

TerraGreen

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Subscriber's copy VOLUME 13 | ISSUE 03 | June 2020

Climate Change, COVID-19 Burden India's Fisherfolk

Sustaining Livelihood in Lockdown

IN CONVERSATION

Dr Puneet Gupta,
CEO, Glensta International

SPECIAL HIGHLIGHTS

Sustaining Distribution Companies
in COVID-19 Slowdown

Destruction of Nature: Is it
Responsible for the Emergence of
Pandemics?

TERRA YOUTH

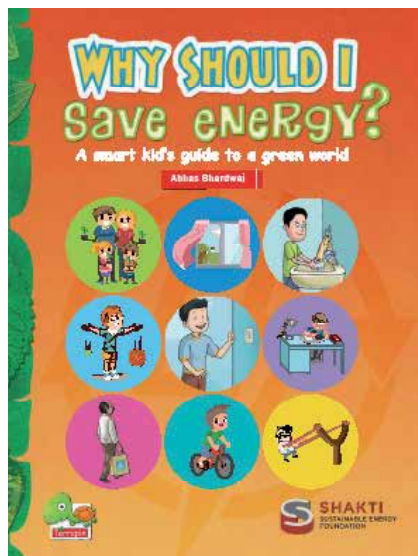
Olive Ridley Turtles



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WHY SHOULD I Save eNErgY?

A smart kid's guide to a green world

Abhas Bhardwaj

- 2020 • 210 x 280 mm • 56 pages
- Hardback • ISBN: 9788179935798
- Genre: Pictorial-Reference • Price: ₹250.00

Ages: 12+ years

Did you know that energy consumption by humans has increased by at least 30,000 times in the last 5000 years? In Delhi alone, there are over 80,000 trucks that run on the city roads every night. They emit un-burnt fossil fuels from their exhausts. Isn't it terrifying that over 1 million seabirds and 100,000 sea mammals are killed by pollution every year?

Why Should I Save Energy? is a comprehensive book that will introduce children to different forms of energy, history of fossil fuels, great scientists and their inventions, and more importantly, to the problems our planet faces with depletion of natural resources. Filled with eye-opening facts, beautiful pictures, multiple activities, and a quiz that helps reinforce learning; this book is the perfect guide to help you become an energy saver.

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About the Author

Abhas Bhardwaj has studied botany and economics. Currently, he works as a market researcher. He has an avid interest in the environment and likes to share his enthusiasm with young minds. In his inimitable style, he likes to approach serious questions with humour.

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**KNOWLEDGE BOOKS ON ENVIRONMENT, WHICH SUPPLEMENT
THE ENVIRONMENT EDUCATION CURRICULUM**

EDITORIAL



“ This month’s cover story looks into the challenges faced by the fishery sector because of the onslaught of cyclones and the COVID-19. ”

As India enters Lockdown 4.0, with new rules, economic packages for the distressed and considerable relaxations in certain zones, there are also fresh challenges staring at us. While the number of COVID-19 cases in India has crossed 1 lakh, experts say, the country will not reach a uniform peak, after all. Amidst the ongoing phases of the nationwide lockdown, the environment has benefitted largely at the cost of global economic slowdown. Ever since the lockdown was imposed by the Central Government, there has been a growing concern over lives and livelihoods in India. One of the sectors that has been hit hard is the fishery sector. Though the sector was eventually exempted from the lockdown restrictions, the COVID-19 scare had already inflicted a daily loss of ₹224 crore.

This month’s cover story ‘Climate Change, COVID-19 Burden India’s Fisherfolk’ looks into the challenges faced by the sector because of the onslaught of cyclones and the COVID-19. In 2019, India faced the brunt of 19 cyclones. This year, cyclone Amphan is predicted to unleash devastating effects on the states of West Bengal and Odisha. With most small-scale fish vendors living a hand-to-mouth existence, the article delves into the multiple issues of losses and recovery for the fishery sector.

