August-September 2020

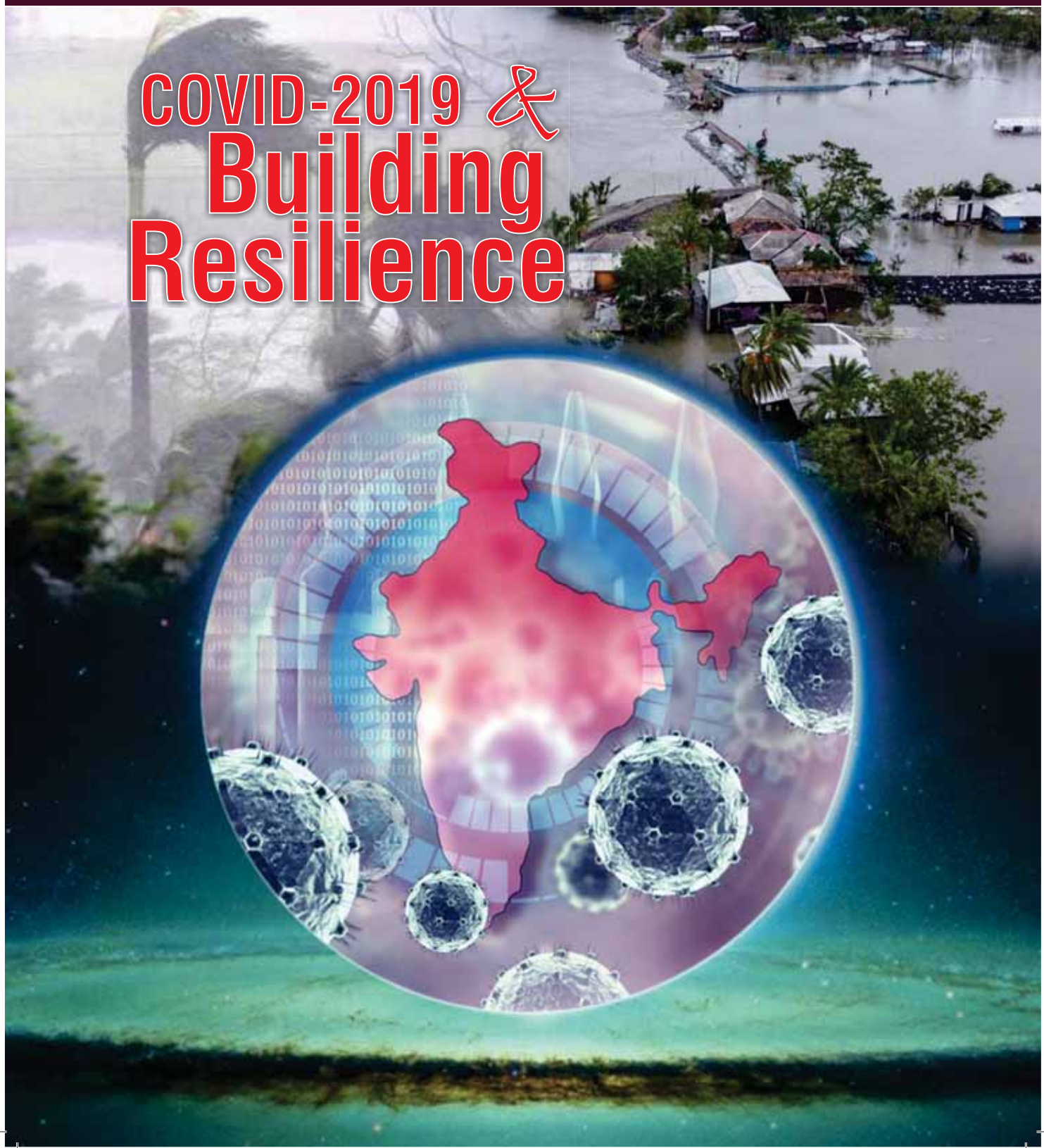
GFDR
GLOBAL FORUM FOR DISASTER REDUCTION
Global Vision, Local Action

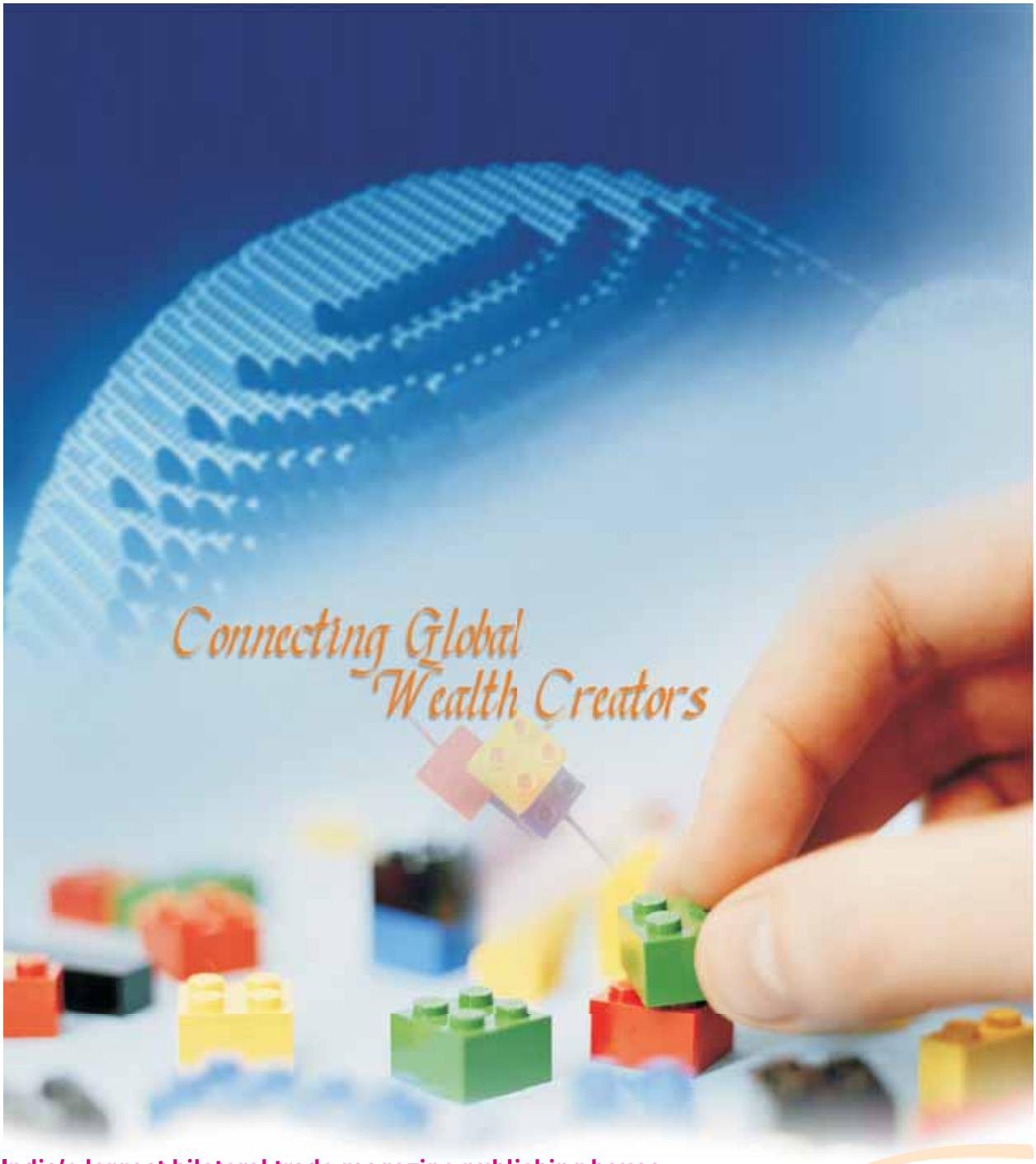
KNOW DISASTERS

NEW MEDIA
Adding A Cutting Edge To The Digital Age

SALUTING THE SPIRIT OF RESILIENCE

COVID-2019 & Building Resilience





India's largest bilateral trade magazine publishing house

- Export Advisory Services
- K.P.O.
- Outsourced Publishing
- Online Publishing
- Content Creation
- Illustrations
- 3D Printing
- 2D/3D Animation
- Mobile Applications
- Multimedia Services
- Events...

To know more about our services: enquiry@newmediacomm.biz

NEW MEDIA
Adding A Cutting Edge To The Digital Age
www.newmediacomm.com

New Media House, 1 Akbar Villa,
B.R. Sakpal Marg, Off Marol-Maroshi Road,
Andheri (E), Mumbai-400059 India.
Tel: +91-22-29250690, Fax: +91-22-29255279

Follow us on:

Newmediacomm *Nmediacomm* *New Media Communication Pvt Ltd*

In This Issue

Founder Chairman
Late Shri R.K. Prasad

Distributed by:
New Media Communication Pvt. Ltd.

Founder Chairman Late Shri R.K. Prasad
Managing Editor: Satya Swaroop
Directors: B.K. Sinha, Kamaljit Swaroop
Editor-in-Chief: Anil K Sinha IAS (RETD)
Executive Editors: Asif Shabab
Cdr. P.S. Amar
Editorial Team: Suresh Vasudevan & Atula Imchen
Coordinator: Arvinder Kaur Sethi, Mohit Naik
Marketing Services: Veerendra Bhargava
Admin & Finance: Vrunda Gurav
Art Director: Santosh Nawar
Associate Art Director: Hemant Kolambe
Circulation: Jawaharlal, Santosh Gangurde, Vijay W.
Photographer: Kishen Singh

For Subscriptions Contact:
subscription@newmediacomm.com

BRANCHES:

Kolkata:
Anurag Sinha, Regional Head,
Mob: 09830043339 / 09051112019
Tel: 033-22640070/71
Email: anurag@newmediacomm.biz

Patna:
Rajesh Naraen, Vimmi, V.P. Tulsi
173 - B, 2nd Floor, S.K. Puri, Patna 800001. Bihar
Email: rajeshnaraen@newmediacomm.com
Mob: 09334390988

New Media Communication Pvt. Ltd.,
New Media House, 1 Akbar Villa, Near Old State Bank,
Moral-Maroshi Road, Andheri (E), Mumbai - 400 059
Tel: +91-22-2925 0690. Telefax: +91-22-2925 5279
E-mail: enquiry@newmediacomm.biz
www.newmediacomm.com

Printed & Published by
Satya Swaroop, published from New Media House, 1 Akbar Villa, Marol-Maroshi Road, Andheri (East), Mumbai 400 059. India

Editor: B.K. Sinha

EDITORIAL

Dear Readers,

Greetings!

It makes us more than happy to witness the re-launching of the "Know Disasters" magazine after a gap of a few years.

Most of the world's natural disasters occur in Asia and the Pacific. Needless to say that India is no stranger to disasters in this context. These disasters have caused enormous destruction and human sufferings in the country. Since the beginning of the year, amid the COVID-19 pandemic, our country is continuing to bear the devastating impact of back-to-back disasters like Cyclone Amphan in West Bengal and Odisha, the wildfire in the Uttrakhand forest, Cyclonic Storm Nisarga in Mumbai, floods in Bihar and Assam, the Vizag Gas Leak, locust attack in multiple States, etc. As a concerned media stakeholder, New Media Communication is quite anxious about the rising incidence and impact of natural disasters in the country.

The principal focus of this magazine, COVID-19 and Disaster Management, underscores that Disaster Risk Reduction (DRR) is very much an ongoing requirement, important to governments, concerned stakeholders, media and people alike. The latest, unprecedented global pandemic, COVID-19, has taught us an important lesson that we need enhanced preparedness, which consequently, lays the foundation towards mitigating its impact. Given a disaster of unprecedented scale and the responses involved in the current state of affairs, it incontrovertibly calls for capturing the proceedings of COVID-19 responses and disseminating the same through an appropriate platform like this.

To be effective, Know Disasters would advocate for implementing disaster management as a comprehensive and continuous activity, not as a periodic reaction to individual disaster circumstances. It would bring issues to support disaster managers who are charged with DRR responsibilities in dealing with a wide range of policy, planning, organizational, operational, and other matters. It is beneficial for them to have access to relevant information and content like this to draw upon the experiences, insights and knowledge disseminated by through the pages of this magazine.

Individual articles in this magazine are as self-contained as possible, with adequate cross-references where necessary. Its content is not dogmatic; instead, it takes a recommended line, including options and case material references to help disaster managers in resolving their local needs. This contributes to the application of past experiences accrued within the country and, where appropriate, elsewhere.

We are strong. We are resilient. Together we will rebuild a better future with greater opportunities in the post-COVID-19 era

Happy reading !

Satya Swaroop
Managing Editor
satya@newmediacomm.biz

EDITORIAL

Dear Readers,

Greetings!

It is an overwhelming moment to associate myself in the re-launching of the "Know Disasters" magazine which is finally taking its shape in its second spell.

The current edition touches upon exclusively on COVID-2019 and Disaster Management, an unrelenting burning topic that is humanity's biggest crisis since World War II. Almost every country has been affected by the devastating Coronavirus disease (COVID-2019). This pandemic conforms to key baseline conclusions which have emerged from disaster anthropology over the past decades. The UNDRR says, even before the world brings the COVID-2019 disaster under control, there should be demand for: "Never again." We can never go back to business as usual. The current disaster demonstrates that as per UNDRR, which is outlined in the Global Assessment on Risk 2019: risk is systemic, and crises are cascading. Disasters are rapidly producing further disasters to become more complex and deadly. Everyone is affected, but not everyone is affected equally.

In its first phase, this magazine was earlier launched in Mumbai by NDMA during the 1st World Conference on Disaster Management in 2005, organized by GFDR and New Media Communication Pvt. Ltd. In no time, it became the first of its kind in India, thanks to the popularity it gained as a journal that entirely focused on disaster management. I take this opportunity to underline this fact that during my past role as Vice Chairman of Bihar State Disaster Management Authority, and subsequently, collaborating with New Media Communication Pvt. Ltd. as a Communication Partner, we met the crucial demand of the authority at the highest level in terms of enlightening and educating all stakeholders in disaster management.

As its Honorary Editor-in-Chief, I would like to emphasize that under the aegis of this magazine, we will enable the disaster risk community to communicate, learn, disseminate and progress to improve the capacities for integrated disaster risk and resilience identification at all levels. We assure you that New Media Communication has a big potential to bridge the critical gap related to meeting the underlying need of a dedicated journal that addresses a range of issues pertaining to disasters. We hope the second launching event of this magazine would continue to attract the readers as it did previously and continue to win accolades with its wider readership.

Happy reading!

Anil K. Sinha IAS (rtd.)
Hony. Editor-in-Chief
ICIMOD Fellow - Policy Advisor,
International Centre for Integrated
Mountain Development (ICIMOD)
Sr. Advisor, Centre for Disaster Management,
LBS National Academy of Administration,
Mussoorie Founder Vice Chairman,
Bihar State Disaster Management Authority (BSDMA), Patna
Founder-Executive Director,
National Institute of Disaster Management,
Govt. of India, New Delhi
Founder-Programme Advisor,
International Recovery Platform/UNDP, Kobe, Japan

EDITORIAL

Dear Readers,

Greetings!

It gives me immense pleasure to be a part of the re-launch of this magazine, "Know Disasters", which provides a pioneering platform for organizations, practitioners, academicians and researchers aiming to enhance greater resilience towards local, regional, and global disasters. At a time when COVID-19 is devastating the country and the world, this magazine breaks new ground about disaster risks by connecting in-depth studies of disasters as well as specific practices of disaster risk management and publishing the results of truly interdisciplinary approaches to anticipate risk, loss reduction, and community resilience.

The focus of this issue revolves around COVID-19 and Disaster Management. The unfolding coronavirus pandemic is very much a global issue. However, the impact is affecting individual countries in profoundly different ways. The issue carries a relevant article on COVID-19 Pandemic: Its implications to Sendai Framework and Risk Assessment by Prof. Rajib Shaw; COVID-19: A Systemic Risk Requiring System-Based Approach to Manage, by Dr Satendra, within the context of the Sendai Framework for Disaster Risk Reduction (SFDRR). Besides, it would be interesting for the readers to study the Invocation of DM Act, 2005 in COVID-19 Management in India, by Raman Kumar as well as the article on Climate Change and COVID-19 by Dr Kashif Imdad. In addition, the Practitioner's Guide to Business Impact Analysis – A Synopsis, by Priti Sikdar, illustrates the importance of business impact analysis. Reducing Risk for Future Disasters Through Greening of Disaster Response from Bindu Aggarwal features innovative ideas of reducing risks.

This issue of the magazine also covers stories of the humanitarian responses to Cyclone Amphan amid COVID-19 by Oxfam India and Save the Children. In the News and Trends section, major disaster-related news and events occurring globally and locally are highlighted. Check out how technology is being used to back disaster preparedness efforts as well as early warnings alerts for earthquake detection, etc.

We trust that this magazine will promote knowledge sharing and dissemination of information, which are the key aspects of disaster risk management.

Wishing you a happy reading!

Asif Shahab
Executive Editor

Oxfam India's Compassionate Response to Survivors Left Devastated by Cyclone Amphan

Laressa A. Gomez, Programme Coordinator - Humanitarian Communications, National Humanitarian Hub, Oxfam India

The vulnerable communities of the Sundarbans affected by Cyclone Amphan narrated their tale of the extraordinary scale of disaster which has deeply impacted their lives and livelihood. Their unmet needs to lessen the impact of the cyclone were urgently required. Thanks to the presence of Oxfam India, their sufferings were further alleviated with appropriate timely relief materials provided to them.

Fifty-five-year-old Latika Mollah lost her asbestos roof to the cyclone. Her house is flooded and the 80 sacks of paddy that she had stored in her house are spoilt. Latika lives with her widowed daughter and granddaughter in Raidighi Panchayat. A landless labourer, she had leased some land. She was looking forward to the income from the paddy.

"My entire paddy is gone. My neighbours tried to save some but everything is wet. We are poor. We don't know what to do now." She and her family had moved into a neighbour's pucca house before the cyclone made landfall on May 20.

Another villager, Adhar Haldar, too, lost his paddy as well as all the chicken in his coop. His house, which is close to the embankment, is now under two feet of water.

Cyclone Amphan made landfall on May 20 in the Sundarbans around 2.30 pm. The hours of untold devastation in West Bengal and Bangladesh that it left were enormous. Lives were lost, houses collapsed, power and telephone

connectivity disrupted. Trees were uprooted and the ones that stood turned yellow due to the salinity of the water from the Bay of Bengal. Even the land has been rendered saline and will be ineffectual for at least a few years. The official death toll stands at 98.

The villagers kept updating us with videos, while there was still some net connectivity, as the landfall began. We witnessed the heavy rains, strong winds, tin roofs blowing away, and trees swaying wildly with just minutes away from snapping into two. After the cyclone had passed — and hours of eerie silence later, we started receiving photos of the havoc caused by Amphan. They were grim photos of people standing in front of skeletal remains of what used to be their homes, the lucky few who only lost their roofs, uprooted trees, scattered utensils, cots, clothes, and people clutching on to their loved ones and their most cherished possessions which they were able to salvage.

Murshid Alam Sheikh, an Oxfam India consultant working as an officer overseeing Emergency Food Security and Vulnerable Livelihoods (EFSVL) happened to be in the eye of the storm. His brother's house was destroyed, an uncle's tin roof was blown away, and another relative's goat barn flattened. The

goats thankfully were all brought and kept in Murshid's verandah just before the cyclone. Around seven families from his neighbourhood spent the night at his place. "Ispent the entire time cooking for friends and families. We have never seen anything like this before," said Sheikh.

The lockdown and the subsequent job loss made matters worse. Thirty-five-year-old Mosalim Sheikh was a daily wage labourer at a galvanising plant in Howrah. He was among the many who lost his job. He had cultivated 10 kathas of land but all that was destroyed during the cyclone and the heavy rains. To top it all, he lost his house and possessions. He had no option but to take his wife and four children to take shelter at his brother's house.

"My children have lost their books. I have no job, no money, no house, no crops," he lamented.

His neighbour Varun Mallik too lost his job at the Howrah factory. This forced him to return home. His children had to drop out of school. His kachcha house was swept away by the cyclone. He and his family of four are now staying with his brother. "The lockdown and the cyclone have taken everything away from us," mourned Varun.

"Sundarbans is finished", quoted a news report a few days later. A couple of my friends who have either worked in or studied the Sundarbans were distraught. I had been to the Sundarbans once on an assignment in 2014, and even then, people were reeling under the impact of Aila cyclone. Then there was Bulbul, and now Amphan has left behind a trail of utter destruction.

Oxfam India is on the ground providing relief and rehabilitation to the victims of the cyclone. It is our moral obligation to see that these wonderful people, who go through so much every time a natural disaster strike them, be back on their feet again in the shortest possible timeframe. We have distributed nearly 1800 shelter kits — groundsheet and tarpaulin — to those who lost their homes to the cyclone in seven blocks of South 24 Parganas, North 24 Parganas and Medinipur in the Sunderbans. ■

Global Disaster News and Trends

Global Economy Absorbs $75 Billion Natural Disaster Loss in First Half of 2020

Global natural disaster events during 1H 2020 caused total economic losses estimated at $75 billion – 23 per cent lower than the 2000-2019 average of USD98 billion, says Aon's Global Catastrophe Recap: First Half of 2020 report. Meanwhile, insured losses were estimated at $30 billion – eight per cent higher than the 20-year average of $28 billion.

Natural disasters were responsible for approximately 2,200 fatalities during the first half of 2020, significantly below the long-term (1980-2019) average of 39,800 and the median of 7,700. Flooding was the deadliest natural peril during the period, having been responsible for 60 per cent of the death toll. The total of 207 global natural disaster events recorded by Impact Forecasting for 1H 2020 was above the 20-year average of 184 and the median of 189. There were at least 20 separate billion-dollar economic events during the first half of the year – led by the United States with 10 events; Asia Pacific (APAC) with five events; Europe, Middle East and Africa (EMEA) with three events and the Americas with two events.

Cyclone Amphan, which killed 133 people in India in May, was the costliest economic event of 1H 2020, causing an estimated USD15 billion in direct damage loss. A severe weather event in the United States from April 10-14, which killed 38 people, was the costliest insured event, with claims totalling nearly USD3 billion. The first six months of the year were marked by many smaller and medium-scale disasters, which impacted a large number of communities globally. From a peril perspective, there were an unusually low number of significant earthquakes in the first half of 2020.

