate meetings of both shareholders as well as of the Board of Directors. While the Companies Act, 2013 or the Companies (Meetings of Board and Its Powers) Rules, 2014 used to provide for only physical meetings of the Board, the 2014 Rules have been amended by the MCA vide a notification dated March 19, 2020 allowing the Board to conduct such meetings via video-conferencing or other comparable audio-visual means at least till June 30, 2020, so long as such meetings are intended to approve annual financial statements, Board reports, prospectus, mergers, amalgamations, acquisitions or takeovers, or if the Audit Committee (one of the sub-committees of the Board) are meeting to consider financial statements. From this list, one may be able to conclude that the legislative intention was to ensure that the pandemic and the restrictions issued because of it do not succeed in bringing the
essential corporate activities to a complete stop; the inclusion of mergers etc. in the list may in particular bear significance in relation to the collaborative restructuring that the fight against the pandemic gets to see in the coming days. While holding such virtual meetings, however, there is a list of legal issues that the Board must take into consideration, *inter alia* providing the directors the option to participate in such meetings using audio-visual means clearly in the notice to the meeting, ensuring that each member of the Board clearly indicates their consent to participate in such meetings and confirms receipt of the agenda beforehand, the quorum for such meetings is conclusively ascertained by the Chairperson, preferably by taking specific roll call during the meeting, any oral communication taking place during the meeting is preceded by the concerned member clearly stating their identity for the benefit of all other participants, the Chairperson announcing a summarized version of the all the decisions taken in the meeting, the members present having agreed to consider the statutory registers deemed to be signed by all of them as applicable, and finally, timely circulation of the minutes of the meeting among all the members within 15 days from the date of the meeting (in written or electronic format). Further, the mandatory period within which successive Board meetings have to be held has also been increased by 60 days for the period between April, 2020 to September, 2020 (allowing two consecutive meetings to take place as long as 180 days apart). Specifically, in case Independent Directors cannot hold their statutory exclusive annual meeting for the financial year 2019-20, the same would not be considered a statutory breach so long as the meeting is held subsequently following lifting of the ongoing restrictions, although the MCA has encouraged such directors to hold their meeting using audio-visual means if possible.

When it comes to shareholder meetings, the MCA has advised the companies not to hold any physical meetings at this stage and seek essential shareholder approval by way of postal ballots/e-voting. Section 108 of the 2013 Act and Rule 20 of the Companies (Management and Administration) Rules, 2014 already provide for detailed procedure with regard to such e-voting, although till date, only listed companies and all unlisted companies having more than 1000 shareholders were required to provide such facilities. Apart from said e-voting, if a company has to convene an Extraordinary General Meeting of the shareholder under unavoidable circumstances, then the same can be conducted using audio-visual means like the Board meetings till June 30, 2020, provided certain specific conditions such as attendance of at least one independent director (where applicable) and auditor (or his authorized and qualified representative), maintenance of all records of the meeting (and providing the same on the company website in case of public companies) and provision of e-voting facilities, notice for the meeting and e-voting being provided via registered shareholder email address or through the depository or depository participant...
etc.\textsuperscript{vii} The conditions make it clear that while the MCA acknowledges the need for the hour of allowing corporate activities to be compromised even under the current exceptional circumstances, at the same time, it also remains mindful of the need to maintain transparency and accountability in course of such activities. Having said that, if such virtual meetings continue to remain a regular feature in the Indian corporate scene for some time to come, then the author is of the opinion that certain issues of paramount importance need to be addressed specifically, including but not limited to those pertaining to privacy, data confidentiality and accessibility, especially when it comes to small-scale retail investors who own shares in such companies.