The COVID-19 pandemic has also led to marked behavioural changes in professionals. Going forward, many companies are thinking of opting for work-from-home as a permanent arrangement. Twitter was amongst the first to declare that its employees can choose work-from-home as a long-term option. TCS has announced that 75 per cent of its workforce would be working from home by 2025. Remote working may have beneficial impact on air pollution, but it will present yet another challenge for the automobile industry. In this issue’s Green Challenges section, we examine the challenge faced by the automobile industry transition during a period when it is facing slump in demand, due to poor economic growth and the cascading effects of the COVID-19 pandemic across the world, as well as the additional issues in India, due to the recent transition to Bharat VI emission norms.

As per the World Health Organization (WHO), there is no direct evidence between climate change and the coronavirus outbreak. However, it points out that ‘most emerging infectious diseases, and almost all recent pandemics, originate in wildlife’. In this month’s special report, ‘Destruction of Nature: Is it Responsible for the Emergence of Pandemics?’, we try to understand the origin and spread of infectious diseases that cause pandemic and pandemonium. The article discusses a new study by Stanford University, which says that deforestation is to blame for the spread of viruses such as the coronavirus.

Every year, World Environment Day is celebrated on June 5, which aims to instil awareness of environmental concerns and encourage necessary socio-political action. In an era of the COVID-19, let us consider this to be yet another opportunity for us to appreciate and value our relationship with Mother Nature and the web of life we inhabit.

A handwritten signature in black ink, appearing to read 'Ajay Mathur'.

Ajay Mathur
Director General, TERI



What if tomorrow the world ends?
It seemed a cliché question until now.
What if tomorrow, the sun chose to be lazy?
It seemed a kid's childish dream until now.
What if tomorrow the wrath decides to sweep away?
It seemed unreal, unfair until now.
What if tomorrow there would be death before wisdom?
It seemed a philosophical analogy, until now.
What if tomorrow there are true nightmares before dreams?
It seemed fearful, but unnerving now.
What if tomorrow Nature's wrath decided to drown a beloved?
It seemed farsighted, unbelievable until now.
What if tomorrow brings in choke instead of a laugh?
It seemed possible to spend the winters without the flu, until now.
What if tomorrow these blue walls with

hanging photographs are replaced by incessant white, hypnotic ones?
It seemed far-fetched, rare, until now.
What if tomorrow a part of me unknowingly hurts another?
It seemed as impossible as herding cats, until now.
What if tomorrow existence is a 'what if'?
It seemed outlandish until now.
Questions bury me within but the numbers rise overseas,
Fear floods me within, but, there is a drought of saves, mere.
Headlines creep under my skin but over, resides the deadly mine.
Oh little one, shrink not at deviations!
Oh little one, tear not at its accelerations!
I can't promise its destination,
I can't promise if it's here for a revelation,
I can't promise you a forever,
But, I can promise this won't last forever!

Neha Sehgal
Atlanta, USA

I read the online version of the May 2020 issue of *TerraGreen*. The author of the cover story rightly says that the coronavirus pandemic has caused a far-reaching slowing of economic activity across India, as industries scale-back production, employees work from home, and communities enter lockdown. We have already entered the fourth phase of the lockdown in India which is scheduled to last till May 31, 2020. We have seen significant impacts on the Indian energy sector. The author has covered both the short-term implications of the response to COVID-19 on the energy sector, as well as some of the possible longer-term impact.

Anuradha Goyal
Lucknow, UP

Printed by Dr Ajay Mathur on behalf of The Energy and Resources Institute, Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi – 110 003, Editor-in-chief Dr Ajay Mathur