National Trends and News

FLOODS

Alarming Figures Reminds us how Devastating Floods in India are

• Floods are the most devastating among climate-related disasters in India, as per the estimation of The Asian Development Bank. They comprise more than 50 per cent of all climate-related disasters in India. The trend of erratic monsoon pattern and extreme rainfall has just supplemented to this.

• As per a study commissioned by the Asian Development Bank, 'Impacts of Natural Disasters on Households and Small Businesses in India', extreme precipitation and flooding results into significant impacts on the vulnerable people, and are further compounded by infrastructure expansion, rapid urbanization, and huge numbers of people residing in informal settlements in poor conditions.

• There was not a single year when flood did not impact the country with major losses to lives, livelihoods and property. According to an analysis by the DTE-CSE Data Centre of the Central Water Commission (CWC), data showed that in the last 65 years (1952-2018), floods killed 109,412 people. Over 81,187,187 houses were destroyed, and 258 million hectares of crops were damaged. The total economic losses amounted to Rs 4.69 trillion owing to house, crop, and other property damages.

• Coastal flooding risk in India has been greater than before, researchers projected in a study published in journal Nature Communications in October 2019. Some 36 million people in India were under menace, which was six times more than the earlier estimates.

• Extreme flooding is being contributed by extreme precipitation also. Indian rivers reported high flood level in extraordinary number last year in August. According to CWC data, in August, various rivers at 25 stations crossed their highest flood-level.

• As per Down To Earth's State of India's Environment 2020, at least 19 extreme weather events in 2019 took the death toll to 1,357 lives; with heavy rain and floods contributing to 63 per cent of these lives. The most death was reported in Bihar, with people losing their lives from floods and heavy rain (306), thunderstorms (71) and heatwave (292) between May and October in 2019.

Meanwhile, in the face of the flood, Assam farmers show up with flood-resistant paddy

Recently, farmers from Golaghat district in Assam have cultivated new flood-resistant paddy varieties to shift from the traditional ones.

As flood destroys crops, the villagers adopted the flood-resilient paddy varieties such as Ranjit Sub-1, Bahadur Sub-1, Kanaklata, Jal Kuwori and Jalshree, which can withstand floodwater up to two weeks. The new variety sown last year has inspired a majority of cultivators in Golaghat district to shift over from traditional ones. According to the Assam State Disaster Management Authority, this year's flood since May 22 has affected crop, mainly paddy, on more than 125,097 hectares of land across 25 of the State's 33 districts.

The varieties called Ranjit Sub-1, Swarna Sub-1 and Bahadur Sub-1 have been used by about 60 per cent farmers of the West Brahmaputra area. Farmers in flood-prone areas of Assam have been harvesting the water-resistant Swarna Sub-1, developed by the Indian Council of Agricultural Research and the Manila-based International Rice Research Institute, since 2009. But the switchover from traditional varieties of paddy has been slow. The flood-resistant varieties including Ranjit Sub-1 were reintroduced in 2018.

Resist submergence: The new rice varieties can resist submergence for up to two weeks, and significantly do not get damaged by the heavy flood. However, comparisons with the traditional varieties are difficult as they get damaged in the flood. Enriched with the 'submergence' (sub in short) gene, the varieties can yield up to five tonnes per hectare on an average.

Reduction in crop loss: Some 1,500 farmers cultivate on about 950 hectares in crop-yielding areas which have been impacted by the regular flood. Therefore, rice varieties can reduce flood-caused crop loss substantially. These varieties can get regenerated again in case they are damaged by the flood; hence, they ensure maximum productivity. ■

EARTHQUAKES

Google's Ambitious New Plan to Detect Earthquakes Early

At a time when India is experiencing small-medium intensity tremors across many States, the question on how to detect earthquakes early has become a quest. Google has come up with a solution.

The company will use subsea fibre optic cables to achieve the same. These cables are capable of detecting earthquakes and tsunamis early and can be deployed as a warning system. The optical fibres are used to sense movement in a distance of up to 100 kilometres. The tech giant has developed a technique that could cover a vast area. Google said that it is using existing fibre to detect disturbances on the seafloor. The Company said in a blog post: "Better yet, our technique relies on equipment that is present on the vast majority of the world's existing fibre optic systems, so it is broadly applicable." According to Google, these optic fibres can connect different continents to the ocean floor through which most of the internet's international traffic to travels. "Google's global network of undersea cables makes it possible to share, search, send, and receive information around the world at the speed of light," it added.

These cables are made of optic fibres that could carry the data in the form of a light pulse travelling at 204,190 kilometres per second. The receiving end detects these light pulses and a digital signal processor is used to correct distortions. When tracked as a part of optical transmission, the light is in a State of Polarization (SOP). "The SOP changes in response to mechanical disturbances along the cable and tracking these disturbances enables us to detect seismic activity," Google said.

Previously unknown faults at the foot of the Himalaya discovered

Previously unknown faults at the foot of the Himalayan Mountain Range could cause earthquakes in a densely populated region, says two University of Alberta researchers. A newly identified fault system in southeastern Nepal has the potential to cause earthquakes in a densely populated area, according to two University of Alberta scientists who were part of an international team that made the discovery. The team looked at seismic reflection data, which are routinely collected by exploration companies looking for oil and gas. In this method, seismic waves are produced by small explosions

at multiple sources, and many recorders called geophones to record the sound echoing off layers beneath the surface.

The signals are combined to make an image that looks like a slice showing layers through the top few kilometres of the earth's crust. The researchers were able to identify the faults because the pattern of layers showed bends. This network of faults shows that the Himalayan deformation reaches further [about 40 kilometres further south] than we previously thought.

Earthquake detection and early alerts, now on your android mobile phone

Android phones will be used to sense earthquakes around the world, and may one day, be able to provide global warnings; with the first mass alert system being unveiled in California as announced by Google. Google, which helped develop Android, worked with California and the U.S. Geological Survey to build the quake alerts into all phones that run the commonplace mobile operating system. Android users, who have enabled location services and are near a quake of magnitude 4.5 or greater, will receive a full-screen earthquake warning telling them to drop to the floor and seek cover. The screen also will provide estimates of the quake's magnitude and distance from the user. The alert is based on the projected shaking at a particular location and a certain level of intensity. Depending on their distance from a quake, people could get several seconds or perhaps a minute of warning. The warnings are powered by California's Shake Alert system, which uses signals from more than 700 seismometers installed around the State that can sense seismic waves.

Twitter backs disaster preparedness efforts; launches a dedicated search prompt in India

Twitter has announced a partnership with the National Disaster Response Force (NDRF) in India to expand its efforts towards handling disaster situations, with the launch of a dedicated search prompt to help people stay updated with the latest information around disaster relief and preparedness efforts. Every time someone searches for certain keywords associated with disaster relief, a prompt will direct them to the relevant information and sources of help available on Twitter. This is an expansion of Twitter's #ThereIsHelp prompt, which was specifically put in place for the public to find clear, credible information focusing on disaster preparedness and emergencies. The search prompt will be available on iOS, Android, and on mobile. twitter.com in India, in both English and Hindi languages. The feature will be reviewed at regular intervals by the Twitter team to ensure that all related keywords generate the proactive search prompt. The dedicated search prompt will ensure there is uninterrupted access to relevant and authoritative information, such as important updates on critical transit and utility outages, efforts to oversee crowd management and establish direct access between the affected areas and the rescue teams. ■

COVID-2019 and Disaster Management

Latest Global/National News, Trends, Learnings and Opportunities

A UN report says the pandemic could push up to 132 million people into hunger

The coronavirus pandemic could push up to 132 million people into hunger by the end of 2020, according to a new report from the United Nations. "As progress in fighting hunger stalls, the COVID-19 pandemic is intensifying the vulnerabilities and inadequacies of global food systems," UNICEF said in a statement. "While it is too early to assess the full impact of the lockdowns and other containment measures, at least another 83 million people, and possibly as many as 132 million, may go hungry in 2020," the agency added. The finding was included in the latest version of The State of Food Security and Nutrition in the World, published annually by U.N. agencies, including the World Health Organization.

Climate-resilient recovery from COVID-19, says UN

The Global Commission on Adaptation (GCA) has released a call to action to bring about a climate-resilient recovery from the COVID-19 global pandemic, which urges governments to leverage COVID-19-related stimulus packages to invest in climate resilience.

The Commission recommends that governments and organizations integrate climate resilience into all decisions and invest in innovative solutions to address both the pandemic and the climate crisis. The Commission emphasizes that adaptation investments deliver higher returns while pre-empting the destructive impact of future shocks. The Call to Action laments that most countries have not incorporated climate resilience into the USD 10 trillion of public funds thus far invested in pandemic crisis relief, and warns that resulting debt may restrict governments' ability to address future climate resilience needs. The Commission also warns that the pandemic has the potential to drive 100 million more people into extreme poverty by the end of 2020, and calls on governments and donors to direct recovery aid to the world's most vulnerable.

The Commission calls on world leaders to respond to the pandemic by accelerating progress in seven areas, and articulates opportunities to do so, which, it states, "align with and support internationally agreed frameworks" such as the 2030 Agenda for Sustainable Development, the Paris Agreement on Climate Change, and the Sendai Framework on Disaster Risk Reduction (DRR), "while prioritizing an equitable and resilient recovery." The seven areas are locally-led adaptation; urban resilience; water resources management; shock-responsive social safety nets; food security; nature-based solutions; and disaster prevention.

Under Training (UT) Officers of the 2018 batch of IAS implements DM Act, 2005 in combating the pandemic in Rajasthan

Many of the trainee officers were at the frontline fighting the

pandemic. Given that most of them were from engineering stream, they were assigned some difficult but significant tasks such as data analysis, management of camps and quarantine facilities, contact tracing, logistics and interstate coordination for migrant labours. Certain disasters need an instant response, such as floods and earthquakes, etc. However, a pandemic requires a consistent response. They learnt how to design relief camps, maintain high standards of sanitation and ensure no biasness happens. This once-in-a-lifetime experience allowed them to implement the Epidemic Act, the Disaster Management Act, and other government directives so that preventive actions are invoked.

Using lessons from disaster management, Odisha takes on COVID-19

To deal with the spread of the novel coronavirus disease (COVID-19), Odisha's two-pronged approach in disaster management has come in handy. This entails 'physical infrastructure' created to help people during disasters, and 'intellectual infrastructure' referring to the government's institutional setups to tackle disasters speedily and efficiently.

Experts have underlined on fine-tuning Standard Operating Procedures (SOPs) for cyclone and flood shelters to fight the dual challenges of climate-related disasters and COVID-19. From Odisha's prior experience, they knew the efficacy of government buildings like schools, cyclone shelter, Sub-1anchayat offices, and how to manage a disaster, besides knowledge of the obstacles that come in between. They used many of these centres either as quarantine centres or relief centres to host stranded migrant workers and the needy to serve them food and provide shelter during the lockdown.

COVID-19 brings opportunities and upsides as well

A lot of dark sides have been created by the coronavirus pandemic. Many untoward consequences across the world, people getting ill and die, the overloaded healthcare system, schools being shut down, employees losing their jobs, companies facing bankruptcy, stock markets collapsing and countries having to spend billions on bailouts and medical aid. No matter how serious and sad all of this is, there are upsides as well. We have to decide for ourselves whether this pandemic is an unmitigated disaster or whether we can make the best use of the opportunities that will come in its wake.

Ecology and Environment

• The pandemic has attributed a global decline in economic activity and even though this is foremost grounds for concern, the plummeting rate of human activity has had a positive impact on the environment. There is a clear reduction in industrial and transport emissions and effluents, and quantifiable data corroborates the clearing of pollutants in the soil atmosphere and water. As a result of stimulus spending on fossil fuel used to kick start the global economy, this effect is also contrary to carbon emissions, which rose by 5 per cent following the global financial meltdown over ten years ago.

• A significant dip in air pollution levels was measured across India following the lockdown where cities like Delhi, Bengaluru, Kolkata and Lucknow experienced their average Air Quality Index (AQI) was restricted to two digits.

• Another example of cleaner air was observed when, on April 3, 2020, residents of Jalandhar, a city in Punjab, woke up to a view of the Dhauladhar Mountain Range, a rare feat in normal times, given the distance between the two places - lying nearly 213 kilometres apart from each other, and has not been visible from the city in recent memory.

• Water bodies have also been observed to be cleaner, and the rivers Yamuna and Ganga have seen considerable improvement ever since the nationwide lockdown was put into effect. The average water quality of 27 points of the Ganga seen in recent days is appropriate for bathing and propagation of wildlife and fisheries as per the real-time water monitoring data of the Central Pollution Control Board (CPCB).

COVID-19 impact on climate change and related future of the change

The coronavirus could have a longer-term impact on sustainability, though there are further, fewer straight ways as well. One is evading the climate crisis eliminating from people's minds, as the more critical concern of instantly saving lives takes the priority. Another one is relatively merely making dialogue around climate extra complicated as mass events are deferred. Greta Thunberg has advocated for digital activism to replace physical protests due to the coronavirus outbreak, whereas the major climate event of the year, COP26, is presently still planned to be held in November. COP26 is expected to draw 30,000 delegates from around the world.

Ahead of the current pandemic, there may be a different way that the behavioural changes emerging out around the world could carry over. From social science research that interventions are more successful if they take place during moments of change. So times of change can pave the way in the introduction of long-lasting habits. At the time of the coronavirus outbreak, those gained habits that are accidentally fine for the climate might be travelling not as much of or, perhaps, curtailment on food wastes as we come across shortening resulting from stockpiling.

Community action

One response to the coronavirus outbreak that has attracted varied reactions from climate scientists is the means that several communities have taken considerable measures to safeguard each other from the health impact. The pace and degree of the response have specified some expectation that quick steps could also be taken on climate change if the risk it creates was dealt as immediately. In the longer term, community action has ignited hope for the climate. The time afforded by self-isolation as an excellent opportunity for the community to estimate their consumption.

Positive impact on environment

It is right to say that nobody would have wished for emissions to be reduced this way. COVID-19 has unleashed a severe global toll on lives, health services livelihood and mental health. However, if anything, it has also revealed the diversity that communities can make when they figure out for each other – and that's one lesson that could be very useful in tackling climate change.

The novel coronavirus disease (COVID-19) has had a positive impact on carbon emissions due to reduction in energy demand. 2020 has seen the largest ever annual decline in energy-related carbon-dioxide emissions. COVID-19 disruptions caused shocks to the power and oil sector that will lead to a significant drop in carbon emissions. However, the long-term implications of this are still uncertain. India's CO2 emissions have dropped for the first time in over 40 years. The fall in emissions is a result of economic slowdown and growth in the renewable energy sector. Coal and oil consumption has also flat lined. Many have called for a post-COVID-19 'green recovery', with environmentally friendly initiatives at the heart of any stimulus package.

Plants are growing better thanks to the unfolding of cleaner air and water, and as a result of yet again, there is no human interference. With everything at a standstill, plants are allowed to thrive and grow and produce more coverage and oxygen. Less litter also means lesser clogging of river systems, which is good in the long run for the environment.

Promote sustainable consumption and nature-based solutions

Global carbon dioxide emissions are expected to reduce by 8 per cent in 2020, compared to 2019 as a result of the pandemic. The momentary declinations in both carbon emissions and energy demand have contributed to the environment some breathing space. Nonetheless, the return in emissions may be bigger than the reduction, unless economic incentives and investments to resume economies are attuned to encourage cleaner and more resilient energy infrastructure.

While there are significant temporary challenges around how to deal with the shock linked to COVID-19, governments should not trade-off long term global objectives around decarbonisation, coping with climate change and sustainable consumption. Post-COVID recovery should lead to a "new normal" that is more equitable and climate-sensitive. There are numerous opportunities for an environmentally sustainable recovery. The tax reform element of stimulus packages can also be used to exploit these opportunities by generating fiscal incentives to trim down carbon emissions taking into account the greater than before cost-effectiveness of sustainable technologies like renewable energy, in comparison to conventional energy sources. In conclusion, though there has been a positive impact on the environment due to the lockdown, there is an implicit fear that once people start making movement again or resuming what they were discharging previously, all such valuable positive gains retrieved due to COVID-19 will be lost over time.

COVID-19 has increased career opportunities in renewable energy, emergency and disaster management

A special economic package worth 10 per cent of GDP has been announced by the Central Government. The Environment and Water (CEEW), Council on Energy, along with the National Institute of Public Policy and Finance (NIPFP), has presented a report on how parts of this package could be used. The promising sectors with higher prospects in the post-COVID-19 period will be distributed hybrid energy, renewable energy, city gas distribution, emergency and disaster management systems, and urban transportation, as per the authors. For instance, building a low-emission air conditioner servicing sector could generate more than two million jobs by 2037. Thousands of jobs can be created by widening investment in distributed renewable energy. Around 110,000 skilled and unskilled jobs can be formed by 20 GW of small-and large-scale micro-grids. About 50,000 potential skilled and unskilled jobs can be generated for each 4 GW of rooftop solar power as per the estimation of the report.

Return on investment in emergency preparedness reveals that every Rs 75.35 invested for preparedness saves more than Rs 150.70 in future responses as per the UN's Inter-Agency Standing Committee's (UN-IASC) report. India has exhausted nearly Rs 13.52 lakh crore on disaster management in the past 20 years, and the Government could have saved nearly Rs 6.76 lakh crore if such systems were in place, the report projected. The report suggested a share of capital be used for disaster risk reduction by designing a "Climate Risk Atlas", an emergency surveillance system and a response network.

Converting the COVID-19 situation into an opportunity to meet the SDGs: Niti Aayog

Niti Ayog is deeply devoted to bolstering current efforts and set out on newer initiatives to speed up progress on the SDG targets for long term transformation. In this attempt, knowledge sharing and peer learning and will play a crucial role - which we are actively fostering among States and Union Territories. The Niti Ayog is aiming to wipe out all differences and dissimilarity amongst us and team up to strive and transform the existing situation into an opportunity for picking up the pace our progress towards attaining the SDG targets. The endeavour to turn COVID-19 into opportunity came in the light of India's VNR 2020 report titled 'Decade of Action: Taking SDGs from Global to Local', which is a comprehensive description of the adoption and execution of the 2030 Agenda in India. The report discusses in detail the policy and enabling environment, India's approach to localising SDGs, and strengthening means of implementation.

Major Disasters in India

Cyclone Amphan

Cyclone Amphan came barreling down from the Bay of Bengal and became the deadliest cyclones in the region in a century, leaving nearly 90 people dead and more than 10 million homeless. Amphan originated as a low-pressure area around 300km east of Colombo, Sri Lanka. Moving northeastward, the cyclone left its trail in Sri Lanka, India, Bangladesh and Bhutan. West Bengal, the epicentre of the cyclone's landfall, suffered the worst damage. While a detailed report on the total damage made by Amphan is yet to be published, an initial investigation estimates nearly $13 billion in damages to the state. Amphan affected nearly 70 per cent of the people in West Bengal, but the Sundarbans, a UNESCO World Heritage site, faced the most catastrophic destruction. In the neighbouring State of Odisha, four people died across the ten-affected districts. 4.4 million people were impacted in some way by the cyclone. At least 500 homes were destroyed and a further 15,000 were damaged.

Massive Floods in Bihar

The death toll due to the Bihar floods reached 24 even as 75 lakh people were affected across 16 districts on as on August 13, 2020. Bihar is experiencing the calamity after the torrential rains coupled with record discharge of barrage water into the northern Bihar rivers triggered major flooding amid COVID-19 pandemic. However, with the constraints of the spread of the coronavirus, the flood in the State at the time of a pandemic has come as a twin challenge. All District Magistrates across Bihar were directed by the Disaster Management Department to make necessary arrangements for masks and sanitizers at relief camps along with social distancing.

Devastating Floods in Assam

The flood in Assam is an annual feature with low or higher intensity. This year the State became more vulnerable amid the overlapping menace of COVID-19 pandemic. As on August 13, 2020, in Assam, 30 districts have been affected and 158 people have lost their lives due to landslides triggered by floods. The floods have also caused large scale damage to physical infrastructure like roads, bridges and culverts, inundated vast areas of agricultural lands and drowned several animals.

Locust Attack in Multiple States of India

While the overall impact of the infestation is not yet known, authorities estimate the insects engulfed more than 50,000 hectares (123,5000 acres) of agricultural land in seven of India's heartland States. It was a very badly-timed "serious infestation" that led to serious crop losses.

Forest Fire in Uttarakhand

Uttarakhand forest was devastated by ravaging forest fires which are estimated to have consumed 51.34 hectares of forest cover so far. It was also reported that the Kumaon region was among the worst-hit area with almost two dozen incidents of forest fires.

Cyclone Nisarga ravages Maharastra

A severe cyclone, Nisarga, struck Maharashtra on India's western coasts. It was formed on 1 June 2020 and disappeared on 4 June 2020. The eye of the storm narrowly missed Mumbai, India's most populous city of 20 million, which is already struggling with some of the highest numbers of coronavirus cases in the region. Nearby districts experienced more serious damages with six deaths, over a dozen injuries, and thousands were relocated.

Landslides in Kerala

A massive landslide triggered by the monsoon rainfall occurred in a tea plantation in Idduki District of Kerala on August 8, 2020, leading to an increasing number of fatalities. The toll in the landslip at Pettimudi in Kerala's Idukki rose to 49 with six more bodies recovered from under the debris and 22 people were still missing in the August 7, 2020 tragedy.

Plane Crashes in Kerala after Skidding off the Runway

Air India Express plane crashed in Kerala after skidding off the runway and breaking into two while landing at Kozhikode Calicut International Airport on August 7, 2020. At least 18 people died in the crash, including both pilots, with up to 30 others received treatment for serious injuries. The air disaster exemplified the role of community as first responders who came forward for search and rescue. The injured were rushed too far away from towns of Manjeri, Malappuram and Kozhikode with airport authorities and support staff leading the way. Local young men with cars and vans swung into action to supplement the modest institutional resources, triaging decisions were taken on the spot, and the seriously injured were sent directly in the direction of better hospitals. Subsequently, even with precautions against the prevailing pandemic in place, people queued up outside facilities for donating blood.