One of the significant changes that has been introduced by the MCA during ongoing crisis is to encourage companies satisfying the requirements prescribed under Section 135 of the 2013 Act\textsuperscript{viii} to provide financial support to the different initiatives that are being undertaken all around the country for the purpose of dealing with the pandemic and the disruptions triggered by it – it is to such end that the MCA has vide notification dated March 23, 2020\textsuperscript{ix} declared all expenditure on such grounds as incurred by the companies as to qualify as legitimate corporate social responsibility (hereinafter ‘CSR’) expenditure\textsuperscript{x}. Further, a specific fund created for the purpose of providing necessary funding to deal with emergency or distress situations such as the one triggered by the pandemic, that goes by the name of Prime Minister’s Citizen Assistance and Relief in Emergency Situations Fund (PM-CARES Fund), has also been announced as one, any contribution made wherein would qualify as legitimate CSR expenditure.\textsuperscript{xi}

Some of the other significant changes introduced by the MCA as responses to the pandemic and the associated disruption include advising all Indian companies and limited liability partnerships to encourage their employees to work from home and facilitate the same\textsuperscript{xii}, waiving of the requirement to pay additional fees for delay in filing of the various statutory forms by the companies before the Registrar of Companies until June 30, 2020, deciding not to treat inability of any residential director to prove minimum 182 days of residence in the country during the financial year 2019-20 as a statutory violation in the light of the travel restrictions, postponement of the implementation of the Companies (Auditor’s Report) Order, 2020 for the time being (this allows the companies not to have to immediately enhance their compliance level beyond the existing norms as the Order would have otherwise required) and allowing newly incorporated companies an extension of time by 6 months to declare themselves ready to commence business (earlier it used to be 6 months from the date of incorporation), to name a few.\textsuperscript{xiii} Among other relaxations provided to statutory corporate practices, the one relating to maintenance of sufficient reserves (minimum 15%\textsuperscript{xiv}) for the
debentures maturing in course of a financial year by investing such amounts in specified financial instruments by the end of April of that financial year, is significant – the deadline for such investment has been extended till the end of June, 2020 for the financial year 2020-21.\textsuperscript{xv} Similar extension has been provided to deposit maintenance reserve too\textsuperscript{xvi} (minimum 20\% of the deposits repayable during that financial year\textsuperscript{xvii}). Last but not the least, mention must be made in this context of the Companies Fresh Start Scheme, 2020 and the LLP Settlement Scheme, 2020 that have been introduced by the MCA – according to these schemes, companies and LLPs incorporated in India get the opportunity to rectify their existing defaults in terms of statutory procedural requirements including filing of all prescribed documents, without having to pay any penalty for the same during a moratorium period extending from April 1, 2020 to September 30, 2020.\textsuperscript{xviii} Companies that have been rendered inactive owing to the pandemic also get to avail of this scheme to get the status of dormant companies (or even apply for getting their names struck off the register of companies), thereby minimizing their overall compliance requirements. While the relaxation is available for delay or default in filing of statutory documents, it cannot, however, be availed for other statutory violations that the company may be liable for. Once the company has withdrawn any appeal that it might have had filed against any order sanctioning it for delay/default, it has the opportunity of availing the benefits of this scheme by filing Form CFSS 2020 in order to procure the immunity certificate within 6 months from the date of the closure of the scheme.\textsuperscript{xix} However, companies that have already applied for dormant status or for getting their names struck off the register, or companies against which the process for issuing final notice for such striking off has already been initiated, or companies that have been restructured or amalgamated under any scheme of compromise or arrangement under the 2013 Act, would not be able to avail the benefits of this scheme. The scheme applicable to LLPs as notified provide for similar relaxation of norms too.

The author is of the opinion that the MCA’s regulatory responses so far in the context of the pandemic can broadly be classified into two categories, viz. the ones that are trying to provide solutions to ensure that the corporate activities can continue unabated and also absorb the disruptions caused by the pandemic (these include the amendments relating to the CSR provisions, the Work from Home facilitation, and the changes introduced in the context of holding virtual meetings of the Board and the shareholders – they also allow for the possibility that the pandemic and its aftermath may continue for quite some time and acknowledge the need to change the existing norms and perspectives to such effect); on the other hand, there are also those responses that are merely of the nature of ‘stopping the clock’ provisions (these do not make any change in the regulatory norms as such, but merely postpone the implementation or application of the same to a point of time a few
months ahead, thereby assuming that the pandemic would be brought under effective control by that time—therefore, they may need to be bolstered with further extensions in the event that assumption proves not to be true, at least until more reforms of the first category are brought forth as solutions).

**Regulatory Responses from the Securities and Exchange Board of India**

While the bulk of the regulatory responses applicable to the companies in the context of COVID-19 have originated from the MCA, SEBI, the capital market regulator in the country, has also come up with certain responses of its own during this period, some of which are even directly linked with the stance assumed by the MCA in this regard.