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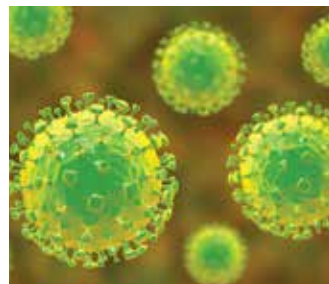
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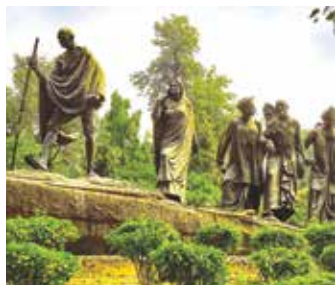
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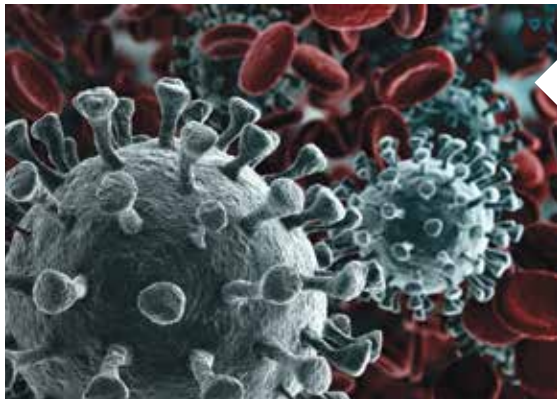


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COVER STORY





Roorkee-based IIT-COER Join Hands, Adopt Five Villages for COVID-19 Prevention

Under aegis of Human Resource Development Ministry's Unnat Bharat Abhiyan, Roorkee-based Indian Institute of Technology (IIT) and College of Engineering (COER) has adopted five villages in Haridwar district for COVID-19 prevention measures and helping needy people. These Roorkee-based engineering institutions have adopted five villages in the first phase wherein these will be made model coronavirus preventive villages. All these villages are being sanitized fully as part of this project. Facemasks, sanitizers, soaps and personal hygiene care tips are being provided to villagers by trained faculty staff members.

Source: <https://www.hindustantimes.com/>

Roof Solar Capacity Growth Falls 7 Per Cent in 2019

India's renewable energy push has come under strain, with a 7 per cent on-year fall in solar rooftop capacity building in 2019, ending an eight-year run of continuous growth in demand. Demand is likely to fall further in 2020 owing to disruptions caused by COVID-19, according to a report by consultancy firm Bridge to India. This is a cause for concern for the government, which has declared renewable power an essential service amid the lockdown to keep up growth. The 'India Solar Rooftop Map Report' says India's rooftop installed capacity stood at 5440 MW on December 31, 2019, adding only 1534 MW in 2019. The agency attributed the decline to uncertainty in the market owing to policy volatility and a weakening economy.

Source: <https://economictimes.indiatimes.com/>



India Saves ₹89,122 Crore in 2018-19 by Energy Efficiency

India saved ₹89,122 crore through energy efficiency in 2018-19 and reduced energy intensity by 20 per cent in the fiscal compared to 2005 level, according to a report. India has set a target to reduce the energy intensity by 33-35 per cent by 2030 compared to 2005 level. 'The energy efficiency initiatives by BEE (Bureau of Energy Efficiency) led to savings worth ₹89,122 crore in 2018-19,' a report released by Power Minister Shri R K Singh on May 6, 2020. While unveiling the e-book, Shri Singh said, 'We have pledged in COP-21 that we will bring down energy intensity of economy by 33-35 per cent compared to 2005 levels by 2030. Now, with our energy-efficiency initiatives we have already reduced the energy intensity of our economy by 20 per cent compared to 2005 levels which is a very good performance indeed.'