Vizag Gas Leak Disaster

The Visakhapatnam Gas Leak, also referred to as the Vizag Gas Leak, was an industrial accident that occurred at the LG Polymers chemical plant in the R. R. Venkatapuram village of the Gopalapatnam neighbourhood, located at the outskirts of Visakhapatnam, Andhra Pradesh, India, during the early morning of May 7, 2020. The resulting vapour cloud spread over a radius of around 3km (1.86 mi), affecting the nearby areas and villages. As per the National Disaster Response Force (NDRF), the death toll was 11, and more than 1,000 people became sick after being exposed to the gas.

COVID-19: A Systemic Risk Requiring System-Based Approach to Manage

Dr. Satendra, IFS
International Expert - Disaster Risk Reduction in FAO, UN, Senior Adviser - Bihar State Disaster Management Authority, Former Executive Director of National Institute of Disaster Management, Govt. of India, Former Director - SAARC Disaster Management Centre, and Former Special Secretary, Disaster Management Department, Government of Bihar

COVID-19 pandemic's overall behaviour, including origin, spread, and impact has turned it into a systemic risk, i.e. a risk which not only leads to negative effects in parts of the system but a failure of the system as a whole. Considering the complexity, global nature, non-linear development, marked with tipping points, long-lasting, stochastic nature; the COVID-19 risk management has become a challenge and needs a system-based approach, incorporating all four priorities of action of SFDRR (2015-30)

COVID-19: A Systemic Risk

In late December 2019, COVID-19 emerged in the form of a global crisis which originated in Wuhan, China, subsequently killing thousands of people in different parts of the world. Now, when the number of infections in many countries is increasing at an alarming rate, the crisis has turned into a catastrophe. In many cases, this has overwhelmed the national capacities to manage it effectively thus posing severe threats to the entire system, including societal health, social, cultural, financial and economic systems.

While critically analyzing the Corona virus's overall behaviour including origin, spread, and impact, we can say that the risks posed by the virus have turned into systemic risks, i.e. risks which not only lead to negative effects in parts of the system but a failure of the system as a whole. The pandemic is having all the characteristics of systemic risks, i.e.

(i). It is highly complex, having sub-components tightly coupled with each other, and also with traditional risks

(ii). It is global in nature with no geographical boundaries

(iii). It has a stochastic relationship between trigger and effects, i.e. having uncertainty and randomness in the outcomes

(iv). It has tipping points, indicating the drastic change in nature and extent

(v). Is unpredictable and underestimated in general

(vi). It is never going to be eliminated completely

The present COVID-19 pandemic having all these characteristics may be safely termed as systemic risk, which needs a system-based approach to mitigate and manage it effectively and efficiently.

System-Based Approach to Manage COVID-19 Risk

Considering the complexity, global nature, non-linear development, marked with tipping points, long-lasting and stochastic nature, COVID-19 risk management has become a challenge and needs a system-based approach, incorporating all four priorities of action of the Sendai Framework for Disaster Risk Reduction (SFDRR: 2015-2030) i.e., understanding disaster risk, strengthening disaster risk governance, investing in disaster risk reduction for resilience, and enhance disaster preparedness for effective response and reconstruction in a comprehensive manner, including a "build back better" approach.

Understanding the Risk

Risk in the present scenario is not simple, like with common hazards such as flood, cyclone, or earthquake, where risk is well-defined and easy to identify and assess. But in the present pandemic case, the risk is not possible to evaluate by simple traditional methods. Instead, it needs a scenario building and modelling approach; making use of various hypothetical imaginations and possibilities of occurrences. In the case of COVID-19, the risks are multifarious, affecting almost all sectors, starting from livelihood to food security, production (both industry and agriculture), education, culture, health, communication, and so on. The trans-boundary nature of such risks requires international

cooperation and support, thus making it further difficult to manage and control the spread. The most sensitive issue with such systemic risks is the stochastic relationships between trigger and effect (identical causes leading to diverse results), which pose a major challenge before the governance to identify and assess its impact. The tipping point or the threshold stage i.e., the stage when risk drastically changes its condition of existence is another characteristic of such risks; making it difficult to assess the tipping point in time. The systemic risks, in general, are underestimated and thus do not alert the governance in advance to make effective preparations to reduce and mitigate its impacts. In many cases, the systemic risks are not completely rooted out from the system and thus regularly pose a threat to the system; forcing society to live with it while simultaneously and continuously changing its shape, form, and also the capacity to damage (Figure-2).

This brief discussion regarding the priority area of action under SFDRR: "Understanding Disaster Risk" clearly shows that in case of systemic risks like COVID-19, the exercise, though much complex, needs to be done very precisely, taking into consideration each aspect which may affect risk directly or indirectly. This is also of utmost importance because understanding all aspects of disaster risks serves as the foundation for the whole risk reduction and management framework, thus deciding the success or failure of the whole exercise.

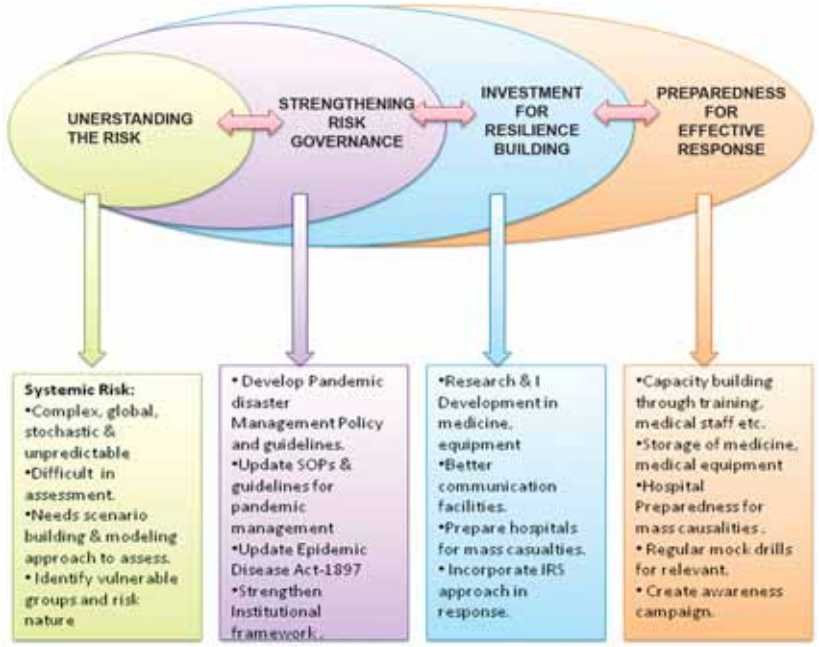


Figure 1 Pandemic management strategy: four priorities for action.

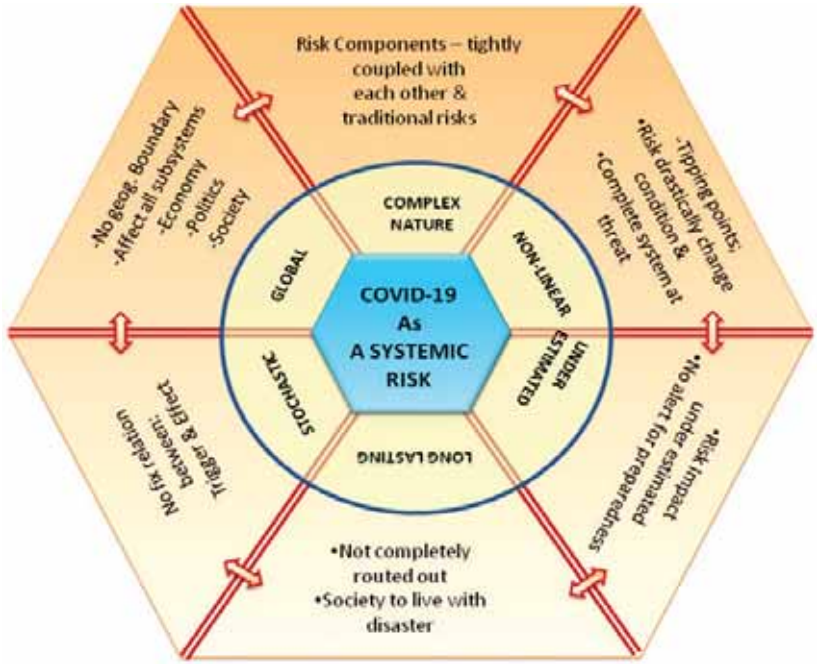


Figure 2: Hexagonal Characteristics of COVID-19, a Systemic Risk

Strengthening Disaster Risk Governance

While considering the complex nature of risks of COVID-19, the governance needs to be strengthened to understand and work on three basic questions related to disaster risk assessment and risk reduction. One, what can go wrong? Two, what is the likelihood, and what are the consequences (Kaplan and Garrick - 1981) while looking for their answers for managing the assessed risks (Haimes 1991) such as, what can be done, and what are the options available, what are the trade-offs in terms of all relevant costs, benefits, and risks? The third and the most important is what will be the impacts of current decisions

on future options? The governance must be capable to deal with all the questions and also the answers, along with the allocation of responsibilities of functionaries to work on these question-answer series.

While analyzing the pandemic risk governance, the condition of relevant laws, regulations, and policy is found to be very poor. There is only one 19th century-old Act – The Epidemic Diseases Act of 1897, enacted by the British Parliament to curb in the spread of the plague in Mandvi (then in Bombay Presidency; presently in Gujarat). An over the century-old document has very limited relevance and utility in the present context when all social, political and governance systems have gone under total transformation. The Act mainly focuses on the prevention of disease with limited provision to respond or curb the disease. Other main limitations, especially in the present context of COVID-19, include no clear-cut guidelines about the isolation of a suspected patient to prevent the spread, no provision of a special task force to tackle the problem on the spot without waiting for the permission from the concerned authorities and safety and security of the government and other officials.

In this context, the Union Cabinet on April 22, 2020, approved the Epidemic Diseases (Amendment) Ordinance, 2020, to add protections for healthcare personnel, involved in combating epidemic and also simultaneously expands the powers of the Central Government to make arrangements to prevent the spread of such diseases. This is also the first time that the Disaster Management Act, 2005, is used to manage a pandemic, especially for imposing lockdown guidelines and to take other measures to maintain social distancing and to prevent the spread of the pandemic. In addition to these two Acts, some State Governments also made use of several public health-related laws passed by the Parliament to manage situations and different issues that emerged during the lockdown and also handling safety and security of health workers.

However, this use of different rules and regulations by different stakeholders at various levels created confusion and in some cases, chaos. In such circumstances, there is a need to deeply review the existing Epidemic Diseases Act, 1897, not only in the context of the present pandemic but also other pandemics and their management in the future. In addition to the legal issues, the other felt need, while managing this mega-disaster, is the non-existence of any well-defined guidelines or Standard Operating Procedures (SOPs) defining the roles, responsibilities, and functions of various role players and stakeholders, neither at the Central nor State level, which are easily available in case of other common disasters such as floods, cyclones, drought, etc.

Investing in Disaster Risk Reduction for Resilience

A systemic risk, like the present pandemic with complex nature and unpredictability, needs a systematic public and private investment in risk prevention and reduction through structural and non-structural measures to enhance the resilience of persons, communities, and countries. These investments need to be in the field of research and innovating vaccine, developing preventive equipment (such as PPE kits, masks, etc.), creating assets and other facilities like capacity enhancement of existing hospitals to manage mass casualties, building new hospitals, creating medical responders and enhancing capacities of the existing ones and so on. In the case of this present pandemic catastrophe, there is a need to learn from past experiences and also from well-tested practices in some parts of the country and also the world over.

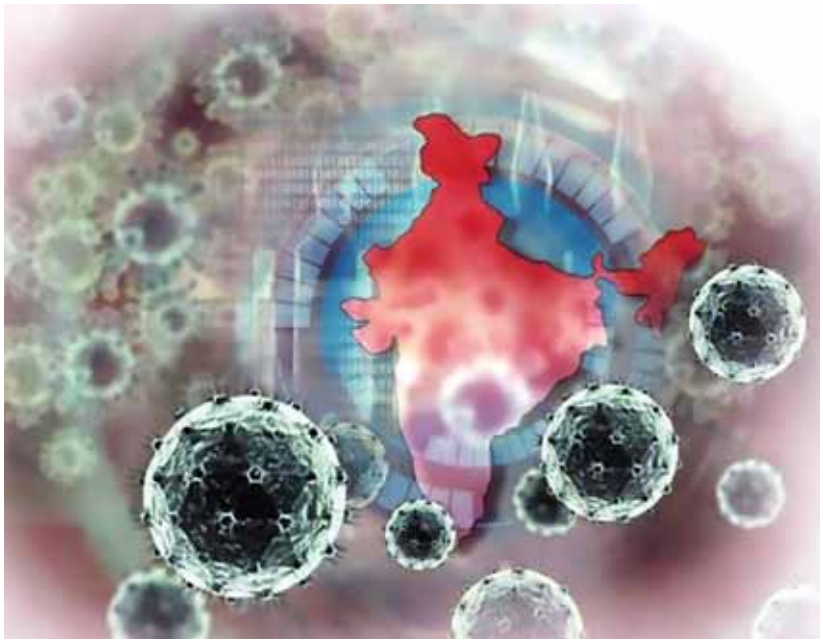
Lack of proper communication among different stakeholders and role players during COVID-19 management has been another problem, especially in the case of research and production and also in demand and supply. An interdisciplinary and trans-disciplinary approach is required for the successful implementation of the management of such mega-crisis. Better coordination is a must among scientific communities, local and regional administrators, as well as stakeholders from the community and CSOs, CBOs, NGOs and INGOs for such mega-level disaster handling. The ideal mechanism to handle such coordination must be that on one hand, the scientific community must combine all practical research findings and field test its utility and, on the other hand, the administration, social and communication organizations ensure to make optimum use of the research or innovation for the benefit of the affected community through developing and communicating the risk reduction products.

There is a lack of interdisciplinary competence, trained subject experts and civil servants, and also a proper network of experts to share knowledge and ideas. Special capacity building programs are required for various stakeholders like medical professionals, administrative functionaries, and communicators to better manage such disastrous situations effectively and efficiently. For capacity enhancement of these functionaries, it is of utmost importance to incorporate pandemic disaster management content in the ongoing training programs, and if required, necessary arrangements

can be made to initiate some special courses for pandemic management at existing institutes. There is also a need to develop, and if already existing, promote knowledge-sharing platforms for experts in the field and organize regular workshops and seminars for such knowledge-sharing exercises. Research and innovations need to be promoted in universities, especially technical institutions such as IITs, NIDs, NITs, and other professional colleges to innovate appropriate technologies to manage and reduce disaster risks and also help in post-disaster rehabilitation and recovery programs.

Enhance Preparedness for Effective Response and Reconstruction with Build Back Better Approach

For an effective response, especially in the case of systemic risks such as COVID-19, the preparedness needs a comprehensive and system-based approach, where preparedness measures need to be strengthened as well as ensure that capacities for effective recovery are in place. While preparing for a response, it is of paramount importance that the policymakers are very clear about the options available to mitigate and reduce the risk, costs and benefits and also about the impacts of current decisions on future options. In complex situations where risks are non-linear and unpredictable and frequently changing its forms and nature, it becomes imperative to get prepared not only for current risks but also for future risks, which may be a result of some external phenomenon or a consequence of risk reduction or mitigation measures taken. In such cases, it is the responsibility of the decision-makers to assess and evaluate the possible future threat that



may require special preparedness options and strategies to deal with.

A critical analysis of the preparedness measures to respond to a pandemic reveals that there is quite a good scope to improve and upgrade the response preparedness system. The first and topmost priority for better response in the present case is the capacity enhancement of responders through training and/ or orientation programs, including that of health personnel, administration, and law and order functionaries. Awareness generation of the community is of utmost significance to seek their support and cooperation. In addition to this software approach, the preparedness for material in terms of hospital preparedness with necessities such as oxygen, medicines, alternative arrangements of hospitals and beds in case hospitals are fully occupied, quarantine centres with all facilities, transportation and means of communication, including hospitals, proper facilities for disposal of carcasses, food stock and other essential items to use during an emergency, arrangement for stay, and meal for casual workers and labourers or people doing petty business.

COVID-19 has had a devastating impact on almost all sectors, especially the economy. The need of the hour is that debts need to be written down and new flows of investment have to be found in every sector, starting from roadside vendors to huge multinational companies. The decision made at this present juncture is very critical and will have long term impact on recovery and on the ultimate final product or society we are going to have after this catastrophe is over. The desired economic recovery has to be durable and resilient and needs to be designed with "Build Back Better" approach, giving due consideration to factoring in resilience to climate change and environmental conservation. Atmanirbhar Bharat is one of the best examples of such timely decisions. If implemented in its true spirit, involving all major stakeholders, including the community, the reconstruction and recovery results will certainly be exemplary and sustainable leading to make the country self-reliant and "Vishv Guru" in every sense. ■

COVID-19 Pandemic: Its Implications to the Sendai Framework and Risk Assessment

Rajib Shaw, Professor, Graduate School of Media and Governance, Keio University, Japan

The COVID-19 pandemic is the worst biological hazard-induced disaster observed in recent memory. The year 2020, which is supposed to be an important milestone year for the (SDGs), the Sendai Framework and the Paris Climate Agreement, is under the shadow of the pandemic. The Sendai Framework reinforces the scope of disaster risk management by expanding beyond natural hazards to include biological hazards such as epidemic and pandemic diseases. The Sendai Framework also places a strong emphasis on the need to build resilient health systems through the integration of disaster risk management into the provision of health care at all levels and, in particular, "to enhance cooperation between health authorities and other relevant stakeholders to strengthen country capacity for disaster risk management for health."

The pandemic's unprecedented speed and spread have affected most parts of the world. The year 2020, which is supposed to be an important milestone year for the Sustainable Development Goals (SDGs), the Sendai Framework for Disaster Risk Reduction 2015-2030 and the Paris Climate Agreement, is under the shadow of the pandemic. The pandemic has not only impacted economies at every level, but it has also hindered the achievement of the SDGs. Moreover, the cumulative effect of COVID-19 has strongly impacted national and local development planning. The Sendai Framework reinforces the scope of disaster risk management by expanding beyond natural hazards to include biological hazards such as epidemic- and pandemic diseases. The Sendai Framework also places a strong emphasis on the need to build resilient health systems through the integration of disaster risk management into the provision of health care at all levels and, in particular, "to enhance cooperation between health authorities and other relevant stakeholders to strengthen country capacity for disaster risk management for health."

Risk Assessment Framework

Comprehensive risk assessment of biological hazards forms the basis for effective emergency risk management of health, helps in understanding risk by supporting risk communication and acts as a backbone for risk-informed decision making, planning and development. Conducting such an assessment calls for a whole-of-government and whole-of-society approach, as also suggested by WHO's IHR and HEDRM.

The Words into Action Guidelines: National Disaster Risk Assessment, 2017 (Biological Hazards Risk Assessment) underscore that an estimated 75 per cent of emerging infectious diseases of humans that have evolved from exposure to zoonotic pathogens warrant risk assessments for health threats at the interface between animal, human and the ecosystem. The guidelines note three approaches to assessing the risks of biological hazards catering to three different purposes:

1. A strategic risk assessment which caters to pre-event phase and aids in planning for prevention, preparedness, capacity development and medium to longer-term risk monitoring and evaluation.

2. Rapid risk assessment is used for planning response interventions based on the risk associated with detected events

3. Post-event assessment is used for planning recovery, updating and strengthening the overall risk management system.

Analysis of past cases of pandemics and public health emergencies of international concern (PHEIC) and the experience of countries in managing COVID-19 point towards the need for evidence-based decision making supported by technology and innovations to develop early warning and risk assessment tools (Figure 1). The direct, indirect and wider impacts of a health emergency are sector-specific and vary across economies.

Figure 1: Inferences from dealing with past and current health emergencies

Risk Assessment Tool

Risk awareness is the best way to prevent and slow down the transmission of the COVID-19 pandemic. Risk awareness is achieved through the communication of risk assessment. Effective risk communication is an important measure to control infodemic. Most risk assessment tools focus on either tracking the affected patients or diagnosing a probable health condition through symptoms. RIKA India developed an innovative Risk Assessment Tool which goes beyond the symptom detection and patient tracking. It includes four factors in risk assessment: Health, Behaviour, Exposure, and Social Policy. Each of these four factors has sub-factors which help to assess the overall risk more comprehensively and also present it to the user in a simplified way. The importance of the Risk Assessment Tool lies both in awareness generation and decision making. Further, the datasets generated through the tool have been analyzed to understand the key intervention areas for COVID-19 response and management.

Integration into DRR Strategies

Effective and relevant risk management of biological hazards changes with the advancement of science, clinical medicine and public health practices and policy. The latest technical guidelines and research findings to support planning may be found in WHO's Health-Emergency Disaster Risk Management (Health-EDRM). The following are some further recommendations for the integration of biological hazards into DRR strategies:

SFDRR Priority 1: Understanding Disaster Risk

- **Conduct integrated risk assessments:** For biological hazards, a comprehensive multi-hazard and multi-sectoral National Risk Assessment (NRA) needs to be conducted. The assessment should include exposure, vulnerability and capacity analyses as part of an integrated policy approach.

- **Enhance capacities and knowledge management:**

Capacity and systems development for integrated risk assessment at the national to the local level is important. Disciplinary divergence (wherever possible) and multi-disciplinary collaboration are key to producing an integrated risk assessment.

SFDRR Priority 2: Strengthen Disaster Risk Governance

- **Revising regulations, legislations, policies:** Several countries have different regulations for emergencies and disasters including epidemics and pandemics. It is important to identify synergies between the health emergency and disaster risk management regulations, and where applicable, review laws specific to epidemics and pandemics to determine implications for disaster risk management.

- **Enhance science-based governance and decision making:** Science-based, data-centric decision making is considered important for early identification of hotspots, to provide policymakers with the appropriate advice, and to address collateral hazards.

SFDRR Priority 3: Investing in DRR for Resilience

- **Introduce fiscal boosting and social protection:** Epidemics and pandemics affect wide sectors of society and put both lives and livelihoods at risk, which also impedes development.

- **Enhance business resilience:** Keeping with a whole-of-society approach, public-private partnerships and business-to-business cooperation are important elements to ensure the continuity of supply chains.