The first response had been in the form of the circular titled ‘Relaxation from compliance with certain provisions of the SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015 due to the COVID-19 virus pandemic’, dated March 19, 2020. SEBI has vide this circular sought to relax specific compliance requirements for listed companies under the aforesaid 2015 Regulations—extension of one month had been provided with regard to submission of compliance certificate regarding reports on corporate governance, share transfer facility and compliance with applicable secretarial standards, as well as submission annual financial results, extension of 3 weeks had been provided for submission of reports on investor complaints and shareholding patterns for the ongoing quarter, and extension of 45 days had been provided for submission of quarterly financial results. Further, the same circular relaxed the maximum time gap of 120 days as applicable between two successive meetings of the Board and the Audit Committee, to the extent such meetings were to be held between December 1, 2019 and June 30, 2020. Subsequently, in a circular dated March 23, 2020, SEBI has also provided comparable relaxations to companies having listed non-convertible debentures (hereinafter “NCDs”), non-convertible redeemable preference shares (hereinafter “NCRPs”), municipal debt securities and commercial papers, especially from compliance requirements applicable to such companies under the aforesaid 2015 Regulations, as well as the SEBI (Issue and Listing of Debt Securities) Regulations, 2008.

With regard to public issue of debt securities, commercial papers, or NCRPs, companies can now provide their audited financial results only till September 30, 2019 provided they intend to issue such securities or papers by June 30, 2020, thus being allowed a relaxation of 60 days in the process. Similar relaxation of 60 days and 45 days have been provided to initial and annual disclosures required by companies (large entities) raising funds by issuing debt securities. Further, relaxations of 45 days, 30 days and 45 days have also respectively been provided with regard to disclosure of half-yearly investor grievance report, half-yearly financial results and quarterly account reports required to be disclosed by companies under the SEBI (Issue and Listing of Municipal Debt Securities) Regulations, 2015. Existing timelines...
for the regular monthly reporting by portfolio managers are also being maintained for the next 2 months, and the applicability of the SEBI Guidelines for Portfolio Managers has been temporarily withheld for the time being. A similar relaxation of 2 months has also been provided to Venture Capital Funds and Alternative Investment Funds for any statutory filing requirement under the SEBI (Alternative Investment Funds) Regulations, 2012. Depository participants are also being allowed as of now to process applications for registration, KYC verification and related material changes on the basis of scanned copies of signed documents or copies that have not been certified as otherwise required for Foreign Portfolio Investors in particular (provided they subsequently obtain duly certified copies within a month from the end of the period of operation of this relief). Processing of different investor requests relating to physical securities and compliance requirements has also been allowed to continue for an additional 21 days over and above the applicable timelines insofar as issuing companies and share issue/transfer agents are concerned. All these relaxations are as of date applicable only till June 30, 2020.

**Regulatory Responses from the Competition Commission of India**

In relation to competition concerns surrounding various sectors, particularly in light of the various coordinated activities that the various enterprises operating in the healthcare, hospitality, essential commodities, banking and software development sectors need to undertake in order to effectively address the ongoing crisis, the role played by the competition watchdog, CCI, cannot be overlooked either. In the absence of specific exemptions from the provisions of the Competition Act, 2002, such activities might run afoul of the prohibitions applicable to anti-competitive agreements or abuse of dominant position, as prescribed under Sections 3 and 4 of the said Act, regardless of their efficacy in providing a united front to the perils posed by the pandemic.