Source: <https://www.deccanherald.com/>



Uttarakhand's Rudraprayag Forest Division Launches App to Monitor Forest Fires

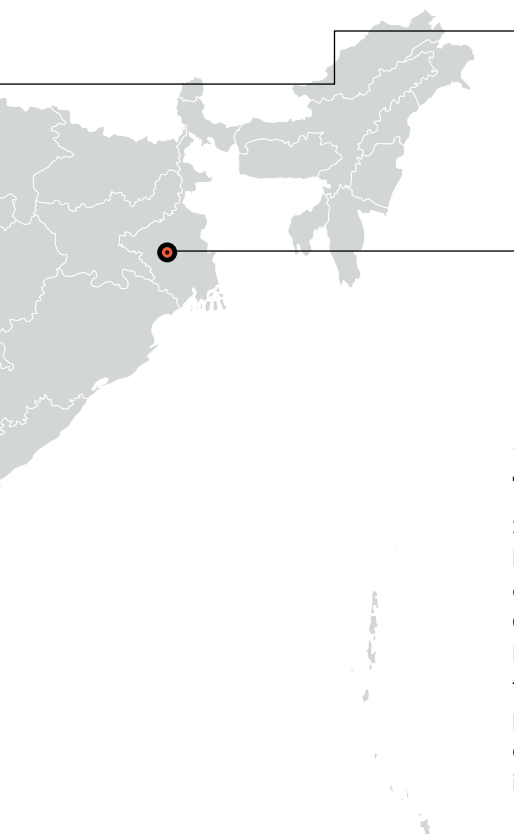
For real-time monitoring of forest fires, the Rudraprayag division, Uttarakhand, has launched a mobile application. Called Forest Fire Rudraprayag, the application will help officials monitor such incidents better with real-time location of active fires on Google Map. Using the application, people can report forest fires through geo-tagged images. 'Our main aim with this application is to reduce the response time. We have mapped our fire crew stations, plantations, van panchayats along with type of forests. As soon as a new fire is detected by Forest Survey of India, we can put the input received from FSI on our system and know the exact location of the fire, whether it is in a pine forest or a plantation or civil forest,' said Vaibhav Singh, Divisional Forest Officer of Rudraprayag division.

Source: <https://www.hindustantimes.com/>

Centre Issues Guidelines for Restarting Industries Post-coronavirus Lockdown

The National Disaster Management Authority (NDMA) under the Union Home Ministry has said that the manufacturing units which will restart after the COVID-19 lockdown ends, should consider the first week as the trial period. 'Due to several weeks of lockdown and the closure of industrial units during the lockdown period, it is possible that some of the operators might not have followed the established SOP. As a result, some of the manufacturing facilities, pipelines, valves, etc., may have residual chemicals, which may pose risk,' the NDMA said in a letter to states. 'While restarting the unit, consider the first week as the trial or test run period; ensure all safety protocols; and not try to achieve high production targets,' it added.

Source: <https://www.hindustantimes.com/>



Scientists Develop Mobile Indoor Disinfection Sprayer to Combat COVID-19

Scientists at CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur, have developed two mobile indoor Disinfection Sprayer units. These units can be used for cleaning and disinfecting pathogenic microorganisms effectively, especially in hospitals. Called Battery Powered Disinfectant Sprayer (BPDS) and Pneumatically Operated Mobile Indoor Disinfection (POMID), these units can be used to clean and disinfect frequently touched surfaces such as tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, sinks, and cardboard boxes. Intermittent usage of these disinfecting units can help minimize the risk of transmitting coronavirus to people who inadvertently come in contact with those surfaces.

Source: <https://pib.gov.in/>



Around 11,000 Deaths Avoided During Lockdown in Europe

Coronavirus lockdowns across Europe have reduced levels of some of the most harmful air pollutants by almost half, resulting in 11,000 fewer deaths from air pollution, according to a new study. The Centre for Research on Energy and Clean Air (CREA) says levels of nitrogen dioxide (NO₂) dropped by 40 per cent in April 2020 and particulate matter in the atmosphere was reduced by 10 per cent during the same period. The absence of traffic has been a major factor, but so too has a sharp drop in demand for electricity, which has led to many coal-fired power stations being taken offline. In total, coal burning to generate electricity dropped by 37 per cent. Oil consumption declined by almost a third.

Source: <https://www.weforum.org/>



Vitamin D Levels Appear to Play Role in COVID-19 Mortality Rates

After studying global data from the novel coronavirus (COVID-19) pandemic, researchers have discovered a strong correlation between severe vitamin D deficiency and mortality rates. Led by Northwestern University, the research team conducted a statistical analysis of data from hospitals and clinics across China, France, Germany, Italy, Iran, South Korea, Spain, Switzerland, the United Kingdom, and the United States. The researchers noted that patients from countries with high COVID-19 mortality rates, such as Italy, Spain, and the UK, had lower levels of vitamin D compared to patients in countries that were not as severely affected. This does not mean that everyone—especially those without a known deficiency—needs to start hoarding supplements, the researchers caution.