SFDRR Priority 4: Enhancing Disaster Preparedness for Effective Response

- **Robust and integrated early warning systems:** Early warning is key to responding to any type of hazard, and biological hazards are no exception. A proper early warning system for biological hazards can be developed only when there is a robust public health system in place, which detects any biological hazards before outbreaks occur.

- **Introduce business continuity planning and adaptive strategies:** Since epidemics and pandemics are often long-lasting, proper business continuity planning for core impacted sectors/ministries are critical. These plans should be developed in advance or at an early stage of the event. ■

2020: A Planet Under Repair and Maintenance

Shriyans Bhandari is a Social Entrepreneur and the Co-founder of Greensole, an NGO that provides refurbished discarded footwear with zero carbon footprint and economic good to underprivileged school children, where owning a single pair of basic footwear is considered to be a luxury.

Quarantine, Social Distancing, Self Isolation. Lockdown. While these words have always existed, it is the first time that we have come to fully understand their meaning. The same is true for all other words: hard work, compassion, family time, love. We get a grasp of their true meaning once we experience them.

2020 will go down in history as a year of great challenges. The year started with the catastrophic Australian fire which devastated the country in unimaginable magnitude. No sooner had the world come to terms with this devastation when an unexpected virus struck Wuhan in China. It then spread globally, striking without impunity. We would not be accused of being naïve if we have been thinking or imagined what a world war and other crisis would be like, but when one descends upon us as suddenly as this present one – the coronavirus or COVID-19, do we understand the gravity of the situation. We have been discussing World War III happening in outer space, but here it is, in a mode we least expected, and probably creating more damage and fear in such a short period.

COVID-19 has become a crisis as it has all the elements: the spread, lethality, unpreparedness, absence of a vaccine and so on. Likewise, new things always catch us unprepared, unless we identify the early signs of misbalance in the environment; from increasing forest fires to natural calamities. There is also an urgent need for an active risk management department in all governments which sparks an alarm as soon as they see any potential development which could potentially derail society. We have been investing in defence, missiles and bombs; all destructive, rather than constructively building up other areas of our systems.

Shriyans Bhandari

It is also true during a time of crisis that our true self is revealed; thus this is a test. So then, do we think only of ourselves or are we mindful

“There is also an urgent need for an active risk management department in all governments which sparks an alarm as soon as they see any potential development which could potentially derail society”

of the wages of the workers? Do we do charity for the sake of garnering likes on social media? Do we truly donate or do we get involved in charity so that we are not left out from the bandwagon of do-gooders? Are we doing our part in saving the economy? Are we preventing deaths? Do we only see the number of cases rising or do we sincerely feel bad for the lives that have been struck down by the virus, and the unfortunate ones who lost their lives to it? Do we think only about ourselves or do we spare a spare for others too? Only we can be the judge of our intrinsic motives.

On the other side, I see that a lot of youth have been wasting their time instead of building themselves up by engaging in constructive activities, apart from spending time with family and catching up with friends, which is also important. One cannot wait for the storm to pass to restart, to grow. The good and bad times need to be used to equal advantage. It is surprising to see that the most successful start-ups we see today started just after the financial crisis of 2008 - from WhatsApp, Uber, Pinterest to Airbnb. This is a good time to spend on planning on your current start-up, writing the book which you have been putting off, taking online classes, ideation, and many more things.

It also brings out the human potential and the fact that no matter how tough the day is, it will eventually get better. After all, we have 4.5 billion years of survival planning in our genes. This may seem new to us but our genes have been programmed for this, time and again. If we can identify what kept

“Looking back at history, we find out that the earth has been plagued by a pandemic every hundred years. We will rise from the ashes and rebuild ourselves all over again. It does make us think if there could be a larger reason behind this - to motivate us to change our lifestyle, reduce climate change and self-introspect on what matters”

us going during these tough times, we could use that as motivation later on in such situations.

Looking back at history, we find out that the earth has been plagued by a pandemic every hundred years. We will rise from the ashes and rebuild ourselves all over again. It does make us think if there could be a larger reason behind this - to motivate us to change our lifestyle, reduce climate change and self-introspect on what matters.

We should brace ourselves for more such crises in the 21st century; with disasters taking different forms. Businesses must build themselves like Lego blocks which can be easily dismantled and require less time to restart with a low debt ratio. Governments must holistically employ their budget for different measures, and individuals should know the difference between necessities and wants and spend accordingly. But most importantly, there is a need to understand the response time to a crisis and how we rise after it.

We are in the middle of this crisis and things may get worse before they get better. However, we must not forget the lessons of this crisis and bring about necessary changes. We have been using historic statistics from 1919 to 2008 to measure the impact, but we must all work together during this current pandemic and ensure that it does not become the mother of all crisis. ■

COVID-19 Economic Recovery Plans and India's Pivot to Low Carbon Sustainable Development

Pooran Chandra Pandey is a founding CEO of a Berlin-based global think tank - Dialogue of Civilizations Research Institute. He has worked with the UN and the Times of India in senior leadership roles.

The first case of the 2019–20 corona virus pandemic in India was reported on January 30, 2020, originating from China. As of May 15, 2020, the Ministry of Health and Family Welfare has confirmed a total of 53,035 cases, 30,152 recoveries (including one migration) and 2752 deaths in the country with mortalities around 3.4 per cent, and recovery rates over 31 per cent. Experts suggest the number of infections could be much higher as India's testing rates are among the lowest in the world. The infection rate of COVID-19 in India is reported to be 1.7, significantly lower than in the worst-affected countries.

Keeping in view the surge and precautionary measures, including social distancing, India is under a total lockdown since March 22 until May 31. This has been a historic decision taken by the Indian government to impose a nationwide lockdown of 1.3 billion people (almost 20 per cent of humanity worldwide). The government's actions so far have resulted in lower reported cases, recovery of about 29 per cent with a mortality rate of 3.2 per cent.

Recognising this strenuous effort of the Indian government's lockdown, the Oxford COVID-19 Government Response Tracker (OxCGRT), in its report based on data from 73 countries, reports that the Indian Government has responded more stringently than other countries in tackling the pandemic. Acknowledging this massive exercise of lock-down, Michael Ryan, Chief Executive Director of the World Health Organisation's Health Emergencies Programme, said that India had "tremendous capacity" to deal with the corona virus outbreak and, as the second-most populous country, will have an enormous impact on the world's ability to deal with it.

National Lockdown and its Fallout

Given a complete lockdown in India, there has been, like other countries, a complete halt in production and consumption of goods, services including manufacturing, and there are visible signs of economic suffering necessitating economic stimulus and bailouts by industry - big, medium and small - coupled with demands of the

Pooran Chandra Pandey

industry. The worst-hit industries have been aviation, the services sector in general, automobile and construction. The corona virus has displaced about 10 million labourers from their work; adding to a downturn in the economy. To support these migrant workers, the Indian Government in the last month set aside one per cent of its gross domestic product (GDP) to support approximately 10 million informal workers by way of providing food security and handing them USD 25 as basic income through direct cash transfers to ensure their well being and survival. Subsequently, the Government also announced

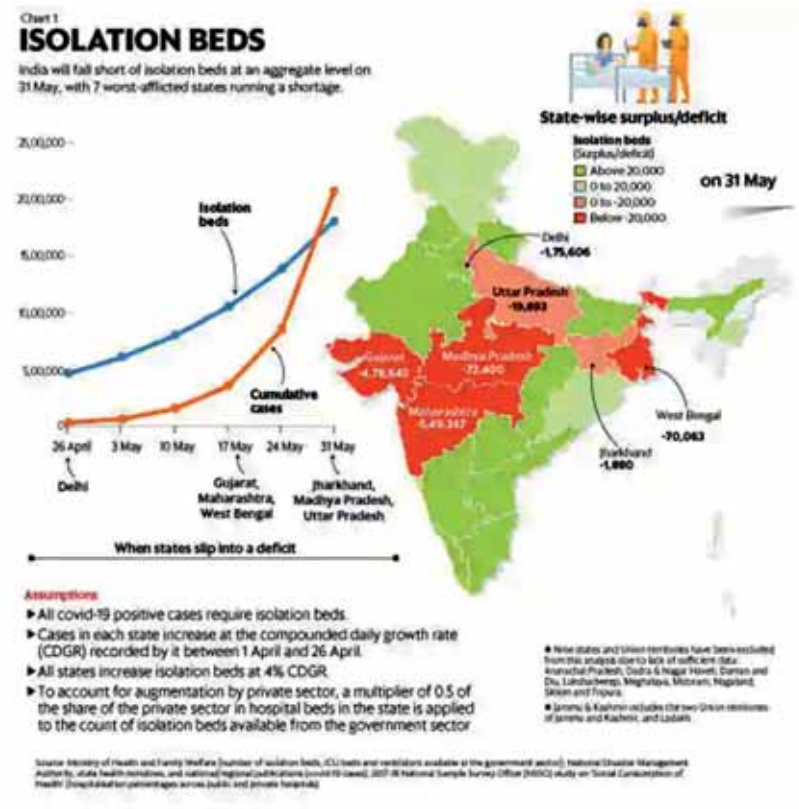
> **COVID-19 has also dealt a fresh blow to the country's healthcare system and exposed vulnerabilities in terms of the lack of testing facilities, personal protective gears, nurses and doctors and ventilators along with a shortage of beds and hospitals for the infected patients with the virus**

USD 50 billion to address the issue of liquidity in the banking sector.

COVID-19 has also dealt a fresh blow to the country's healthcare system and exposed vulnerabilities in terms of the lack of testing facilities, personal protective gears, nurses and doctors and ventilators along with a shortage of beds and hospitals for the infected patients with the virus. India currently accounts for one bed per 1000 patients and five patients per doctor against WHO's prescribed minimum standards of three beds per 1000 patients. If this is the case and assuming that there could be a rebound, it is estimated that by Q1 of 2021, the Government would need to infuse about USD 2 billion into improving the health systems and about USD 12 billion over the next decade to create about 2.5 million hospital beds.

India's Pandemic Response and Economic Package

The Indian Prime Minister, recently, in a televised address also announced a large economic recovery



> **For instance, the Government is discussing with the auto industry making greater use of Bharat VII fuel (the cleanest transport fuel) for their new cars, undertaking and revising the adaptation of the proposed e-mobility policy one year ahead of the planned date, and strengthening the EV charging infrastructure and storage facilities**

(reforms) package pegged at USD 270 billion aimed at strengthening before country's supply chains through the private and public sector participation in making India self-reliant (without depending on any outside support for essential supplies during anything like COVID-19 next time). This recovery package is the largest announced by far in independent India's history; accounting for 10 per cent national Gross Domestic Product (GDP) and 70 per cent of India's total budget presented for the FY 2020-21 in February this year. The country thus becomes among the Top 5 that has set aside 10 per cent or more of their Gross National Product (GNP) apportioned toward the economic recovery package to fight out economic distress and health crisis emanating from the ongoing COVID-19 pandemic.

While announcing the economic recovery plan, the Indian Prime Minister also spoke about climate change and global warming as key future challenges and asked for responsible conduct by the companies in re-setting their economic activities in the post-lock-down period starting May 31. He also stressed on technology-driven economic growth putting people at the centre of overall sustainable development for India. Details of the package are being worked out and are going to have key climate and global warming measures embedded into the economic recovery measures for follow up and reporting.

> **India has charted out a plan, unlike others, that promotes a national economic recovery plan rather than offering handouts to industries with accountability embedded into the proposed plans to account for each rupee spent and the value obtained therefrom**

Climate Change and Global Warming Linked Recovery Plan

The national lockdown in India, like other places, has proven to result in improved climatic conditions including low emissions, cleaner rivers, lower CO2, cleaner air, and improvements in bio-diversity. The Government has been discussing directly with the industry the possibility of adopting practices post COVID-19 that will allow for the continuation of these improved climatic conditions.

For instance, the Government is discussing with the auto industry in making greater use of Bharat VII fuel (the cleanest transport fuel) for their new cars, undertaking and revising the adaptation of the proposed e-mobility policy one year ahead of the planned date, and strengthening the EV charging infrastructure and storage facilities. The Government also said they would provide subsidies to those who shift to electric cars or clean-fuel cars. With airlines, the government is discussing their plans to lease out new-generation aircraft that are superior in design and more fuel-efficient. Similarly, with the construction and real estate sectors, discussions are underway to promote the use of graded steel, natural materials made of wood, more efficient cement materials, and cutting the usage of water in building new facilities.

During these trying times, India like other countries has seen a visible drop in its NOx and CO2. It has posted a drop of 62 per cent in its NOx and 42 per cent in CO2 (best-case scenario) levels. While these changes are visible on a short-term basis, questions remain whether such a situation can hold its ground post the virus period when industrial activities resume full-blown.

"This drop of emissions of six per cent, that's unfortunately (only) short-term good news," said Professor Petteri Taalas, World Meteorological Organization (WMO) Secretary-General, in reference to a 5.5 to 7.7 per cent fall in levels of carbon dioxide due to the pandemic, flagging that once the industrial activities resume, the emissions can go back to its normal levels. "The extent of urgency in countries' ability to achieve 1.5 degree Celsius target requires a regular and verifiable emissions cut of 7.5 per cent from 2020 to 2030," states UNEP-led 'The Emissions Gap Report, 2019'

India's Pivot to Low Carbon Sustainable Development

COVID-19 pandemic has been devastating for the people and economies while simultaneously being a boon in disguise for our climate and environment. The Indian Government has already committed to embedding climate-resilient and technology measures based on human-centric sustainable development. Alongside the measures announced, the Government is further urged to push with greater vigour policy measures such as the promotion of clean fuel; cleaner heating/ cooling options, green-grids, and phase-out of coal. E-mobility measures and creating more green jobs may help stabilise the climate gains made during the current pandemic.

India has charted out a plan, unlike others, that promotes a national economic recovery plan rather than offering handouts to industries with accountability embedded into the proposed plans to account for each rupee spent and the value obtained there from. The economic package announced by the Indian Government is aimed at revival, recovery and putting the domestic economy on a fast-paced growth trajectory without being inward - The economic package announced by the Indian Government is aimed at revival, recovery and putting the domestic economy on a fast-paced growth trajectory without being inward - a plan that has potentially all the ingredients for it to succeed and pay a rich dividend to both Indian industries, economies and people in short to medium term horizons. ■

Reducing Risk for Future Disasters Through Greening of Disaster Response

Bindu Aggarwal, Faculty/Special Adviser (Disaster Management) for Indian Red Cross Society (NHQ)

The post-disaster situation allows humanitarian actors and communities an opportunity to undertake projects that have an integrated environmental component to build back safer. This may be, for example, rebuilding with clean energy systems, or reducing development in flood-prone areas.

Climate change worsens the risk of some hazards arising from extreme weather events and climate warming (e.g. drought, avalanches, landslides and floods). Significant sections of the population tremendously depend on locally-available natural resources and ecosystem services for their livelihood and security. Natural resources are constituted of firewood, building materials, forest foods, grazing and medicines. Clean air, clean and reliable water supplies, protection from soil erosion, landslides and extreme flooding are few of the services provided by ecosystems. Avoiding overexploitation of natural resources or damage to ecosystem services reduces risk to hazards. In this context, environmentally-responsible practices pave the way for resilience to future disasters through sustainable reconstruction. Environmentally-responsible practices include avoiding felling timber on steep slopes which may risk future landslides or polluting local water supplies with sewage from temporary settlements.

Post-disaster, there is also an opportunity to tackle previously existing environmental problems and build back safer and greener (for example, better land-use to promote recharge of aquifers, hence conserving or hampering water supplies). There are also chances to build back better for a resilient future. At the same time, it must also be recognised that there is a risk of improper practices during recovery and reconstruction. Such activities are liable to damage the environment, thereby, putting people at greater risk in future. The Sphere Handbook, the Code of Conduct for The International Red Cross and Red Crescent Movement and NGOs in Disaster Relief, and the Sendai Framework for Disaster Risk Reduction address the need for the greening of disaster response, reduce degradation of the environment and achieve community resilience.

All sectors call for the greening of disaster response including settlements and land-use planning, building construction, energy, waste management, water and sanitation, agriculture and livelihoods, forestry, education and infrastructure,

Bindu Aggarwal

landslide prevention and treatment and flood management. Greening of disaster response and recovery helps to achieve targets of Sustainable Development Goals SDG 3 and SDG 11.

Planning to reduce carbon footprints during disaster response opens up a multitude of opportunities. This includes, for example, minimizing environmental impacts of relief materials during production, packaging, distribution and disposal, reducing demand for fuelwood for cooking/warmth, and poles for temporary shelters. Salvaging the debris and utilising it for reconstruction reduces the debris load and generates revenue. Local procurement of relief material further reduces the fuel consumption and costs involved in transportation from distant locations.

SDG 3 - Target 3.9:	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.
SDG 11 - Target 11.6:	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.
SDG 11 - Target 11 b:	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.

Principles of Greening Disaster Response

• Resettlement areas to be demarcated only after conducting land-use planning, including zoning. This helps to minimize risks from landslides and floods. It is also important to take into account adequate land and natural resources to meet community needs.

• Building design and construction to comply with standards laid out and should be environmentally sustainable, appropriate to the region, and withstand future local disasters.

• Promotion of alternative or green energy and energy-efficient practices at settlement camps to reduce pressure on forests. Ensure that fuel wood collection complies with existing forest management plans.

• Disaster Waste Management Plan in place following principles of segregation, recycle and reuse. Ensure that solid waste disposal during the reconstruction phase is managed using environmentally-sound practices, including the introduction of new systems to avoid the threat of vector-borne diseases.

• Use a watershed management approach. Protecting and managing the watershed can help sustain the water source, and provide other services such as water retention and filtration. Utilise technological interventions that reduce demand on water supplies, decrease the inflow of harmful nutrients to water bodies, provide communities with higher water quality and quantity, and decrease maintenance effort and costs.

• Reconstruction of infrastructures like roads, bridges and hydropower, follow the principle of Build Back Better through avoidance of landslide-prone areas, and take account of increasing climate variability accompanied by green infrastructure - trees.

• Ecosystem restoration and sustainable livelihood options be followed to reduce pressure on natural resources forests and biodiversity.

• Specific rights, needs, and vulnerabilities of women and marginalized people be addressed concerning natural resources during recovery. Promote equitable access to recovery support and strengthen community institutions and participation.

• Enforce environmental impact assessment/initial environmental examination regulations during reconstruction to avoid future disasters; and ensure enforcement.

• Build capacity for green recovery and reconstruction through training and outreach and ensure consultation/coordination with relevant stakeholders in recovery and reconstruction.

Green recovery and reconstruction is everyone's responsibility post-disaster – no single organization or sector can do it in silos. While there is a very important role for the environmental sector in helping to identify potentially damaging actions and ways to avoid adverse impacts, ultimately everyone involved in DRR, recovery and reconstruction – be it the government, NGOs, CSOs, academic institutes or research bodies - all need to play their part.

The post-disaster situation allows humanitarian actors and communities an opportunity to undertake projects that have an integrated environmental component to build back safer. This may be, for example, rebuilding with clean energy systems, or reducing development in flood-prone areas. ■

Double Whammy - Responding to Cyclone Amaphan Amidst COVID-19

Soumi Halder,
Manager - Campaigns & Communication (East)
Devendra Tak Head - Media & Communication Save the Children

Following the large scale devastation rendered by Cyclone Amphan amid COVID-19, affecting people in general, and children in particular, Save the Children has set an example in effectively responding to the situation by meeting the urgent needs, especially of the children. Besides, with a blend of agility, resilience and leadership, Save the Children through its partner organization, has been able to secure the rights of the children and help rebuild their communities in a double-edged crisis like this.

On 20 May 2020, West Bengal was brutally hit by Cyclone Amphan. It was the severest tropical storm in the region. It was also the strongest super cyclone in recorded times and the costliest one ever in the region – with estimates putting damages to over one trillion rupees ($13 billion) to infrastructure and crops, State officials were quoted in the media (Reuters). There is never a good time to have such a disaster but there could hardly have been a worse one – with the region, as well as the world, still clueless about how to deal with the COVID-19 pandemic that was steadily infecting people across all sections of society. According to UNICEF, approximately 19 million children in West Bengal itself were directly affected due to the said cyclone.

The double jeopardy of COVID-19 and Cyclone Amphan has proven to be a terrifying phenomenon. Due to the nationwide lockdown to prevent community outbreak of the deadly Corona virus, the disaster management infrastructure was already under unprecedented strain. After all, how often do we have a disaster that spans the entire length and breadth of the nation and which has the potential to impact every citizen? Due to the lockdown and social distancing norms, a huge blow was delivered to the livelihood of millions of people. Millions of labourers and other workers have migrated back to their original homes to be closer to their loved ones and draw strength from each other. Health infrastructure was already under tremendous strain; many migrant labourers were stuck in the middle of nowhere when transportation came to a halt due to Cyclone Amphan. Trying to coordinate disaster relief teams and supplies to where they were needed the most became complicated and took more time.

Children are always the most vulnerable in such humanitarian situations, and across India, they form a sizable 40 per cent of the population (Census 2011). Children have specific needs, which cannot be just generally covered. Children were forced to stay away from school due to the COVID-19 lockdown. They became vulnerable to severe threats ranging from physical to emotional and psychological. There is a threat of increased abuse at home, as has been found in the sudden spike in the number of distress calls received by Childline during the lockdown period; and then there is the need for psychosocial support – which is most often neglected and which has life-long consequences.

Save the Children understands that 'Children Cannot Wait'. It, therefore, makes every effort to be the 'First to arrive and last to leave' whenever any disaster strike. The leading independent Child Rights organization that works across 19 States in India and 120 countries worldwide, aims to respond to any emergency, such as a cyclone, within 72 hours of its landfall. A strong element of disaster preparedness is to build the resilience of communities. A lot of work has been undertaken

in this region by Save the Children towards this end. Working with children's groups, trainings were imparted to ensure children know how to keep themselves safe and offer their support to the community. Last year, when Cyclone Fani had threatened the eastern coastline, children's groups had played a stellar role in alerting their communities as part of the Early Warning System to make sure that everyone evacuated to safety.