Section 3 of the 2002 Act prohibits *inter alia* activities such as price fixing, market sharing, bid rigging, manipulating production and supply of products and services, and related collusive endeavours between enterprises having horizontal or vertical relationship vis-à-vis each other. Most of such activities are considered *per se* violative of the Act, and attract penalties accordingly. The measures being taken by various market players across multiple sectors to cope with the abnormalities in demand/supply conditions may involve multiple instances of cooperation and coordination with their horizontal and vertical counterparts. Sharing of consumer, price and production data, apportionment of markets as an efficiency-enhancing strategy, collaboration for the purpose of facilitating innovation are but some of the examples of such measures. Having said that, such prohibitions are not absolute, and there are provisions under competition law jurisprudence that
may allow for collaborative agreements in the form of joint ventures intended to increase pro-competitive market efficiency, assuming such efficiency, whether technological, capacity-based, or economic, can be effectively demonstrated by the parties involved in said agreements. An illustration of the power to provide similar exemption under the 2002 Act is Section 54 thereof, which authorizes the Central Government to extend such relaxation to certain agreements on grounds like public interest or national security, a power that has been exercised in the recent past. Even other jurisdictions such as the United States, European Union, Australia, United Kingdom, and some of the Nordic countries have witnessed similar relaxation norms being exercised by their respective antitrust authorities in the context of the Covid-19 pandemic. The recent advisory that has been issued by the CCI on April 19, 2020, seeks to adhere to a similar line of thought. Titled ‘Advisory to Businesses in Time of COVID 19’, it acknowledges the disruption that has been caused to the supply chain by the pandemic and recognizes the need for coordinated activities for the enterprises to engage in, especially in the healthcare and essential commodities sectors, in order to ensure smooth supply and fair distribution of products and services; such activities might include sharing of vital information between enterprises that might have otherwise attracted the prohibition under Section 3. Interestingly, the advisory also refers to the powers of the CCI granted under Section 19(3) of the 2002 Act, which allows the Commission to take into consideration factors such as improving production, supply or distribution of goods/services, increase in consumer utility, development on scientific, technological or economic fronts etc. while reviewing whether a certain activity might be allowed. The author is of the opinion that such references, together with the advisory having limited such special consideration only to activities deemed ‘necessary and proportionate’ by the Commission for the purpose of combating the pandemic and assuaging the various shocks generated by it, might have had the cumulative effect of rendering aforesaid collaborative activities usually deemed per se illegal under Section 3, to be subjected to a Rule of Reason analysis instead. On another note, the possibility of exploitative conduct by enterprises by way of imposing unfair pricing and non-pricing conditions in order to take advantage of the fluctuations taking place in several markets owing to the disturbances generated by the pandemic may also be examined by the Commission under Section 4 of the 2002 Act, assuming such conduct amounts to abuse of a dominant position in the relevant market concerned. Apart from the penalties that the Commission has the power to impose on enterprises for the latter’s inability to adequately establish a correlation between the production and distribution costs incurred and the final retail price charged from the consumer, there are also other legislative provisions at play here, such as the Essential Commodities Act, 1955, which allows the Union Government to designate goods as essential...
commodities that cannot be sold for prices exceeding the maximum retail price as indicated on the package. Relevant departments of the government also have the power to implement price controlling mechanisms on such occasions.

In the light of the aforesaid stance that the CCI has adopted in this matter, it might be advisable for the companies seeking to collaborate on one or more fronts with the objective of dealing with the pandemic in a manner more efficient, to follow certain practices that might help convince the regulator of their good faith and lack of intention to enter into anti-competitive agreements or engage in abuse of dominance. Ring-fencing the relevant organizational departments that are engaging in such collaboration, as well as all the organizational data that are not considered essential for the purpose of such collaboration can be a good start; refraining from any kind of organizational coordination including data sharing or market allocation for the purpose of bidding for any of the tenders that the government and public sector enterprises may soon float in relation to measures against the pandemic may turn out be another important precautionary practice. Further, given the increase in communication between market players under such conditions, both on the horizontal as well as vertical levels, if only for the purpose of coordination, as well as the lack of organizational supervision of such communication in the light of most of the actual personnel involved working from home and not supervised office spaces or protected networks, it is also imperative that confidential organizational data is not carelessly communicated so as to allow other rival organizations be privy to the same.