Source: <https://www.sciencedaily.com/>



NASA's ICESat-2 Measures Arctic Ocean's Sea Ice Thickness

Arctic sea ice helps keep Earth cool, as its bright surface reflects the Sun's energy back into space. Each year scientists use multiple satellites and data sets to track how much of the Arctic Ocean is covered in sea ice, but its thickness is harder to gauge. Initial results from NASA's new Ice Cloud and land Elevation Satellite-2 (ICESat-2) suggest that the sea ice has thinned by as much as 20 per cent since the end of the first ICESat mission (2003-2009), contrary to existing studies that find sea ice thickness has remained relatively constant in the last decade.

Source: <https://www.sciencedaily.com/>





Global Airlines Body IATA Backs Face Masks for Safe Flying

The body representing global airlines came out in favour of passengers wearing masks onboard, as debate intensifies over how to get airlines flying while respecting social-distancing rules following the coronavirus crisis. The International Air Transport Association (IATA) has said that wearing masks would help protect passenger health but came out against leaving middle seats empty on aircraft, a measure it had previously said was likely. European flights have all but come to a standstill during the coronavirus pandemic. While there is no visibility on when travel restrictions will ease, airlines are considering how to safely restart services and give passengers confidence to fly.

Source: <https://economictimes.indiatimes.com/>



Fatal Combinations of Humidity and Heat Are Emerging Across the Globe

Some scientists have projected that later in the century, in parts of the tropics and subtropics, warming climate could cause combined heat and humidity to reach levels rarely if ever experienced before by humans. Such conditions would ravage economies, and possibly even surpass the physiological limits of human survival. According to a new study, such conditions are already appearing. The study identifies thousands of previously rare or unprecedented bouts of extreme heat and humidity in Asia, Africa, Australia, South America and North America, including in the US Gulf Coast region.

Source: <https://www.sciencedaily.com/>

Prolonged PPE Usage Can Cause Skin Injuries, Warns Study

Prolonged personal protective equipment (PPE) use can lead to serious skin injuries, a study covering 161 hospitals treating COVID-19 patients in China has found, and said that preventive measures be institutionalized for doctors and nurses at the forefront of the battle against the contagion. The study, to be published in the journal *Advances in Wound Care*, looked at 4308 health care respondents from across 28 provinces in China and found that 42.8 per cent had some form of skin injury related to PPE. The most common forms were device-related pressure injuries, moisture-associated skin damage, and skin tears, and they were sometimes found at multiple parts of the same health care worker's body.

Source: <https://www.hindustantimes.com/>



COVID-19 and Transport

Impact and Suggestions

In this article, **Sharif Qamar** says that in the post-COVID world there should be more focus on moderating travel demand, non-motorized transport, public transport, shared mobility, and railways. He discusses the potential impact and suggestions in this regard. He feels the travel demand management measures such as work-from-home, staggered working hours and encouraging online shopping should become a part of the 'new normal'. Also, increased focus should be there on bus and bus systems, especially in non-metropolitan cities of India.

The total number of people affected by the coronavirus and the number of deaths is increasing rapidly and would unfortunately continue in the coming days and months, till a reliable cure is discovered. The virus, which is too small to be seen using an optical microscope, has brought the world to its knee—quite literally.

Transportation has been worst affected as economies have been under lockdown. This also means that people are not going to their offices, factories, and other places of work. During a 'normal' period, that is, pre-COVID19, transportation was the second largest contributor to global emissions, after the electricity sector. It accounted for about 24 per cent of total global CO₂ emissions in 2018.¹ During the ongoing pandemic, the adverse impact of transportation on air quality has drastically come down. Indian cities, which are known to appear in the list of most polluted cities in the world, have been witnessing considerably improved air quality during the lockdown period.



Opportunity in Crisis

There is no doubt about the devastation that COVID19 virus has brought upon the entire human race. There is a new thought emerging about people adapting to the 'new normal', who also wish for cleaner breathable air under the blue sky. The nature of 'new-normal' is dependent on factors like: How long will the current crisis last? Overall drop in activities? How much recovery

would happen and what would be the path? Will this help people shift to environmentally-conscious options? And, other such questions.