This time, despite all the challenges, we were able to establish regular contact through the telephone. The planning for our work began well before the cyclone's landfall. We kept our partners well informed about how we would assess and respond to any need. Within 72 hours after the cyclone struck, we initiated our response in the affected areas of North 24 Parganas district. Our response kits include a food basket (that can provide a 30-day ration to a family of five) and hygiene kit (containing sanitizers, mask, gloves, soap, toothbrush, toothpaste, etc.). Our ground team took every precautionary measure in advance to accomplish the distribution process while reaching out near the Containment Zones in Kolkata and the coastal villages of the Sunderbans in the submerged land areas post-Amphan.

"I thank Save the Children for reaching out to the most marginalised communities in my block, after Amphan and amidst COVID-19 crisis", said Shri Rajendra Nath Khanra, Block Sabhapati, Sagar Block, 24 Parganas (S), West Bengal

Over the last three months, defying all odds and challenges, we have reached out to 3638 households covering more than 18,000 people, as part of COVID-19 and Cyclone Amphan humanitarian response in Kolkata (Ward: 11, 28,31,36, 56,57,58, 59, 62, 65 93, 107 & 114), North 24 Parganas, South 24 Parganas and East Medinipur. We are extremely thankful for the support of key stakeholders from the community and the government.

Stakeholders like the members of the West Bengal Commission for Protection of Child Rights (WBCPCR) and the Chairperson, Smt. Ananya Chatterjee Chakraborty joined our response during the State Child Protection Day on June 9, 2020.WBCPCR team had also distributed kits in our intervention areas. In some other areas, the local Member of Legislative Assemblies (MLAs) and Ward Councilors joined our team during our response work.

One of the strongest elements of our response has been our youth advocates and child champions. Over the years, Save the Children has steadily engaged in training children to advocate for their rights. It was in this hour of need that these champions came up with exemplary support. Save the Children's Youth Advocate, Anoyara Khatun, a Nari Shakti Awardee - 2017 (whose amazing story is documented in the book 'We are the Champions'), worked together with children and the community to save families in her village in Choto Ajgara of Sandeshkhali I Block in North 24 Parganas. As soon as they were informed about the approaching super-cyclone, Anoyara and two of her peers recalled the aftermath of Aila, the tropical cyclone that had hit the area 11 years back. Aila changed their life forever. Promising herself that no child should suffer her fate, Anoyara immediately raised the alarm in her community. Since most of the cyclone relief centres were already being used as COVID-19 quarantine facilities, the villagers took shelter at the village high school. Anoyara and two other youth champions ensured that social distancing was

maintained to avoid being infected by COVID-19.

After the fateful night when Cyclone Amphan had completed its landfall, Save the Children and its local partner - Dhagagia Social Welfare Society (DSWS) - went to assess the ground situation. The agony of the people staying there was beyond imagination. With no electricity, food and proper drinking water, people were desperately waiting for relief. The makeshift relief centre had only one toilet that was accessed by all the 150 residents of that camp. Anoyara and her peers supported the team in completing the Rapid Assessment process on May 22, 2020.

Among the 150 people of her village whom she relocated to a school building was a family of four – consisting of two visually impaired girls - Alya and Tuhina - and their parents. Anoyara was also able to help Alya and Tuhina and their mother, Fatima Bibi, to reach the cyclone shelter to ensure their safety. "Had Anoyara Didi not saved us then, we would have been washed away by the high tide that had followed the cyclone. I owe a lot to her," said a grateful Fatima when Save the Children representatives met her.

As Save the Children began its humanitarian response in the locality within 72 hours of the aftermath of the cyclone, Anoyara, (ignoring her plight in the situation) took extra care that the children got priority attention. She had requested the response teams to distribute masks among the rescued individuals to protect them from probable infection of COVID-19. A blend of agility, resilience and leadership, Anoyara and her peers proved to secure child rights even at such a distressing situation. They are helping to rebuild their communities as well.

These child champions and youth advocates are an integral part of our intervention that spearheads the community mobilisation process. In the heart of the slums of Kolkata, near Park Circus area, which has been identified as one of the Containment Zones, one would find a Good Samaritan, Murshida Khatoon, all of 14 years, reaching out to her neighbours to generate awareness about the spread of the virus. She has a group of 15 children who also take part in the awareness generation process in their slum that has a population of over a hundred people.

Ever since the lockdown was implemented, this young group initiated their campaign on proper methods of handwashing, maintaining social distancing and proper mask usage. These child champions, with proper protection, go around their neighbourhood to monitor whether social distancing is maintained when people are flocking the local grocery shop or even queuing for water collection at the public tank. This is how they are being able to keep the virus at bay in their lanes and by-lanes. "We can understand the seriousness of the situation, but it is sad to find that adults are unable to understand the seriousness, and that is aggravating the situation," revealed Murshida.

"It is essential that civil society organisations, the government and the community at large come together while responding during such disasters or the pandemic," believes Susmita Guha, Senior Manager and State Lead, Save the Children, West Bengal.

The success of Save the Children's response and the grit of its child champions like Anoyara and Murshida remind us of the inspiring words of our founder, Eglantyne Jebb, from a hundred years ago: "Save the Children is often told that its aims are impossible – that there has always been child suffering and there always will be. We know. It's impossible only if we make it so. It's impossible only if we refuse to attempt it." ■

COVID-19: Through the Looking Glass

Dr Ram Boojh is the CEO, Mobius Foundation. He has a rich and diverse professional experience of working with the United Nations, Government, and academic and development organizations. He has made an outstanding contribution in the field of ecology, biodiversity, climate change, environmental education and education for sustainable development for over three decades in India and abroad.

COVID-19, also known as the Severe Acute Respiratory Syndrome – Coronavirus-2 (SARS-CoV-2) is the most serious global crisis today. The UN Secretary-General - Antonio Guterres - has termed it as a global health crisis unlike any in the 75-year history of the United Nations - one that is spreading human suffering, infecting the global economy and upending people's lives. The World Health Organisation (WHO) has declared the coronavirus outbreak as a pandemic and "a public health emergency of international concern". The rapid spread of the pandemic across the nations and societies has adversely affected the economic, social and health infrastructure with repercussions on life and livelihoods of millions at an unprecedented scale. According to the Asian Development Bank, COVID-19 can lead to losses between US$ 387 million and US$ 29.9 billion in personal consumption losses for the Indian economy alone.

Dr Ram Boojh

The crisis has come at such a time when the world was preparing itself to accelerate action on the climate crisis and fast track the implementation of the 2030 Agenda and the Sustainable Development Goals (SDGs). The world was also set to launch the new agenda for halting the rapid loss of biodiversity and the new framework for Education for Sustainable Development-ESD 2030. However, with the shift of focus on the corona crisis, addressing all other pressing global issues have now been put on hold for an uncertain period, which may be for a few months to more

“The world is paying a huge economic and health cost due to the corona crisis. However, the crisis has its root in the utter disregard and negligence of humans towards environmental sustainability concerns. Emergences of corona-like diseases are linked to the over-exploitation of nature and its resources as well as over-consumption coupled with the loss of biodiversity, forest destruction and degradation”

than a year. In this scenario, we need to analyse and look beyond the current crisis from the lens of sustainability and the future we all want to have.

Root Causes: The Connection to Wild Life

The world is paying a huge economic and health cost to the corona crisis. However, the crisis has its root in the utter disregard and negligence of humans towards environmental sustainability concerns. Emergences of corona-like diseases are linked to the over-exploitation of nature and its resources as well as over-consumption coupled with the loss of biodiversity, forest destruction and degradation. The rapid ecological degradation, habitat loss, deterioration of ecological systems, loss of species and ecosystems bring wild animals into closer contact with humans and domesticated animals resulting in an infectious disease called zoonosis. Wild animals in their natural habitat harbour a vast pool of dangerous viruses and other pathogens which remain harmless till they come in contact with humans or domesticated animals. COVID-19 is believed to have originated in Huanan Seafood Wholesale Market in Wuhan, spreading the contagion like wildfire, first in China and then across the nations, in a globalised and interconnected world. According to estimates, around 6.3 million people are directly engaged in wild animal farming in China with a total value of $18 billion. The Chinese Government on February 24, 2020, prohibited the consumption of terrestrial wildlife to protect public health. However, experts feel that the ban alone is not enough to effectively protect public health from wildlife-associated diseases; rather it requires the implementation of a more comprehensive and sustainable production and consumption approach. Many traditional Chinese medicines are made from wildlife products, such as pangolin scales, snake bile, and bat faeces which are not banned by legislation. The poaching, storage and transportation of wildlife for medicinal purposes pose a risk of transmitting such diseases. The current pandemic should force the Chinese government and the UN to come out with a comprehensive and permanent ban on all such practices related to wildlife to prevent future public health risks.

The Need to Treat Industrial Waste

The COVID-19 crisis and the unprecedented lockdown in India and many other countries have some silver lining too. The air quality in many cities across the globe has significantly improved with clearer skies and cleaner air to breathe. Since industrial wastes have stopped flowing into the rivers, there has been a significant drop in pollution in them as well. Some experts also believe that the present crisis could trigger the biggest fall

> **We will be able to win the battle over COVID-19 with the advent of effective medicines, mass antibody tests and vaccines in the days to come. However, there is a need to bring about changes in the ways we live and go about our day-to-day business**

in carbon emissions since World War II.

However, to avoid a new surge in pollution and emissions when economic activities resume, we need to learn the right lessons of living sustainably with nature and the planet. The problem has also taught a hard lesson to the global community that economic development activities can be put to a halt to save precious lives. This pandemic need not pause our thinking on other equally pressing crises such as climate, pollution, biodiversity loss and population explosion. Governments around the world are in the process of providing economic stimulus packages in response to COVID-19 to rebuild economies and livelihoods. These should be used for simultaneous coordinated action to address the root ecological causes of the crisis and find out new and innovative ways to better tackle global environment and sustainability challenges to restore and rebuild the lost ecological systems and natures assets upon which we all depend for our survival. There is an urgent need to treat industrial waste as well as improve the air quality by limiting cars on the road. Other measures such as regulating stubble burning, emphasis on public transport-sharing system and practising sustainable construction techniques will go a long way in protecting air quality.

Changes in a Working Lifestyle

We will be able to win the battle over COVID-19 with the advent of effective medicines, mass antibody tests and vaccines in the days to come. However, there is a need to bring about changes in the ways we live and go about our day-to-day business. Work from home experiences from across the globe has brought new and innovative ways to connect with people in offices, schools, universities and other work centres. Virtual communities formed during the epidemic have enabled people to come together in a more meaningful way, although remotely. These should be used post-crisis to promote creativity and innovation, thus building new sustainable enterprises and social systems. It has also underscored the need for greater collaboration and sharing best business practices across the globe. The role of lifelong learning has assumed paramount importance for the workforce to gear for changing job roles in the wake of an uncertain future ahead. The crisis has made us rethink about age-old traditional knowledge and practices specifically the experiences and understanding of the natural world, lifestyle choices, herbals, yoga, ayurveda, etc., for creating immunity and building resilience for better health and well-being. The ongoing liquidity crunch in most sectors will prompt several organisations to adopt judicious planning of financial resources and put in place a comprehensive crisis management plan to tackle such exigencies in future.

Going forward, sustainability and an emphasis towards a 'greener' future should be at the core of every decision-making. ■

"If governments put health, natural regeneration and climate action at the core of every decision they make in recovering from this pandemic, we can emerge as a stronger and more resilient society, and on track to a safer climate future."
Former UN Climate Chief
Christiana Figueres

Climate Change and COVID-19

Dr. Kashif Imdad
Assistant Professor of Geography - PPN PG College, CSJM University, Kanpur, Uttar Pradesh

We have been visited by many unwanted, disastrous guests this year. We first had COVID-19, followed by Category 5 tropical cyclone – Amphan, and the recent guest – the catastrophic floods. We are not facing a single disaster; we are facing multiple hazards at the same time. The crisis is unprecedented and the future is uncertain. But the first crisis brought some relief for the planet as air quality improved throughout the world. Roads were empty and rivers became cleaner as industries shut down operations.

Is Climate Change and COVID-19 related?

For most people, climate change makes no sense. It is not that they are not ready to accept but it is beyond their comprehension to understand what climate change is. It is always easy to accept as non-significant something beyond one's comprehension or sight. This is how human psychology works. What if the situation is opposite and you see and feel the impact of an incident? You then began to look for answers beyond general facts and proven science to explain what you experienced.

The first is climate change and the second is COVID-19. Let us try to understand them independently and try to link these unlikely incidents together.

Climate Change

Background

In the beginning, it was considered that as we are burning fossil fuels, gases will be added to the atmosphere, making it even thicker. As the atmosphere thickens, the planet becomes warmer. It is similar to your blanket in winters, the thicker the blanket the warmer you feel. Then in 1896, a Swedish scientist, Svante Arrhenius, came up with a new idea published in the form of a research paper, bringing an entirely new dimension of research for generations to come. He stated that as humanity burned fossil fuels such as coal, which added carbon dioxide gas to the Earth's atmosphere, we raise the planet's average temperature.

The 'Greenhouse Effect' was introduced almost 200 years ago when Joseph Fourier, a French mathematician described how some atmospheric gases can trap the solar energy. These gases acquired a popular name 'Greenhouse Gases' which mainly comprise of carbon dioxide, methane, ozone, nitrous oxide, etc. Chlorofluorocarbon was added in later stages as it is a man-made gas. This 'Greenhouse Effect' was only one of the many speculations about climate change until it picked up pace in the 1960s with a strong UN backing.

What is Climate Change?

So what is climate change? The average temperature of the earth in the 20th century was 14°C. In a normal course of events, this average temperature should remain

Dr. Kashif Imdad

the same, but due to the greenhouse effect, the earth's temperature began rising. The increase in the average temperature of the earth is known as Global Warming. On the opposite side, the decline in the average temperature of the earth is known as Global Cooling. Changes in the climate of the earth due to rise or fall in average temperature is known as Climate Change. This rhythmic rise and fall happen naturally in the geological history of the earth. Unfortunately, whatever is happening now in a very short duration can only be linked to large-scale pollution primarily due to burning of fossil fuels. NOAA/GFD Computer Model Simulations by the Intergovernmental Panel on Climate Change predicted that the average surface temperatures could rise between 2°C and 6°C by the end of the 21st century. How much temperature could rise is dependent on how much economic development we want. High economic development will lead us to the upper side of prediction and low economic development would lead to the lower side of prediction. The United Nations Climate Change

Conference, 2015, well known as COP 21, held in Paris, represented by global leaders, pledged to come under the same umbrella to restrain average temperature to reach 16°C by the end of the century. The common vision of mankind to work together to stop what seems unstoppable in this time of consumerism came into a serious backlash when the Trump Administration of the USA withdrew itself from COP21. But you need not be nervous as humanity always finds its way to a new beginning.

COVID-19: What just happened?

The COVID-19 global pandemic has raged the world in a matter of a few months after being identified in the Wuhan region of China in November 2019. Before it could be identified, the global connectivity became our Achilles' Heel as the virus travelled across the world; emerging in major cities and then spreading to secondary centres and the countryside. The global healthcare system collapsed in no time and we witnessed an event which no generation should ever see again. We have already lost more than 7.5 lakh people in less than a year. Thus, we started speculating about the cause as I stated in the beginning. I don't want to go into the discussion that COVID-19 was transmitted to humans from animals accidentally or was purposely introduced to benefit someone or it was just an accident at an unauthorized lab. We don't know for sure, but if you have ever studied biological warfare, you would know that a virus once released comes back to your own country. Well, we can leave this to WHO to find the sequence of events that happened in Wuhan.

Climate Change and COVID-19 related?

Some 30 new diseases have emerged over the last 25 years and some old diseases that had been under control are now witnessing a resurgence. Ebola Virus Disease (EVD), Marburg, Lassa Fever, MERS and SARS, Nipah, Rift Valley Fever, and now COVID-19, are just a few among them. Other old diseases like Malaria and Dengue are regaining pace and affecting millions due to the global rise in temperature as Anopheles mosquitoes are finding global warming-induced climate more friendly and favourable. Warmer temperatures not only cause these kinds of mosquitoes as well as rodents to breed rapidly but they also bring new species with more serious diseases. Mosquitoes are now found to be breeding in higher altitudes in areas previously alien to them. You might have experienced it yourself if you have ever visited Mussoorie. This hill station was considered mosquito-free during the colonial period.

Various studies published in leading journals concluded that COVID-19 is also very responsive to climatic conditions. Its survival rate is very high in low temperature and low humidity and very low survival rate in high temperature and high humidity. This makes most of the developing countries comparatively safe, but due to high socio-economic vulnerability, we are as vulnerable as developed nations or maybe more. The melting ice due to global warming is also one of the major concerns among researchers. It may release an unknown disease buried inside the ice millions of years ago. It sounds like a fairy tale but who knows what is hidden in the uncertainty of the future.

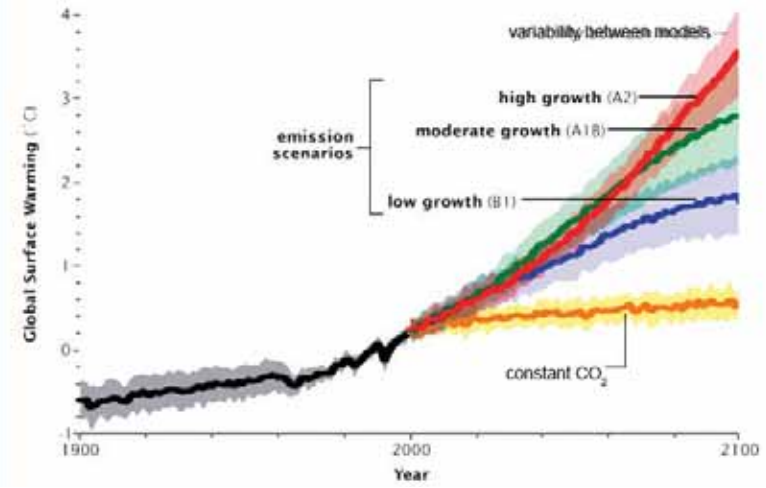


Figure 1: Model simulations by the IPCC estimate that Earth will warm between two and six degrees Celsius over the next century, depending on how fast carbon dioxide emissions grow. Scenarios that assume that people will burn more and more fossil fuel provide the estimates in the top end of the temperature range, while scenarios that assume that greenhouse gas emissions will grow slowly give lower temperature predictions. The orange line provides an estimate of global temperatures if greenhouse gases stayed at year 2000 levels.

What do we do?

What to do is not a difficult question, how to do it is difficult. COVID-19 struck us first. Then came the Category 5 tropical cyclone – Amphan, and now many States are facing the hardships brought about by heavy rains and the floods. We have been bombarded by one after another disaster. And winter is coming. We are not just facing a single disaster but multiple hazards at the same time. It is said that we study history to learn from our mistakes and make sure we do not repeat them. What we learn from this crisis holds the key to the future of human existence. ■

Practitioner's Guide to Business Impact Analysis - A Synopsis

Priti Sikdar, FCA, CISA, CISM, CRISC, ISO 27001 LA, BS 25999 LA, PRINCE 2 (FC), has over 25 years of experience in the risk, audit and assurance sector which includes industry and profession, audit, internal audit, IT audit, compliance and risk assessments.

Unprecedented and lingering pandemics and the ever-increasing influx of new threats from cyberspace have made it difficult and unpredictable to cope with disasters. Business is badly affected by the disruption, and continuity of business and its viability is at stake. Building resilience is the key word!

- It is no longer a disaster recovery plan. It is a living document that gives early warning signals, predicts incidents and safeguards against attack.
- It embeds knowledge and awareness in resilience and resorts to an adequate level of testing on various possible scenarios to understand what action needs to be taken if the scenario happens in reality.
- It demonstrates how to build a customized control framework that fulfils common audit criteria, business resilience needs and internal monitoring for the effectiveness of controls.

Today, COVID-19 has hit almost all the countries of the world. We are being updated on the statistics of rising cases, recoveries, and otherwise – whether in the country or other countries, daily. The need for better resources is increasing. An integrated approach based on cooperation and understanding is necessary to deal with a disaster of this magnitude.

Chain of events following the pandemic

- International travel was one of the first to be hit. People who had gone on holiday out of India were stuck for prolonged periods.
- The lockdown put restrictions on local travel. Offshore projects were stalled.
- Local transport and logistics suffered, and essential commodities were not deliverable. Sites like Amazon, BigBasket, etc., could not deliver as delivery persons were unavailable since they were also restricted to travel due to the imposed lockdown mandated by the government.
- COVID-19 is an example of a disaster which had no precedent and no defined end.
- A large number of people around the globe lost their lives.

Priti Sikdar

- A large number of migrant workers returned to their hometowns.
- Since vaccine development is complex, the most optimistic time of launch of vaccine is not before this year-end.
- An atmosphere of uncertainty prevails worldwide and the impact from the disaster is manifold.

The catastrophic impact of the pandemic

- Financial impact from cancelled deals.
- Inability to meet commitments on delivery.

- Inability to produce at full capacity due to non-availability of labour and raw materials.
- Test the capability of national leaders to control the pandemic and affected people.
- Responsiveness of people to deal with this unique disaster varies.
- Scarcity of infrastructure to house patients, medical equipment, and in some cases, medicines was deeply felt.

If we go into a root-cause analysis, we find that COVID-19 is a brand new pandemic, never heard of before, and never contemplated or planned for. It is time, therefore, to give serious thought to disaster and increase our resilience. We need to educate people to follow all State and local municipal authorities' rules concerning health, hygiene and lockdown. Quarantine concept must be accepted and followed.

Above all, the community as a whole should rise to the occasion and help and contribute in every way to the neediest. Self-discipline should be strictly followed to keep ourselves and our surroundings safe.

The measures we take today will be elements of our plan for COVID-19 tomorrow. Every incident brings us closer to its resolution; hence, doing a business impact for the business and a people impact to gauge peripheral impacts is necessary to prevent disasters in future. ■

(This book by Priti Sikdar illustrates the importance of business impact analysis which covers risk assessment, and moves towards a better understanding of the business environment, industry-specific compliance, legal and regulatory landscape and the need for business continuity. The book provides ample charts, checklists, templates and flow diagrams that give direction in collecting, analyzing, collating and mapping of organizational controls for business continuity. It is a 'must-have' for practitioners who design resilience in systems and helps professionals build a control framework tailored for an enterprise that covers best practices and relevant standards applicable to the enterprise.)