Conclusion

An overview of the various responses of the aforementioned regulators to the challenges posed by the COVID-19 pandemic, as has been provided above, might lead one to several interesting observations. The first would be that the lack of certainty about the duration of the pandemic and the recurring effects in its aftermath is also reflected in the nature of the measures that have been adopted so far. This is apparent from the fact some of the measures are merely meant to stop the clock till the crisis is over; while an acceptable preliminary response, such measures have already revealed their susceptibility to periodic and regular extension or renewal as the pandemic keeps on assuming the shape of a bigger and more durable threat than it had seemed at first. Unless the situation improves considerably over the next couple of months, these preliminary responses might not continue to be effective in their renewed avatars and have to give way to more permanent solutions. Another point is that some of the measures that have been advised by the regulators might face technological and access-related barriers in terms of implementation on a national scale. While with time, effort and dedicated planning, such barriers can be overcome, it might require intervention on the part of the State where the scale and scope of the problem or its solution may defy isolated or even institutional efforts from
the private corporate players. The ease of business policy of the Union Government has so far been reflected in several of the measures, at least to the extent that they allow relaxation of compliance requirements on the companies’ part; however, one must also keep in mind the degree of effectiveness on the part of the regulator as well as the judiciary to ensure that such relaxation is not being abused, especially in light of the severe operational limitations that the latter are facing at the current stage. Injection of sufficient stimulus into the economy across sectors and active solicitation of investment might prove to be of some assistance in this war that the country is waging against the pandemic, along with the rest of the world – keeping in mind the severity and suddenness of the problems with which the globe has been besieged within a relatively short span of time, the author is of the opinion that so far, the hybrid proactive and reactive regulatory responses that the corporate sector has witnessed in this country bear considerable promise for the future.

Shouvik Kumar Guha is working as an Assistant Professor (Senior Scale) at The West Bengal National University of Juridical Sciences, Kolkata.

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2. Id.
5. Id.
6. See SEBI Circular No. CIR/CFD/POLICY CELL/2/2014 dated April 17, 2014, read with aforesaid Section 108 of the 2013 Act and Rule 20 of the 2014 Rules. All the rules applicable to e-voting as mentioned under the aforesaid Rule 20 would apply to such voting at this juncture, along with the ones already mentioned.
7. See MCA F. No. 2/1/2020-CL-V, General Circular No. 14/2020 dated April 8, 2020 delineating all the necessary rules and practices that such virtual EGM would have to adhere to.
8. Id.
9. This includes companies having a net worth/turnover greater than or equal to INR 500/1000 crores, or a net profit greater than or equal to INR 5 crores in the last financial year. Such companies are required to spend in the ongoing financial year as CSR expenses an amount equal to or greater than 2% of their average net profit over the last 3 financial years (or all preceding financial years in case the company has not been existence for 3 years yet). See Companies Act, 2013, Section 135. By virtue of the Companies (Amendment) Act, 2019, penal provisions in the nature of fines for errant companies and even imprisonment for the officers involved have been provided under the aegis of Section 135, which makes the Indian CSR regime to be first of its kind in terms of its mandatory nature. However, criminal liability attracted for non-compliance with the aforesaid Section 135 might be phased out, while keeping the civil liability intact, as per the impression provided by official sources; see PTI, Stimulus package: CSR norm violations not to be treated as criminal offence, says Nirmala Sitharaman, available at https://www.thehindubusinessline.com/economy/govt-not-to-treat-csr-violations-as-criminal-offence-nirmala-sitharaman/article29234104.ece (last visited on May 1, 2020).

Such spending would qualify as to be within the ambit of items (i) and (xii) of Schedule VII to the 2013 Act, including heads such as healthcare promotion, disaster management etc. Liberal interpretation of the items of Schedule VII is an approach that has already been adopted by the MCA in the past; see for example MCA Circular No. 05/01/2014-CSR dated June 18, 2014.

11. See MCA Circular No. eF No. CSR-05/01/2020-CSR-MCA dated March 28, 2020. It is interesting to note that while donations made to the existing Prime Minister’s National Relief Fund also qualify as CSR expenses, donations made to the state-level counterparts of such funds do not qualify to be thus till date, by virtue of the latter funds not having been included in Schedule VII to the 2013 Act. Such a clarification has been provided in the MCA General Circular No. 15/2020 dated April 10, 2020. The same clarification also provided that while regular payment of wages and salary to employees and workers by the companies would not constitute CSR expenses, any ex-gratia payment that the company specifically to such employees and workers for the purpose of battling the pandemic in addition to their regular salary/wages might count as CSR expenditure, provided there is a valid resolution to
such effect by the Board of Directors of the company and the resolution has been duly certified by the statutory auditor.