Transport sector is one of the most vulnerable sectors affecting all of us. Here are some of the areas and measures that are recommended to improve the way Indians travel. Also, some of these measures are encouraged even during normal times and not only during the ongoing crisis.

¹ <https://www.iea.org/reports/tracking-transport-2019>

Moderating Travel Demand

The concept of sustainable mobility is largely based on the ASIF framework, where A stands for 'Avoid', S for 'Shift', I for 'Improve', and F for 'Finance'. The notion of 'avoid' is often left out in the planning process and more focus is allocated towards the supply of infrastructure—building more roads and flyovers, widening the existing roads, etc. One of the first reactions to increasing congestion is to widen the roads or build flyovers or grade separators, which once built get occupied by additional vehicles on road.

The current time warrants that the government and corporates begin to consider the demand side of mobility and implement measures to reduce movement of both—private vehicles as well as people. The travel demand management measures such as work-from-home, staggered working hours and encouraging online shopping should become a part of the 'new normal'. The larger and long-term solution to reduced travel demand would be through urban planning to harmonize commercial and residential spaces so as to reduce distances people travel to go to their work or markets.

Some of the additional measures that could be considered are:

- Encouraging and incentivizing car-pooling, public transport, and cycling
- Mandating certain number of e-meetings or virtual conferences organized by corporates as well as government agencies in a year
- Parking-related restrictions to push organizations to go for rationalizing people's presence in offices or commercial spaces
- Incentive to people, like higher allowance, for relocating close to offices

The high point of these solutions is that these are cost-effective measures and those implementing such policies would incur almost no cost.

Pedalling Along

Another topic, which falls under the ambit of second alphabet of ASIF, is to encourage cycling and pedestrianization of mobility demand. It would also be factually correct to say that these measures have been pressed by many quarters in the past. So, what is new to the argument of promoting non-motorized transport. The experience of some of the European countries—the Netherlands' capital Amsterdam in particular that went on to become cycle capital of the world—which responded to some of the crisis in the past to shift its focus towards cycling. During the current period of unparalleled crisis, there are already cases of cities, case in point – Bogota, Colombia which are augmenting their infrastructure (temporary and permanent) for safe cycling in and around the city.

The benefits of cycling are multi-fold and have been covered in detail in a report published by TERI in March 2019.² The benefits are related to improved health and air quality, economic savings, gender equality, employment opportunity, and so on. In India, a number of 'cycle mayors' are already diligently working at the city level to improve the acceptance and share of cycling in the total mobility demand. It is anticipated that the demand for second hand two-wheelers and cars would increase in post-

² <https://www.teriin.org/sites/default/files/2019-01/Benefits%20of%20Cycling%20in%20India%20-%20Report.pdf>

lockdown period, however, the most affordable mode are cycles and the city governments should take this as an opportunity and work towards creation of cycle and pedestrian infrastructure, which of course would require resources—funding as well as expertise.

Some of the measures that could be considered include:

- Create awareness around the benefits of cycling in the era of physical distancing
- Building temporary infrastructure to catalyse immediate transition
- Encouraging cycling to work by the corporates and creating adequate supporting services in the offices
- Promoting bike-sharing initiatives through lucrative assistance from local governments

Again, these measures are cost-effective and would require fraction of what is invested in widening of roads or building flyovers and elevated corridors.

Bus-based City Transport

In a post-COVID world, increased focus should be there on bus and bus systems, especially in non-metropolitan cities of India. The focus should now shift from building swanky metro systems in cities, where demand would never meet the 'forecasted ridership', to a bus-based transport system. The state government should reject the pull to build investment-heavy low-utilization systems, which could end up as a burden



on their exchequer.

The situation of city transport could be gauged by the fact that majority of the Indian cities do not have formal bus service for its people. According to a study conducted by the Shakti Sustainable Energy Foundation, of the 458 Indian cities of more than 100,000 citizens only 63 cities have formal city bus system.³ Of the 63 cities, only 15 have an organized bus or rail-based transit system.

Coming to the current situation, it is critical that cities have an adequate plan in place when the lockdown is relaxed and people reach the bus stops.