Resetting the Planet after COVID-19: Treating our Wastewater Effectively via DTS Technology

Sangeeta Venkatesh is a Sanitation and Waste Management Consultant. She is currently Lead -Corporate Communications at Ecoparadigm Pvt Ltd. - an environmental engineering company. She had also led the solid waste management group of a citizen initiative, spending hours working with communities as well as Corporate India in formulating guidelines and methods on how to manage their waste.

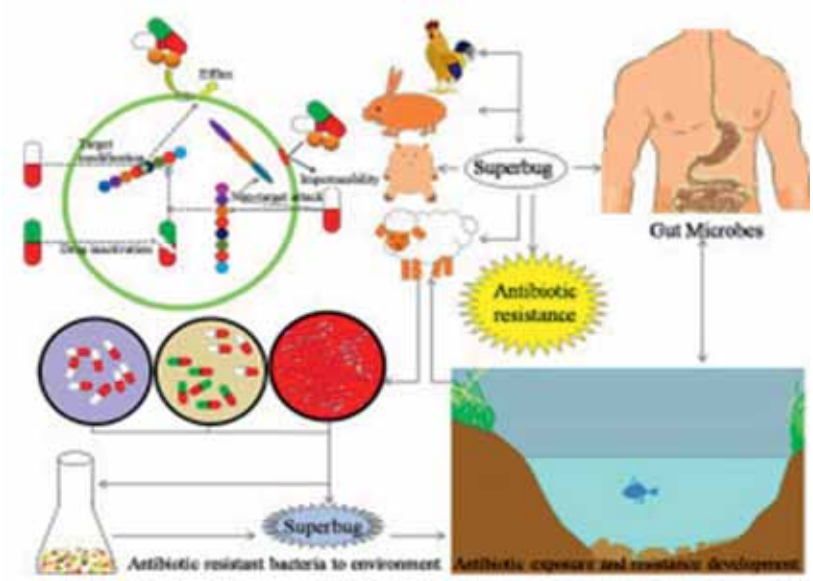
On April 16, researchers from The University of Queensland (UQ) and Australia's National Science Agency - CSIRO announced that they had successfully demonstrated the presence of SARS-CoV2, the virus which leads to the disease COVID-19 in Australian untreated wastewater (sewage). This finding corroborated and confirmed what researchers from the Netherlands and the United States of America had to say. A statement from the Director of UQ's Queensland Alliance for Environmental Health Sciences revealed that samples of wastewater samples were analysed for specific nucleic acid fragments of the virus using RT-PCR analysis, and the presence of SARS-CoV2 in specific wastewater samples was then confirmed using sequencing techniques.

The study inferred to the obvious that people infected with the virus could have shed it through faeces and the same was traced in sewage water. This study indicates that analysing wastewater for SARS-CoV2 could serve as an early warning tool in unaffected areas. But this also means that untreated wastewater can become a source of spread of the disease.

In earlier studies, scientists have found disturbing amounts of antibiotics and antibiotic-resistant bacteria in both freshwater and wastewater in the last decade. In an article in the Horizon magazine (The EU Research and Innovation magazine), Professor Willem van Schaik, of the University of Birmingham is quoted to have said that one way in which antibiotic residues reach the environment is when people excrete them in their faeces and urine. In many poor and developing nations, 80 per cent of the sewage is discharged

Sangeeta Venkatesh

untreated. This also makes its way into city canals whose water is used to irrigate urban farms. Hence, urban farming that is supposed to be a boon can also become a bane. The load in wastewater that comes out of hospital sewerage is



The DTS, currently 0.8 Million litres per day (800000 litres), was safe for reuse for flushing and gardening. The technology does not aeration or mechanical agitation, thus virtually eliminating the generation of bio-aerosols

another potent source of antibiotics and antibiotic-resistant bacteria. Now with SARS-CoV2, we know that leaving wastewater untreated is a huge risk. The current disaster is big enough - can we afford another one? More importantly, do we have a solution to avert another crisis?

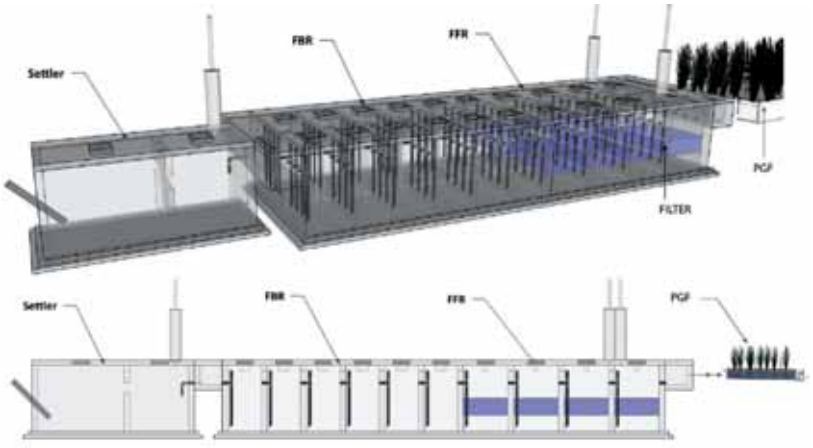
Typically, hospital effluents and domestic sewage are treated in conventional wastewater treatment plants. These plants occupy a large amount of space besides consuming electrical energy and chemicals for their treatment. Aeration is one of the steps in the treatment process. Several researchers, including those from Vienna Institute of Technology and Arizona State University, indicate that the aeration process generates bio-aerosols in the vicinity of the plant, which may carry infectious pathogens and virus. The risks are more pronounced in the case of wastewater from the hospital or quarantined centres. Hence, the STP operators are required to be vigilant and exercise caution during the operation. Use of PPEs especially masks, gloves and goggles are imperative. However, St. Martha's Hospital in the city of Bengaluru is a study in contrast. The 550-bed hospital catering to 250,000 outpatients and 22,000 inpatients per annum implemented a unique Decentralised Wastewater Treatment System, known as DTS in 2009.

The DTS, currently 0.8 Million litres per day (800000 litres), was safe for reuse for flushing and gardening. The technology does not aeration or mechanical agitation, thus virtually eliminating the generation of bio-aerosols. What's more, it has saved the hospital a whopping Rs 2.70 Crore in water savings too. The Patent Pending DTS technology was developed by a Bangalore-based, environmental engineering company called Paradigm Environmental Strategies (P) Ltd or simply called Ecoparadigm.

What is DTS?

The DTS technology is a combination of different wastewater treatment technologies that cascades as separate modules into a full system that achieves the required quality of effluent that can be reused for various purposes.

A DTS is a combination of different wastewater treatment technologies cascaded in modules to a full system, to achieve the required effluent quality for the claimed reuse purpose. The series of fluidized anaerobic bed reactors (FBRs) and fixed film reactors (FFR) makes sure that the treated water



free of antibiotics or pathogen that may cause disease.

The first part of the cascade always consists of three specific anaerobic modules, performing extensive wastewater Stabilisation in terms of organic pollution. Different options of additional modules can be added for further clearing and treating water as per the targeted effluent quality.

Ecological and Economic Advantages: "The technology has both ecological and economic advantages," says Pravinjith KP, Managing Director, Ecoparadigm. Since DTS is an on-site solution (decentralised or semi-centralised), the treated water can be reused locally for different purposes like irrigation, flushing of toilets, cooling and heating, washing, and groundwater recharge. The technology minimises the total water consumption and also additional costs for supply, piping and pumping up into overhead tanks and allowing keeping green areas on the premises. DTS technology works mostly independent from the power supply and daily surveillance, treating the wastewater steadily.

This technology was also used for the rehabilitation and rejuvenation of Kundalahalli Lake in suburban Bengaluru - a project that won the company the National Water Award for the year 2018 under the best Resident Welfare Association (RWA) category. These annual awards have been instituted by the Union Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India, and carry a citation and a memento and a cash prize of Rs Two lakh. The project was selected for adopting an innovative concept to treat sewage to a high degree of purity and permitting clean water to replenish the lake.

Energy Requirement: What is also interesting is the minimal use of energy in the system. The core modules of a DTS use anaerobic processes for stabilisation of the wastewater, which require no process energy. Since the DTS is placed closed to where the wastewater is produced, the flow into the treatment system is driven generally by gravity. The DTS minimises the requirement of process energy for the wastewater treatment; instead, it produces energy in the form of biogas in its anaerobic modules. This biogas can be tapped and used directly for cooking or lighting or converted into electricity via gas-generator. Hence, the energy balance of a DTS is positive and the absence of power does not influence the treatment performance of the system. This, as we see, prevents CO2 emission and saves non-renewable resources too.

“The first part of the cascade always consists of three specific anaerobic modules, performing extensive wastewater Stabilisation in terms of organic pollution”

Construction: To construct a DTS, locally sourced material is generally used which avoids transportation costs. The civil engineering design focuses on the durability and a fuss-free operation for decades. Since the anaerobic core modules require no aeration and desludging of the anaerobic tanks is required only once in two years, maintenance of this system is significantly lower than conventional STPs.

Wastewater – A Resource: What's more, the mineralised sludge can be co-composted with organic material or dewatered for further reuse as fertiliser and soil conditioner in agriculture or garden. The technology drives home the point that wastewater is a resource that contains water, nutrients and some energy. Pravinjith signs off saying, "The DTS technology allows an extensive separation and subsequent reuse of these three components and is, therefore, a technical option for ecological/ sustainable sanitation."

Indeed, when COVID-19 is done and dusted, there is an urgent need to look at the treatment of waste-water as an integral part of the sanitation narrative in the country. ■

Lightning Disaster in Bihar – The Growing Threat and its Mitigation

Col Sanjay Srivastava
Chairman, Climate Resilient Observing Systems Promotion Council Convener, Lightning Resilient India Campaign

It was June 24, 2020. The CROPC team on Weather Basics was analyzing the impending punctual and second wave of monsoon and its impact in Bihar and surroundings. The high-speed intense cloud movement was set to bring heavy rain along with a huge bolt of lightning. A Red Alert was issued by the India Meteorological Department on June 23, 2020, through a special letter. In rural Bihar, when the COVID-19 restrictions had forced the entire workforce to stay indoors, it was an opportunity for villagers to dash to their agriculture fields for their much-loved farming - totally charmed off by the heavy cloud and rains, but unaware of inherent risks of lightning. June 25 came like a hurricane with low-cloud cladding like a carpet from North Bihar to South Bihar. By afternoon, we came to know that lightning had struck and left 13 dead in Gopalganj, five in East Champaran, six in Siwan, and followed by a similar number of deaths in districts down south in Jamui, Nawada, Aurangabad. 21 districts, 97 deaths. June 26 added more to the casualty taking the toll to 113 in two days. The Hon'ble Chief Minister expressed deep shock and ordered ex-gratia payment of Rs 4 lakh as compensation to each victim; to which the Disaster Management Department promptly complied.

The Department through its newly released app "Indravajra" advocated hard and transmitted as many messages and alerts to the people while also reminding them not to ignore the Red Alert by IMD. Other authorities were stunned as their SMS and Doordarshan programmes did not reach the victims. Few pulled up shocks and started running webinars for Mukhiyas. NGOs tried but found themselves in a tight spot due to corona ridden resource crisis and limitations. Overall, few were praising the early warnings and few were talking of awareness. But the poor farmers in agriculture fields and children in mango orchards rejoicing in the rains were hit by the thunderbolts and lightning. The entire strike pattern was well forecasted by IMD Patna and New Delhi and was conveyed to the Government of Bihar. For last-mile connectivity, a state-of-the-art mobile app – Damini - was also made available.

While talking to a villager in Darbhanga, I asked him: "Jha Ji – ki bhelai, atna atna maut bijuria se ki lakhe bhelai?" He replied: "Ki bolbay, Sir. Ahan ke sab patta chhai ki kon badrawa se bijuria girtai aur kaun se nai. Lekin paniya itna badhiya halai ki pura gaon me khete – bagichwa me daud gel chhai." I asked if he has the mobile app - Indravajra. Jha Ji replied: "Saheb, ek dugo tadit chalak lahwawe se thik bhetai."

In Bihar, a sizeable number of deaths are reported due to lightning strikes every 4-5 days; more so during floods. The Chief

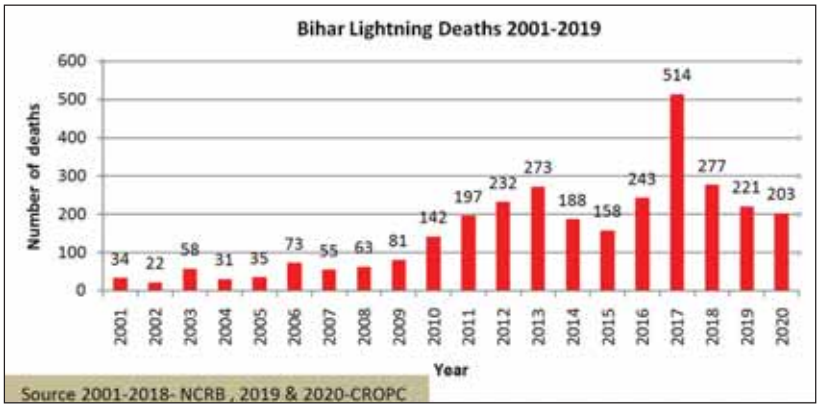


Figure 1: Lightning deaths data from 2001-2020

Minister has been very prompt in expressing his condolences and so are Disaster Management authorities in paying compensation or stressing on the Indravajra app usage. Since April 1, 2020, Bihar has lost more than 200 lives. Lightning deaths have become a routine affair.

Such deaths are nothing new. Since 2015, every year pre-monsoon to early monsoon, deaths due to lightning in Bihar range from 125-150. The figures for the last 20 years indicate a sharp rise due to lightning as evident from the table given below:

Ex-gratia Compensations - There is compensation paid at the rate of Rs 4 lakh per victim as per SDRF norms laid down by the Ministry of Home Affairs, Government of India. The amount paid by the Government of Bihar since 2015 for lightning death is Rs 64.64 crore at an average of more than Rs 12.48 crore (Figure 2). This excludes compensation paid to other losses like animals, poultries, huts and houses catching fire or being damaged due to lightning.

Lightning Resilient India Campaign – A joint initiative of Climate Resilient Observing Systems Promotion Council (CROPC) and IMD, Ministry of Earth Science, carried out a detailed analysis of these deaths. If you closely look at the last 20 years, lightning deaths figures as per the National Crime Records Bureau (NCRB) has seen a sharp increase from 2010 onwards, with a peak of 514 in 2017.

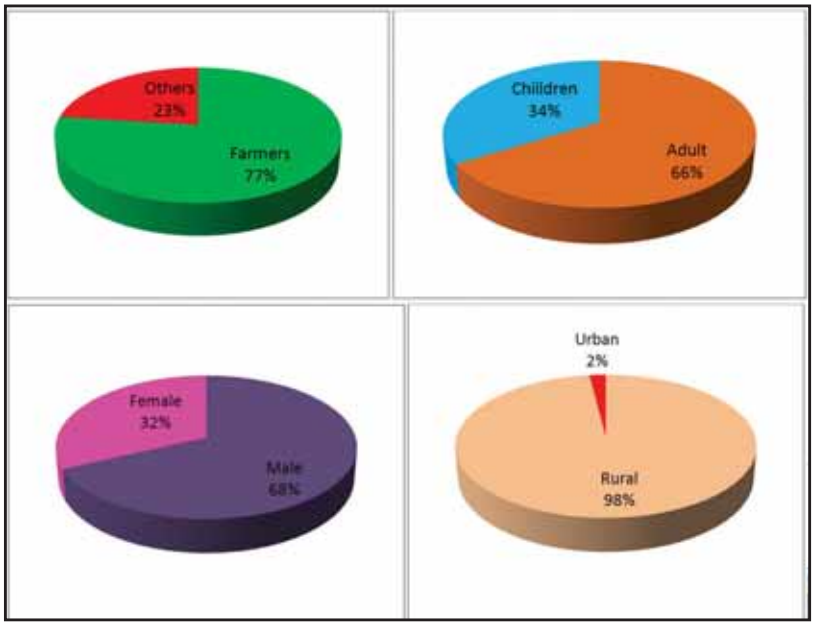


Figure 3: Categories of deaths

Categories of Deaths - It is worth mentioning that majority of these victims are the rural folks - either farmers, cattle grazers, fishermen or children in open fields or hiding under trees; least realizing the inherent risks of lightning. In the analysis of Lightning Resilient India Campaign, victims' categories in Bihar vary differently from the rest of the country. Let us look at these categories:-

Year	No of Deaths	Compensation paid @ 4 lakhs per death	Remarks
2015	158	632	
2016	243	972	Per Year Averages 1. No of deaths – 312 2. Compensation – Rs. 1248 Lakhs
2017	514	2056	
2018	277	1108	
2019	221	884	
2020	203	812	
Total	1616	6464	

Figure 2: Details of ex gratia compensation paid to Lightning victims

Circumstances of lightning victims struck by lightning

The recent fatalities and those of the previous year indicate that during pre-monsoon to initial the monsoon, more farmers are victims as they are in the agriculture field or orchards, or their huts. The later part of the year, in September, a majority die while taking shelter under tall trees on inside their huts. We tried to analyse the overall cause which is depicted below:-

Types of lightning strikes

While analysing, it was observed that lightning fatalities in Bihar are more due to lateral strikes (54%) than direct strikes (34%). A sizeable fatality is also due to indirect strikes - strikes over kutcha huts (12%). Bihar is a plain basin and rich fertile land. The State has vast agriculture fields, especially north of the Ganges. The fertile land is spread over hundreds of acres called Chanvars. They are devoid of trees. The other reason for the decrease in tree cover is due to the division of land; hence land holdings have become small. As a result, trees have been cut en masse to use the fertile land to more

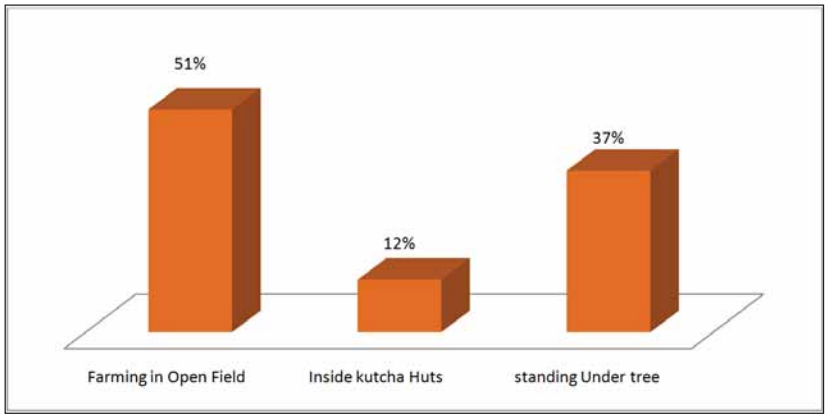


Figure 4: Circumstances of lightning victims during struck by lightning

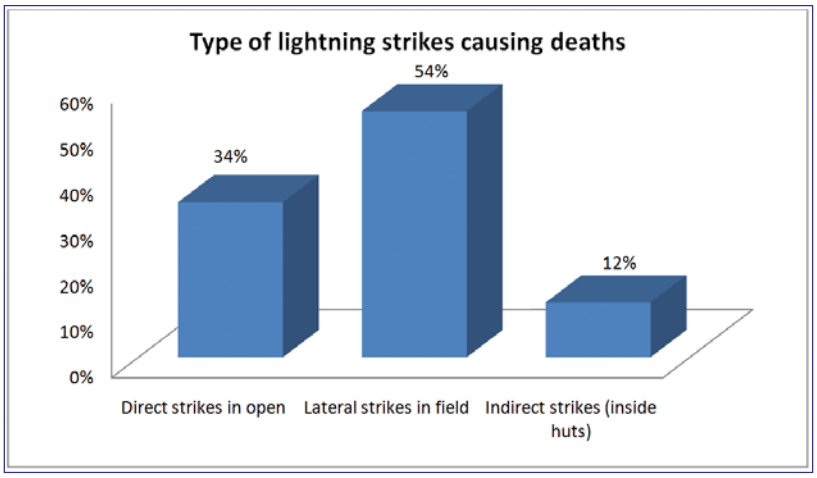


Figure 5 : Type of Lightning strikes causing deaths

yields of crops and vegetables.

Lightning in Bihar - Scientific mapping of its pattern

There may be many reasons assigned to cause the increase of lightning and subsequent fatalities. It is worth analyzing the research-based action undertaken as part of the Lightning Resilient India Campaign 2019-2021 launched on March 26, 2019, jointly by CROPC, IMD and World Vision India. The Annual Lightning Report 2019-2020 reveals that during the year April 1, 2019, to March 31, 2020, Bihar has had more than five lakh lightning strikes, of which 1.71 lakh strikes were a result of convected cloud formation, which in turn, cause lightning which then led to 221 fatalities.

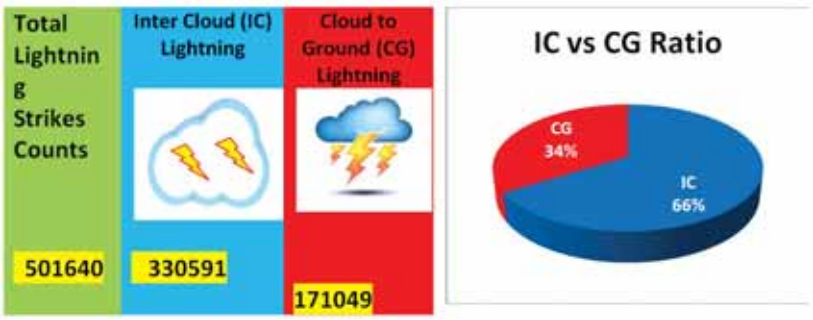


Figure 6: Lightning strikes distribution over Bihar

Lightning strikes count between April 2019 and March 2020

Though lightning strikes throughout the year, it mainly starts in February-March. Kaalbaisakhi in April brings in serious strikes followed by a reduced intensity in May. June-July has very severe strikes and maximum casualty takes place during this timeframe. Though September has the highest strike, there are lesser deaths compared to June-July. This may be because, in June-July, farmers are out in the agriculture field and mango orchards. September being a flood month, a large number of people are confined in their homes.