Some of the key immediate and long-term initiatives to be considered are:

- The states and cities should have their plan in place to monitor and cover the health of its employees, especially drivers and conductors (provision of health insurance by employer)
- Engage experts to design bus-based transit plans for cities
- State governments should continue with their effort to procure electric buses and in no way postpone it
- Demarcating lanes for operation of buses
- Immediately after the lockdown, government could consider allowing private operators to operate in the cities to fill in the supply-demand gap under social distancing guidelines

Shared Mobility

In a scenario where a large proportion of Indian cities do not have an adequate and efficient mass transit system—particularly bus-based, majority of Indian population depend on shared mobility. According to the NITI Aayog, shared mobility is classified as any mode of transportation that is shared by users on an as-needed basis. These fall under two large categories: (i) sharing of transportation resources or vehicles, and

(ii) sharing of transportation services.⁴

These include a long list of mobility options from sharing one's car/bike with acquaintances, to using autos/e-rickshaws, to driving a car provided by a private company, to hailing a taxi.

Due to the ongoing pandemic, shared mobility, including those involved in micro mobility providing first/last-mile connectivity services, have been badly affected. It would include people driving taxis, auto and e-rickshaws, and rickshaw pullers. These are the people who are largely dependent on the system for their daily income to sustain themselves, and lack proper coverage for times of crisis. In the organized sector, the impact has been drastic with a number of start-ups offering shared mobility services on the verge of permanent closure.

Role of shared mobility and app-based service providers:

- Issuance of health-related guidelines for drivers and users of shared mobility, which should include restriction on the number of passengers using the vehicle
- Provision of health insurance by employer/government
- Tariff-related guidelines while incorporating the lost earning opportunity on restricted ridership
- Provision of partition in ride-sharing vehicle, wherever possible, at least till the time a cure is discovered
- Social security solutions for the drivers

⁴ <https://www.teriin.org/article/clearing-haze-shared-mobility>



and single owner/operators

Role of Rail

The demand for rail-based travel is expected to come down drastically, as people would cut down their travel plans and restrict themselves in respective cities. In future, railways would continue to be the preferred mode of transport by the masses for their long-distance travel. Thousands of people are currently stuck away from their homes and are mostly relying on railways to start services. Even during the lockdown special trains such as Shramik Express were operated to ease the concerns of people, most migrant workers. It becomes imperative for the railways to device strategies to regulate passenger (i) booking, (ii) entry and boarding, (iii) on-board facilities, and (iv) de-boarding and exit/transit to other modes.

Already, a number of measures have been proactively taken by the Indian Railways and would continue to take in the times to come. The measures would range from withdrawal of blankets from air-conditioned coaches to changing the seat alignment in rail coaches.

Conclusion

The current pandemic situation is unparalleled, uncharted, and unprecedented. It has definitely changed how we live, work, travel, and interact with people. It is also important that we close the loop on actions related to people safety and security, provision of affordable mobility options without compromising on congestion, and emissions and environment. The immediate action point is to assess vulnerabilities, threats and opportunities and make our plan to ensure that we adapt to the 'new normal'. ■

Sharif Qamar, Associate Fellow and Area Convenor, Centre for Sustainable Mobility, TERI, New Delhi.

³ <https://shaktifoundation.in/improving-city-bus-systems-india/>

Highlights of Our Green Journey in 2019–20



Sustaining Distribution Companies in COVID-19 Slowdown

In a pandemic-stricken world, one of the most hard-hit sectors in India has been the power sector. In this article, **Ashish Kumar Sharma**, **Chetan Gusain** and **Ashish Rawat** highlight the many challenges that DISCOMs and GENCOs are facing in terms of significant changes in electricity consumption pattern, demands of consumers, cross-subsidy losses, and the overall economic health of the power infrastructure. The authors also discuss some pertinent measures that can be adopted by industrial and commercial consumers to ensure a sustainably operational sector during this lockdown period.