Cloud-to-ground lightning strikes took place 1,71,049 times during the said period. The entire State is prone to lightning with varying degrees of severity. Minimum lightning flashes of more than 1000 lightning strikes/ 400 square kilometres were mapped. It also reveals that the southern and eastern parts of Bihar are in the severe/extreme lightning-prone zone while the rest of Bihar is in the high lightning-prone zone.

Lightning safety and roads to mitigation

Lightning mitigation has a process and it is designed based on the Lightning Risk Assessment. Exposure risk to lightning needs to be worked out based on lightning flashes received per

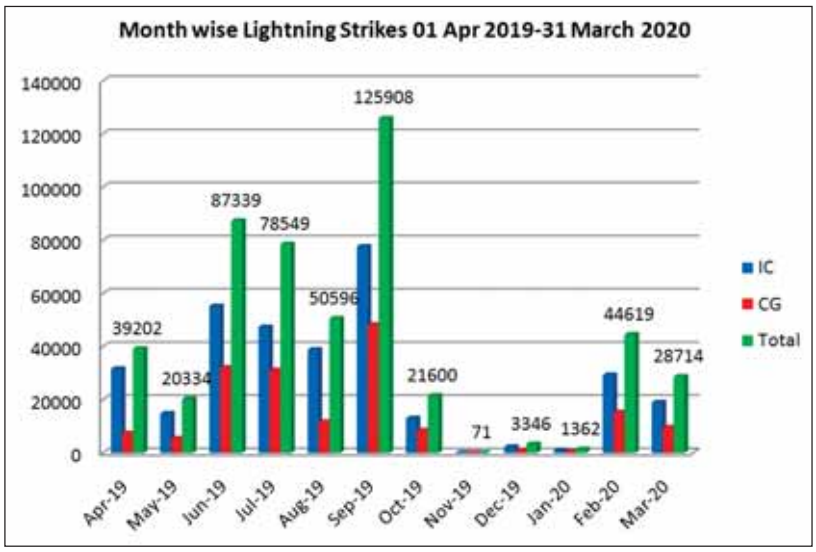


Figure 7: Month wise lightning strikes from 01 April 2019 to 31

square kilometre as elaborated in IS-2309 or IS-62305. Based on the measure of expected exposure risks, the number of lightning flashes, lightning protection has to be designed for high conglomeration areas, community centre, village market, school, colleges, Panchayat Bhawan, and even every single household.

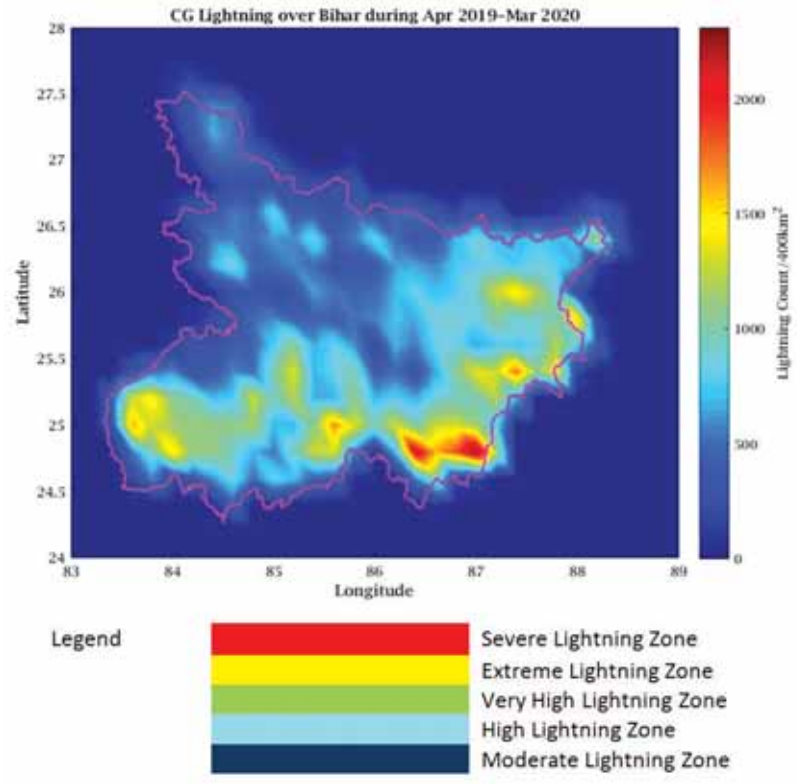


Figure 8: Lightning exposure risk map of Bihar based on lightning strikes 01 Apr 2019 to 31 Mar 2020

CROPC, who is the sole authority, can provide required data to the State/districts and can assist in the mitigation plan. Any mitigation carried out without the measure of exposure risks is like treating a bone fracture without doing an X-ray/ MRI first.

It is recommended that the Government of Bihar undertake microzonation of the lightning map prepared as given in Figure 7 above. It is pertinent to mention that CROPC is the only organization in India who is carrying out such microzonation and measurement of exposure risks.

Mitigation of lightning hazard has many aspects which align with Sendai Frameworks for Disaster Risk Reduction (SFDRR) as mentioned below:

Understanding the risk of lightning: Lightning is a complex scientific problem which needs to be understood by all stakeholders including government functionaries, technocrats, CSOs/ NGOs and the community. A citizen science approach is required for the same. Lightning is a unique hazard where the hazard strikes in the twinkling of an eye, leaving no time for a reaction. The community needs to be trained and reaction to lightning should become second nature. A huge campaign on lightning awareness, education and capacity building is the only answer.

Investing in lightning risk-reduction for resilience: A comprehensive lightning risk-reduction program is needed for Bihar. This should be designed by professional and technically-sound institutions. A Lightning Action Plan as prescribed by the NDMA should be included in this.

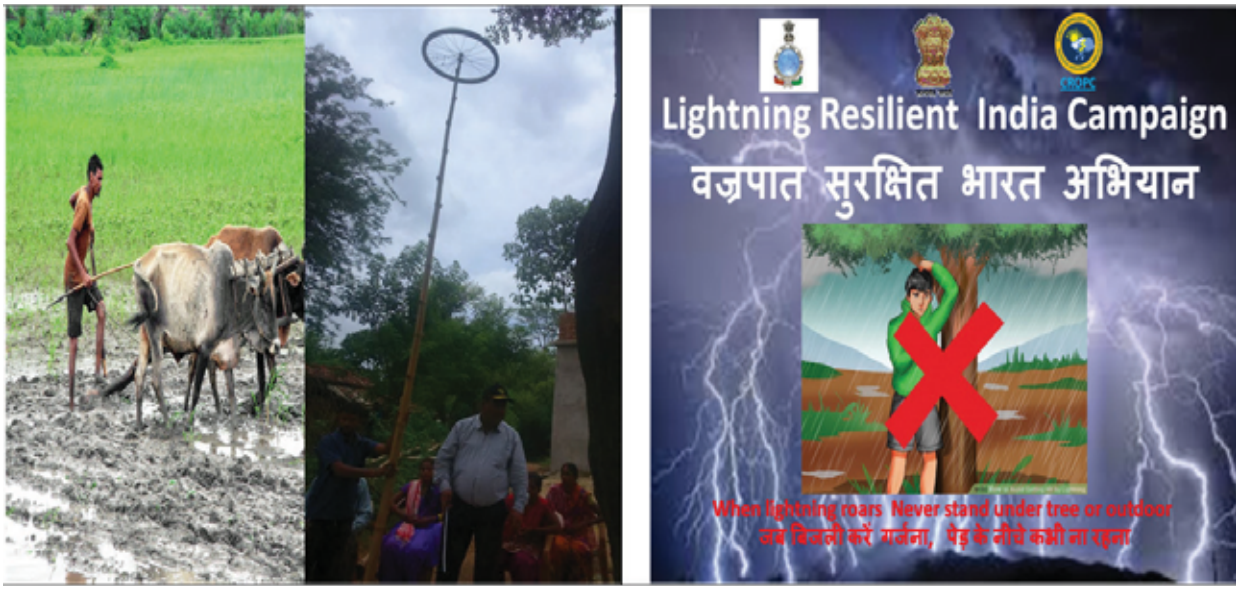


Figure 9: Lightning protection and safety measures

Strengthening lightning risk governance to manage lightning risks: Lightning risk has to be mainstreamed into the governance process to earn institutionalized and lasting dividends. Early warning is the main input in this part. IMD's EW is effective, high-value, actionable and incredible. It must be utilized in lightning risk governance proactively. The impact-based forecasts from IMD should form part of all administrative advisories issued by the State/districts.

Enhance preparedness to lightning through an effective response: A list of measures needs to be prepared.

Lightning protection devices: The culmination of lightning risk management converges finally with the installation of lightning protection devices. The National Building Code (NBC) 2016 adopted by Bihar lays down IEC-63202 based on the lightning conductor, which is a passive device. The Government of Bihar should constitute a Technical Committee and review its State building bye-laws, both for rural and urban areas, and come out with proper guidelines in this regard.

Jharkhand, the neighbouring State of Bihar, is an exemplary example when it comes to creating lightning-safe schools, hospitals, Panchayats, villages and cities. Since 2014, there has been no death at Babadham - the holy city. This is worth emulating by Bihar.

Farmers, school children, cattle grazers and animals are major victims of lightning. However, the affordability of lightning protection devices as per IS-63202 is a major challenge. To overcome this, a similar device based on IS-2309 - the Conventional Lightning Conductor, also called as Franklin Rod, has been designed by CROPC, and a drive has been undertaken to install the same in all agriculture fields. The best part is that it can be made from local materials and it is portable - a farmer can carry it wherever he is physically present - at home or the agriculture field.

Recommendations

Lightning is an avoidable death. It is possible to avoid so using a scientific and community-based approach. The technical knowledge available shall be professionally analyzed in the local context of each village, districts and State. A paradigm shift in approach is the need of the day. There is enough early warning available from IMD, ISRO and CROPC. In this era of technology, when all parameters like lightning strikes, timing, strength, threat, safety, etc., are well-known, it is ironic to lose lives, livestock and livelihood due to it, while at the same time, waste government revenue. The strategy needs to be focused on community-centric mitigation. Instead of spending more than Rs 12.5 crore per year in compensation, there should be measures undertaken to create lightning-resilient infrastructures like safe Panchayats, safe school, safe Kisan Chaupals, safe temples/ mosques to safe agriculture fields.

India Must Act Now to Avert Climate Disaster

Joydeep Gupta
South Asia Director, The Third Pole
Joydeep has been writing on environmental issues ever since he covered the Bhopal Disaster in 1984. For his contributions to environmental journalism, he won the 2012 Green Globe Award at the Delhi Sustainable Development Summit.

The government's first comprehensive study of 'Climate Change: Impacts and Forecasts', paints a grim picture of greenhouse gas emissions it not controlled soon. With industry and transport restarting after the lockdown forced by the COVID-19 pandemic, the best chance for India and the world right now is to control greenhouse gas (GHG) emissions. Failure will mean a country with worse heat waves, droughts, cloudbursts, floods and a more degraded coastline, according to the Indian government's first comprehensive report on current climate change impacts and future scenarios up to the end of the century.

Prepared by experts at the Pune-based Indian Institute of Tropical Meteorology (IITM), the report says that India's average temperature rose by around 0.7 degrees Celsius between 1901 and 2018. It would have risen more if the sky had not been obscured by a pollution haze. But that is no reason to allow the pollution that kills millions every year. Instead, there is every reason to control GHG emissions as well as other pollutions. The report, Assessment of Climate Change over the Indian Region, predicts that unless steps are taken, between 2070 and 2099, the average temperature over India will rise by approximately 4.4 degrees relative to the recent past (1976–2005 average).

This is a scenario caused by high GHG emissions that would increase the heat on the earth's surface by 8.5 watts per square metre. Called RCP8.5, this is the worst-case scenario used by climate modellers worldwide. In a medium GHG emissions scenario, called RCP4.5, the average temperature in India would rise by 2.7 degrees in the last three decades of this century. Even before that, during 2040-2069, the scientists say India's average temperature would rise by 2 degrees in a medium emissions scenario, and by 2.4 degrees in a high emissions scenario.

Despite all countries, including India, making pledges under the 2015 Paris Climate Agreement, current emissions are taking the world to the worst-case scenario, even though other development pathways are not only available but economically more attractive in the medium and long term. The rise in average temperature means the hottest days will be hotter. The report forecasts that by the end of the century, hottest days will be 5.5 degrees hotter in the RCP8.5 scenario, and 4.7 degrees hotter in RCP4.5. "The frequency of summer (April–June) heat waves over India is projected to be three to four times higher by the end of the 21st century under the RCP8.5 scenario, as compared to the 1976–2005 baseline period," it adds.

Hotter Himalayas

The IITM experts have calculated that the Hindu Kush Himalayas (HKH) experienced a temperature rise of about 1.3 degrees between 1951 and 2014. Several areas of HKH have experienced a declining trend in snowfall and also retreat of glaciers in recent decades, though some glaciers in the high-elevation Karakoram Range have escaped this retreat due to more winter snowfall.

Alarmingly, the experts say, "By the end of the 21st century, the annual mean surface temperature over HKH is projected to increase by about 5.2 degrees Celsius under the RCP8.5 scenario." That will accelerate glacier retreat, which means meltwater flows in the rivers of northern India will become more uncertain in non-monsoon months when such water is crucial for millions of people. People living in the Himalayas are already suffering as springs dry up. That trend will also accelerate with the average temperature going up by this extent.

India's average temperature would have risen more in the past century if it were not for high air pollution.

Monsoon Connection

The heating over land is mirrored by the heating over the sea. "Sea surface temperature (SST) of the tropical Indian Ocean has risen by 1 degree Celsius on average during 1951–2015, markedly higher than the global average SST warming of 0.7 degrees Celsius, over the same period," the report says. It forecasts that this trend will continue throughout this century. All this affects the June-September monsoon on which so many Indian farmers depend. Global climate models forecast a rainfall increase, but "the summer monsoon precipitation (June to September) over India has declined by around 6% from 1951 to 2015, with notable decreases over the Indo-Gangetic Plains and the Western Ghats," the report points out. The reason, it says, is air pollution. Not only is it raining less during the rainy season, but the rainfall is also more uneven. The scientists note, "There has been a shift in the recent period toward more frequent dry spells (27% higher during 1981–2011 relative to 1951–1980) and more intense wet spells during the summer monsoon season… Over Central India, the frequency of daily precipitation extremes with rainfall intensities exceeding 150 mm per day increased by about 75% during 1950–2015." The report predicts an increase in this variability. This means a worsening cycle of droughts and floods. The report records this increase in droughts and predicts that there will be even more in the highest emissions scenario.

Land and Sea

The report records that around India, the sea rose by 3.3 mm per year between 1993 and 2017. The scientists forecast that even in an RCP4.5 scenario, by the end of the century, the seas around India will rise by 300 mm from the average level between 1986 and 2005. This means a larger area along the coast will be affected by storms and saltwater intrusion.

Global climate models predict an increase in the frequency of storms due to climate change, but the Indian scientists have found no evidence of it. However, they have found that the strong cyclones are getting stronger, as was the recent case of Cyclone Amphan. Overall, climate change has already made India hotter and drier since the middle of the 20th century, with more droughts, cloudbursts, floods, rising seas, stronger cyclones and a change in the monsoon pattern. And now, "Human-induced climate change is expected to continue apace during the 21st century," the scientists fear. With IITM being a part of India's Ministry of Earth Sciences, which also supervises the India Meteorological Department, the report's immediate recommendation is to have more weather stations across the country.

On a wider scale, the report says, "The rapid changes in India's climate projected by climate models will place increasing stress on the country's natural ecosystems, agricultural output, and freshwater resources, while

Cyclones are becoming stronger, as the destruction brought by Cyclone Amphan demonstrated recently.

also causing escalating damage to infrastructure. These portend serious consequences for the country's biodiversity, food, water and energy security, and public health. In the absence of rapid, informed and far-reaching mitigation and adaptation measures, the impacts of climate change are likely to pose profound challenges to sustaining the country's rapid economic growth, and achieving the Sustainable Development Goals (SDGs) adopted by the UN Member States in 2015." Detailing these impacts in the report's concluding section, the experts say, "It is crucial to make vulnerability assessment central to long-term planning for developing adaptation and mitigation strategies." They list the steps that individuals and policymakers can take to reduce GHG emissions, control climate change impacts and derive other benefits.

Points of Action

The list includes "passive reduction of indoor temperatures, water conservation and rainwater harvesting, groundwater regulation, reversing land degradation, reduction in food and water wastage, waste segregation and recycling, low-impact urban development, expansion of urban green spaces and urban farming, pollution control, increasing the area under irrigation and improving the efficiency of agricultural water use, forest conservation and proactive afforestation, construction of coastal embankments and mangrove restoration, improvement in disaster response, phasing out fossil fuels and transition to renewables, electrification, expansion of walking, bicycling and public transport infrastructure, and carbon taxation."

All these are doable, have been done, and have proved economically viable. What they need is countrywide scaling up, which is dependent on political will.

Responding to the report, Anjal Prakash, Research Director and Adjunct Associate Professor at Bharti Institute of Public Policy, Indian School of Business, and a co-author of various IPCC reports, said, "This is first and foremost a welcome step in inducing science into the policymaking process. I am sure this effort will lead to specific policymaking or informing policy which will help Indian populations affected by the changes in climatic conditions."

Navroz K Dubash of the Centre for Policy Research, also an IPCC co-author, said, "The report makes clear climate change is not an abstract idea; its effects are with us already in India and are expected to accelerate. This report will stimulate an urgent scientific and policy conversation on how India can and should prepare for a climate-disrupted Indian future." ■

DE

DIGITAL EDGE STUDIO

ANIMATION

MOTION GRAPHICS

VISUAL EFFECTS

AD COMMERCIALS

For more details, Contact:
Kolkata - **Anurag Sinha**: +91 9830043339 Mumbai - **Vinay G**: +91 9892601656

A DIVISION OF NEW MEDIA

New Media Communication Private Limited,
1 Akbar Villa, Near Old State Bank Bus Stop,
Marol- Maroshi Road, Marol, Andheri - (East),
Mumbai- 400 059 India
Phone: +91 22 29208888/ 29202999
Telefax: +91 22 2925 5279
www.newmediacomm.com
http://vimeo.com/digitaledgestudio

Frequent Tremors In and Around the NCR

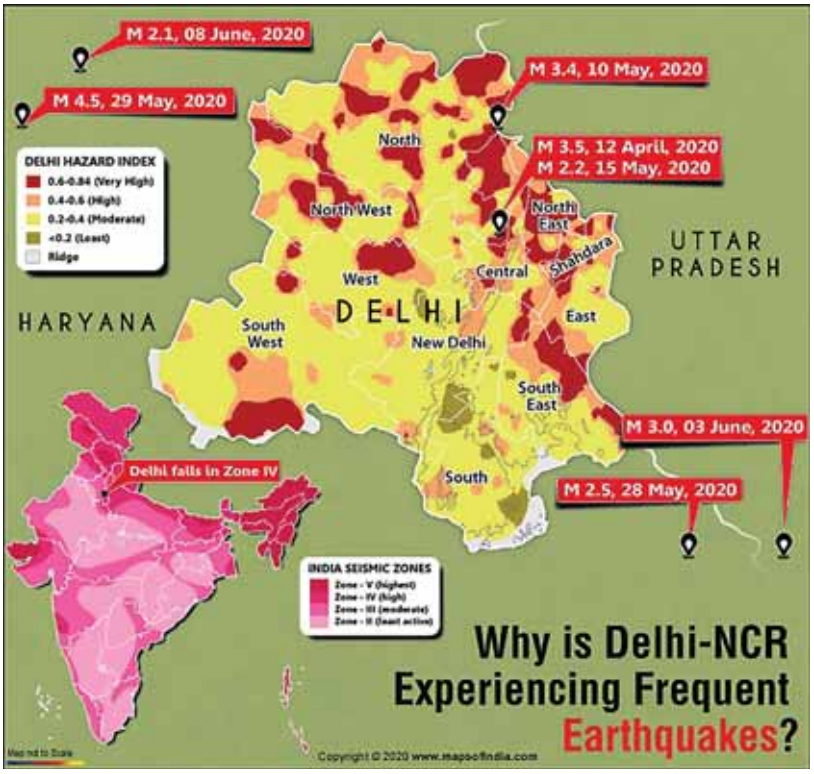
Mukat Lal Sharma
Dean (Finance and Planning), Professor, Department of Earthquake Engineering, Indian Institute of Technology, Roorkee

Since the NCR is made up of different geologies and is surrounded by different strata including the Indo-Gangetic Plains, the Rajasthan fabric of various rock types and ridges joining in its vicinity, it will be interesting to look into the changes in stress patterns and atmospheric weather conditions. The increase in seismicity in and around the NCR region may or may not be considered as a precursory phenomenon due to the absence of advance modelling of this region.

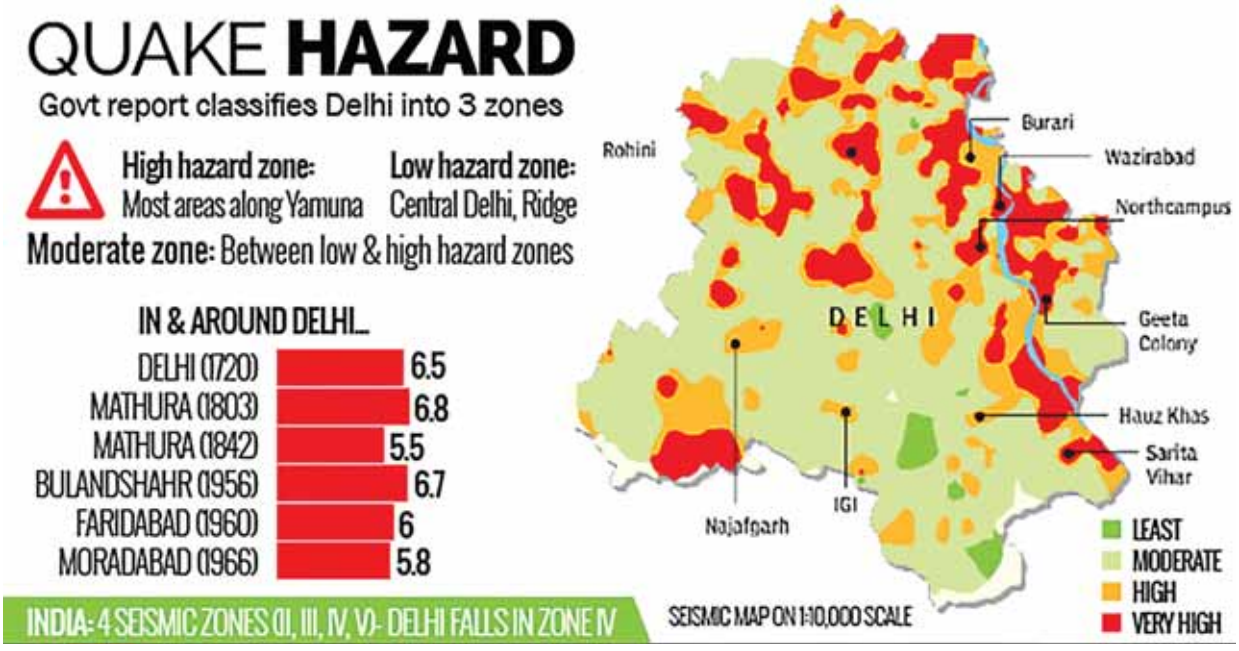
The recent spurt in seismicity around the National Capital Region (NCR) has raised concerns in general from the society and has heightened the sensitivity of the public at large to the looming seismic risk in this densely-populated region. One of the general and foremost queries includes the effect of this spurt on future seismicity with a tag whether this is an ultimatum for any damaging earthquake in this region in the near future. The common notion of people propels us to diligently think of the physical phenomenon giving rise to earthquakes. The information about geological and tectonic setup either has not been dug out or is not available to quantify earthquake risks in the NCR region, which in turn also affect the interpretations given by the scientists. The scientists, in general, tend to downplay the earthquake risk as it seems to be convenient to maintain the status quo. But, science only grows by addressing challenges, by considering alternative views. We are trying to look into the general perception vis-a-vis science as the subject lingers between the general psychology of the layman and requisite engineering solutions. We will further investigate these anomalies, if they are, using some new ideas which are recently being coined for such seismicity which falls beyond the classical theories.

To look into the present-day seismicity, older records need to be investigated. In general, earthquake records of the past are scanty the world over, which is also true for the earthquake occurrences around Delhi. The first records may be considered from ancient literature where Varaha Mihira, who lived in the 5th-6th century, mentioned Northern India as the felt region of severe earthquakes. However, some records were only available after an

earthquake which occurred on 15th July 1720 near Sohna (Haryana), about 60 km of SE of Delhi, having a magnitude 6.5, in which walls of the fortress and many houses in Delhi were destroyed. Another earthquake of a magnitude of 7.0 was reported to have occurred in the Mathura Region in 1803 (Oldham, 1883). The Gurgaon earthquake occurred near Sohna on 27th August 1960, with a magnitude of 6.0. On 28th July 1994, an earthquake with a magnitude of 4 caused minor damage to the minarets of Jama Masjid. On 28th February 2001 and 28th April 2001, Delhi experienced two small earthquakes of magnitudes 4.0 and 3.8, respectively. Delhi and its environs have also been affected by earthquakes from far-field seismic sources in the Himalayas.



Geographically, the region is located on folded crustal ramp represented by basement rocks of Delhi Super Group, bounded by two regional faults viz., Mahendragarh-Dehradun Sub Surface Fault (MDSSF) in the west and the Great Boundary Fault (GBF) in East Delhi. The ramp trending NNE-SSW across the 'fore deep' is juxtaposed to the Himalayan Thrust Belt. In addition to many smaller local faults in this region, one of the important structural elements of the belt is NW-SE trending Delhi-Sargodha Ridge (DSR) which passes through Delhi. It is flanked by basins on either side, viz., the Sahaspur Basin in the north and the Bikaner Basin in the south-west. Most of the earthquakes reported in

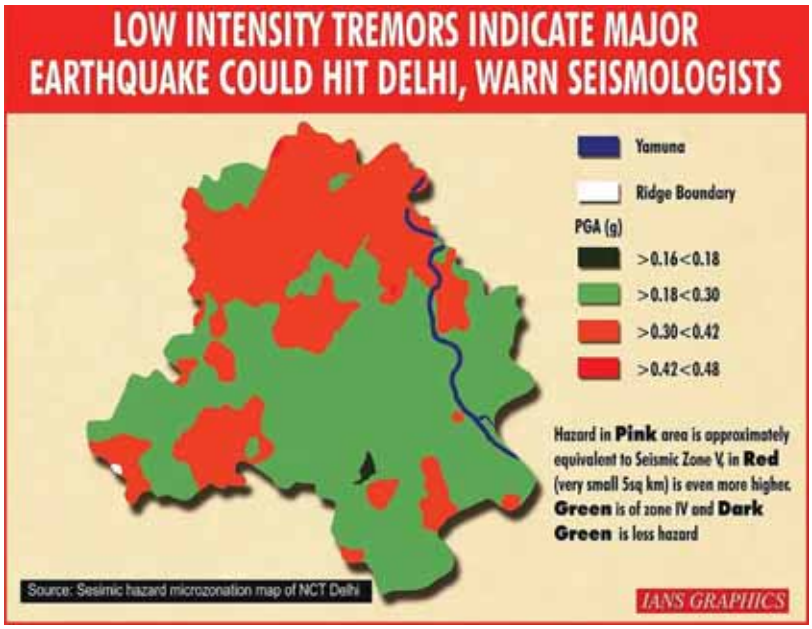


this region may be associated with these features.

Instrumental studies of seismicity around Delhi region could be made possible only after setting up of the Delhi Ridge Observatory in 1960. Besides, the two-component Wood Anderson seismographs were also installed to determine the magnitude of the local earthquakes. To monitor tremor activity that occurred during the period 1963-64, mobile seismic observatories were set up at Rohtak, Sonepat, and Sohna. A broadband seismograph was installed at Delhi Ridge Observatory in December 1999. Now Delhi has a seismological network deployed by the National Center for Seismology. The deployment of the instrument increases the detectability of the earthquakes in terms of lower magnitudes, which means that earthquakes of lower magnitude which took place earlier and were not recorded, are now being recorded by the network and reported.

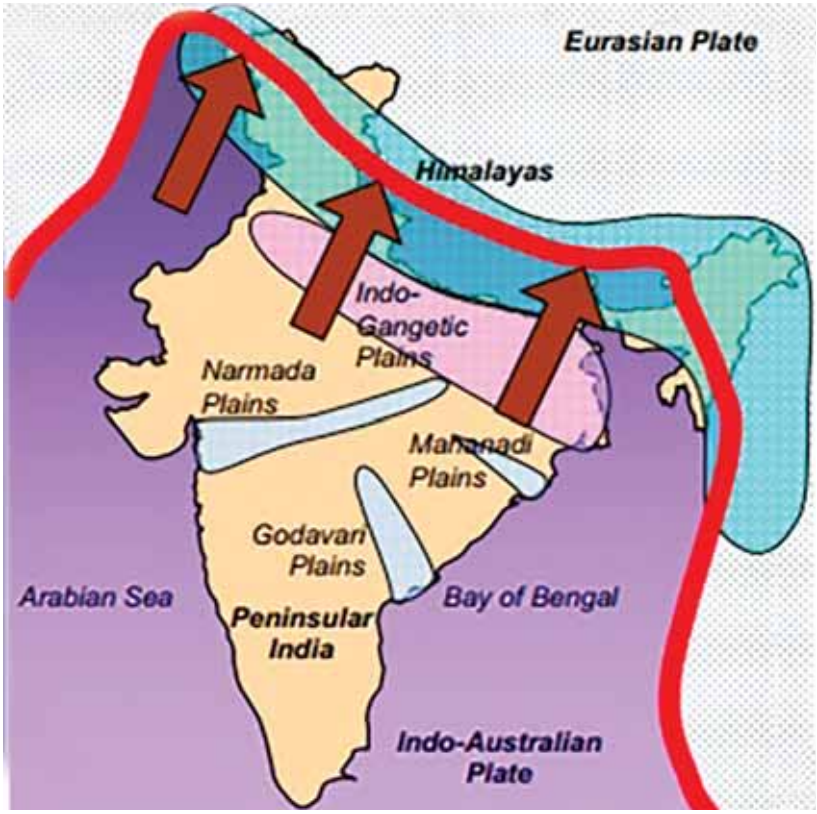
The NCR has felt more than 15 earthquakes in the last two months ranging from magnitude 1.5 to 4.7. It may not be called as an earthquake swarm, since the sources may be considered as independent in this region, which is sometimes considered as a precursory phenomenon. A wealth of information suggests that NCR is sitting over a dynamic system of earthquake occurrence in the Intraplate region. The heterogeneities and crisscrossing of the faults and lineaments make the upper portion weak. This means that it may not be able to sustain very high strains thus resulting in big earthquakes. Therefore, a limit to the magnitude can be easily placed, which may not go above moderate earthquakes, which is also validated by the deterministic and/or probabilistic seismic hazard exercises being carried out from time to time in this region. These exercises are either carried out for the seismic microzonation of the region or to estimate the ground motion for earthquake-resistant design of engineering structures.

Generally, the seismicity is high at the tectonic plate boundaries, but the earthquakes which occur far away from the plate boundaries, i.e., intraplate, are, however, an enigma to seismologists. Although they are responsible for only a small fraction of the world's stress-energy release (about less than 10 per cent), the risk is higher due to the same being in well-developed areas. Continental intraplate earthquakes have been explained basically by reactivation of pre-existing zones of weakness, stress concentration, or both. A new school of thought assumes that seismic activity can be triggered by stress changes of a few kiloPascals (kPa) over periods of tens of seconds, which of course, is not true for bigger earthquakes. Further investigations are required in this direction and it will be of interest to investigate whether kPa-range stress changes over periods of hours-to-days that are associated with changes in barometric pressure can also influence seismicity.



Further extending this, and since we are dealing with almost very shallow microearthquakes, the reactivation may be triggered due to any of the reasons, including tectonic forces in the region, the anthropogenic process like rainfall, hurricanes or atmospheric pressure. And maybe, the climate variability, which is relatively of a lesser return period than the climate change, attributed sometimes, when you get a spurt in seismicity like the one in the NCR. When an earthquake is about to occur, the earth-crust is in a state of unstable equilibrium and any disturbance which exceeds some critical amount may cause the breakdown. Earthquakes can be promoted or inhibited by surprisingly small stress perturbations. The most commonly proposed stress transfer mechanisms include permanent stress redistribution caused by fault slip (i.e., static stress), radiated seismic waves (i.e., dynamic stress) and post-seismic stress redistribution. The slip along the fault occurs only when the acting driving shear stress is more than the shear resistance.

Since the NCR is made up of different geologies and is surrounded by different strata, including the Indo-Gangetic Plains, the Rajasthan fabric of various rock types and ridges joining in its vicinity, it will be interesting to look into the changes in stress patterns and atmospheric weather conditions. The increase in seismicity in and around the NCR region may or may not be considered as a precursory phenomenon due to the absence of an advance modelling of this region. It may be attributed to minor adjustments in the dynamic system of faults in this region. The occurrence of higher magnitude earthquakes in the near future cannot be negated based on the present scenario. The seismicity can be attributed to the classical earthquake occurrence modelling using the Gutenberg-Richter (GR) law or the Poissonian process of earthquake occurrence. But we must also investigate it using newer ideas. Nonetheless, we must use this opportunity to look into the vulnerability of the existing built environment and step towards an earthquake-resilient society in future. It is pertinent to refer to the boldness in using engineering solutions for structures like the Taiwanese 101 Tower and the nuclear power plants built on the Taipei Basin near a mega source of an earthquake like the Chi Chi in Taiwan. .



Invocation of DM Act, 2005 in COVID-19 Management in India

Raman Kumar
An international humanitarian and development professional, Raman has worked with Oxfam International at the Asia region, Care India, Sphere India, and several disaster management authorities in India at the national and state level.

Extraordinary times require extraordinary measures. The biological and health disaster management frameworks in the current DM Act are insufficient. Dedicated legislation must be drawn to handle such nationwide disaster situations where the Centre, State and local authorities have adequate powers and financial backing.

Background

COVID-19 is having an unprecedented impact on all countries, both in terms of promoting the scaling of public health preparedness and response and protection of vulnerable populations, and in terms of requiring mitigation of broader social and economic impacts.

While all countries need to respond to COVID-19, those with existing humanitarian crises are particularly vulnerable and less equipped and able to do so. Humanitarian needs may also occur in other countries as a result of excessive pressure on health systems and the overall delivery of essential services as well as secondary effects on employment, the economy, mobility, the rule of law, protection of human rights, and possible social discontent and unrest.

COVID-19 is threatening humanity, and all of humanity must fight back. Global action and solidarity are crucial. The world is only as strong as the weakest health system.

Globally, as of 2:46 pm CEST, August 9, 2020, there have been 19,462,112 confirmed cases of COVID-19, including 722,285 deaths, reported WHO. After the first confirmed positive case was reported on January 30 in Kerala, the pandemic has reached to 21,53,010 confirmed cases including 43,379 deaths as on the above date.

COVID-19 and its implications in India

Mentioning it as a phase of 'Very Serious Crisis', Prime Minister of India, Mr Narendra Modi called for 'resolve and restraint' to fight the COVID-19 pandemic. During his address to the nation on March 19, 2020, the Prime Minister requested all citizens of India to combat the crisis in a unified manner, given the COVID-19 pandemic is far more devastating than the World Wars!

Despite all positive wills and intentions, some very crucial aspects make it challenging for India to combat the spread of COVID-19:

2.1. Lack of access to the continued supply of water for handwashing: Given the fact that quite a limited percentage of the Indian population has access to running water for handwashing, the preventive action of doing so regularly is a big challenge. The situation is much worse in urban slums and areas populated by the marginalized, poor, Dalit and excluded communities.

2.2. Lack of access to preventive material equipment like soap, sanitizer, etc.: Once the access to finance for meeting the daily needs are getting scarcer for the people, ensuring the supply of materials is another challenge, more specifically for people from the lower-income level.

2.3. Lack of financial support to maintain 'Social Distancing' without compromising basic minimum requirements of living: As already mentioned by the Prime Minister of India, staying home is a very effective strategy for preventing the spread of COVID-19. Given that only 23% of the Indian population is engaged in the organized sector, where 'Working from Home' could be a viable option, the majority

from the business or unorganized sector finds it a deep challenge to manage resources for sustenance. A large chunk of people, mostly the poor, Dalits and other excluded communities, have very limited resources to obtain or enable financial support to follow the preventive practices.

Response from Government of India to prevent the spread of COVID-19

Taking rapid actions to limit travel by suspending visas and quarantining all incoming travellers has helped. All international passengers entering India undergo Universal Health Screening.

The Prime Minister's Office, Group of Ministers, Ministry of Health & Family Welfare (MoHFW) and Cabinet Secretary are closely monitoring the COVID-19 situation. The government has invoked powers under The Epidemic Diseases Act, 1897 to enhance preparedness and containment of the virus. With COVID-19 being declared a notified disaster, the State Disaster Response Fund, constituted under Section 48 (1) (a) of the Disaster Management Act, 2005, is now available with State Governments for response measures.

Invocation of DM Act 2005 in the management of COVID-19

In 2005, the Disaster Management Act (DMA) was enacted by the Parliament. The Act provided for the establishment of a national authority at the Centre and a State authority for each State and UTs for the effective management of disasters. This much-applauded law has so far been used for localised disasters like floods (Uttarkhand 2013), cyclones (Odisha 2019), earthquakes, etc. It is the first time that this law has been pressed into service on a pan India basis. It is also the first time that it has been invoked to address a public health crisis - the pandemic COVID-19.

On 24th March 2020, the National Disaster Management Authority directed all Ministries/ Departments of the Central Govt., State Governments, UT authorities to take measures to ensure social distancing for a period of 21 days. The idea was to prevent the spread of COVID-19. Necessary guidelines were subsequently issued by the DMA – National Executive Committee on 24th March 2020, followed by Addendums, dated 25th March 2020 and 27th March 2020.

These Guidelines (and Addendums) prescribe closure of certain establishments and institutions, places of worship, etc., to avoid crowding and to ensure social distancing. Simultaneously, they seek to ensure unhindered access to essential services like ration shops, pharmacies, health services, banking services, telecommunications, petrol pumps, manufacturing of essential commodities and unhindered supply of food, medical equipment, etc.

First responders / government officials while dealing with suspected patients are not adequately equipped with Personal Protective Kits (PPK), essential to the handling, evacuation and isolation of the infected. Makeshift masks and raincoats cannot be enough. Even getting online curfew passes often requires an invisible hand to push the request through. The failure to contain a mass exodus of migrant labourers, and failure to ensure State borders do not hinder the entry of essential services and supplies, or denial of PPEs for healthcare workers, or congregation of large numbers at religious or other places of congregation, invite criminal prosecution under DMA and other sanctions. Even government officials are liable to be prosecuted for such breaches.

Analysis and observations on the DM Act, 2005 implementation in COVID-19 response management

The unique challenge with COVID-19 is that it does not fit into natural disaster and neither into the category of man-made disasters. The DM Act, 2005 has its limitations as it focuses on the response measures mainly on evacuation, relief and post-disaster analysis. In a traditional disaster such as floods, cyclones, landslides, earthquakes, etc., the National and State Disaster Response Forces (NDRF and SDRF)

play a critical role, whereas, in the current crisis of COVID-19, the public health machinery and the health professionals become the frontiers of response.

The National Disaster Management Plan of 2019 also does not envisage appropriately and does not comprehensively deal with present-day situations arising out of the current pandemic. It does not have mention of measures like lockdown, containment zones, social distancing, etc., in it. The National Disaster Management Plan of 2019's part on 'Biological and Public Health Emergencies' does not mention any of the measures that are being taken today. Therefore, unduly harsh disruptions are being caused in enforcing the same.

The Task Force set up in 2013 identified lapses in ground-level response and implementation. It also highlighted the need for more attention to disaster mitigation. The Task Force also highlighted that the DM Act is not adequate to handle such situations of pandemic proportions. Moreover, the present structure also does not provide a conducive environment for various authorities to perform response and management actions of a pandemic.

It is also to be noted that the COVID-19 crisis is not a usual crisis; it does not fit well in the rapid onset or slow-onset disaster, and its impact and presence are also going to be ongoing for a longer duration.

The provisions of the DM Act, 2005 provides extensive power to the Centre through the NDMA headed by the Prime Minister. Actual implementation and COVID-19 response are done by the States and district authorities, and mostly through the provisions of the Epidemic Disease Act, 1897. States like Kerala enacted the ordinance; Tamil Nadu invoked the Public Health Act, 1939 which shows variability in approaches.

There is also a lack of a grievance mechanism.

Legislation related to COVID-19 in other countries

Countries such as the UK and Singapore have legislated COVID-19-specific laws to address idiosyncratic struggles (Corona Virus Act of 2020, UK Parliament).

Institution of separate funds to take care of the expenditure other than NDRF and SDRF (balanced allocation, since, natural disasters are also becoming a new normal, e.g. super cyclones in the Arabian Sea).

Way forward and recommendations

The situation is often further compounded by local-level conflicts between different departments of the same State which end up hampering relief measures. It is time to set aside political differences and egos to make the disaster management policy work. These internecine differences are the last thing on the minds of citizens who are struggling to cope with the personal and psychological impact of this unprecedented pandemic crisis. At a time when cooperative federalism is essential, our administration and leadership, at every level, cannot, and ought not to fail its citizens.

Extraordinary times require extraordinary measures. The biological and health disaster management frameworks in the current DM Act, 2005 are insufficient. Dedicated legislation must be drawn to handle such nationwide disaster situations where the Centre, State and local authorities have adequate powers and financial backing. A relevant Act will be the need of the hour with greater powers for the local bodies (ULBs and RLBs) to tackle the crisis. Training and capacity building measures are crucial for all stakeholders for their preparedness, and thus, an effective response in future.

There is a need for decentralization of authority to appropriate officers/heads so they can take appropriate actions for the management of pandemics and such situations in future. ■

GFDR
GLOBAL FORUM FOR
DISASTER REDUCTION
Global Vision, Local Action

GLOBAL FORUM FOR DISASTER REDUCTION

Since 2005

A NEW MEDIA Initiative

GFDR Secretariat: 1-Akbar Villa, Near Old State Bank, Marol Maroshi Road, Andheri (E), Mumbai-400 059, India Phone: +91 22 2925 3086, Fax: +91 22 2925 5279.
Email: connect@gfdr.org www.gfdr.org.

towards resilient risk reduction...

WORLD'S 1st FORENSIC SCIENCES UNIVERSITY

GFSU

Gujarat Forensic Sciences University

Knowledge | Wisdom | Fulfilment

NAAC ACCREDITED 'A' GRADE

Education through Investigation

World's first and only university

dedicated to Forensic and Allied Sciences

Established by the Government of Gujarat and recognized by **UGC** with **NAAC Accredited "A" Grade.**

Gujarat Forensic Sciences University (GFSU) provides highly specialised courses in forensic and allied sciences to fill the acute shortage in the country and the world, and to strengthen the criminal justice delivery system, thus helping to make the world a better and safer place.

SPECIAL FEATURES

- Notified by the State Government as **"Centre of Excellence"**
- Notified by the State Government as **"Institute of Strategic or Security Related Interest."**
- **"Centre of Excellence"** for Narcotic Drugs and Psychotropic Substances granted by Ministry of Home Affairs, Government of India
- State of the Art Cyber Defence Centre
- Asia's first Ballistics Research Centre and Testing Range (ISO 9001:2015 Certified)
- International Centre for Humanitarian Forensics
- International Student Exchange Program
- Centrally Air-conditioned ICT-enabled Classrooms, Auditoriums and Rich Resource Centre
- On Campus Hostel Facilities for Girls and Boys with Mess Facilities
- Highly secured campus having Wi-Fi connectivity with CAT 7A Network
- Hi-tech green campus with excellent infrastructure
- Certified under Clause (ii) of Sub Section (1) of Section 35 of Income Tax Act 1961 entitling the donor Institution of 150% rebate in Tax Liabilities for Promoting Research Activities.

Contact

Gujarat Forensic Sciences University, Sector 9, Gandhinagar - 382007, Gujarat, India. Tel: +91 79 2397 7103/102 Email: registrar@gfsu.edu.in Website: www.gfsu.edu.in