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India, along with other countries, is facing an unprecedented challenge with the nationwide pandemic, resulting in spillover adversities in all major sectors such as automobile, infrastructure, IT, power, health care, and so on. Though the government has enforced a lockdown as a strategy to curtail the rate of increasing number of COVID-19 positive cases, this comes at the cost of economic development. The lockdown has affected several sectors and has, specifically, led to changes in electricity consumption pattern, which has a direct impact on operations in the power sector. Over the years, the distribution companies (DISCOMs) have been signing power purchase agreements (PPAs) with generating companies (GENCOs) based on their estimated demand, which has impacted their financial health too. If the demand goes beyond than what is planned, then DISCOMs might have to buy power from exchange, and, in case of less demand (current scenario being a case in point), DISCOMs will have to pay fixed charges to GENCOs, regardless of any consideration.

According to Power System Operation Corporation Limited (POSOCO) (refer to Figure 1), India's daily energy consumption has declined by 26–27 per cent since the beginning of the nationwide lockdown, due to temporary suspension of all non-essential manufacturing units and commercial

services. This has resulted in revenue loss and under recovery of cross-subsidy surcharges. Cross-subsidy losses to a DISCOM depend on the consumer mix. Industrial and commercial consumers are not the only ones who are causing revenue losses to DISCOMs through reduced demand but collection efficiency has also come down for remaining consumers, since physical delivery of electricity bills has been put on hold, thanks to the rising summer load in order to stabilize the falling demand. After March 29, the demand has started rising again. The price discovered on the Indian Energy Exchange (IEX) platform during the lockdown period has averaged around ₹2.40 per unit, with supply bids at the exchange far outstripping the demand. The reduction in demand due to the lockdown is reflected through the volumes traded on the electricity market and the clearing price.

Consumption has become more uniform with the load curve flattening considerably. Reduction in the consumption pattern for a Delhi-based DISCOM can be seen in Figure 2. The recorded demand after the lockdown is the average of the daily demand at a time interval of 15 minutes (till April 17, 2020) and the demand before the lockdown represents demand of a typical day. This cumulates to a reduction in 10 per cent of energy consumption.

The total reduction in energy consumption leads to direct revenue

loss, which can be estimated based on the Average Cost of Supply (ACoS). Other consumers contributing to this loss are the Delhi Metro Rail Corporation (DMRC), railway tractions, airports, and so on. Moreover, predicting the demand has become a comparatively difficult exercise due to the unavailability of data on consumption pattern in such an unprecedented scenario.

A brief assessment of the current status of the operations for various categories of consumers for DISCOMs based out of Delhi, Uttar Pradesh (UP), and Maharashtra is presented in Figures 3, 4, and 5, respectively. It can be observed that operations of all cross-subsidizing categories are either temporarily suspended or not fully operational. Delhi has the highest number of residential consumers. It is a state where a high-consuming resident is paying the cross-subsidy for



a less-consuming resident. However, collection efficiency has also reduced because many consumers continue to rely on physical delivery of bills and cash payments. A Maharashtra-based DISCOM has reported 37 per cent of sales from industrial consumers while a UP-based DISCOM has been heavily dependent on industrial and commercial load to supply domestic and agricultural consumers.

Due to the shutdown, consumers are unable to pay their dues to the DISCOMs, and this has severely affected the liquidity position of the DISCOMs, thereby

impairing their ability to pay to the generating and transmission companies. With an outstanding amount of more than ₹82,602 crore being reported at an all-India level as of March 2020, the power-generating companies are suffering massive delays in payments by DISCOMs. There have been interventions from respective regulatory commissions (refer to Table 1) to help consumers and DISCOMs overcome such a precarious situation.

In view of the increasing number of coronavirus-positive cases and the

ensuing ambiguity that exists with the prevailing lockdown, it is important to take adequate steps to provide essential support to DISCOMs through regulatory interventions. These interventions must be made considering that the slowdown in electricity consumption due to lockdown might continue in a phased manner for the next couple of months. Electricity is a basic and essential need and its proper operations are must for adequate functioning of other essential sectors as well.

Table 1: Status of power distribution sector during lockdown

State	Difficulties faced by DISCOM	Steps taken by DISCOM	View of Regulatory Commission
Maharashtra	1. Total daily demand has fallen by 20 per cent due to which there has been an explicit revenue loss to the DISCOM. 2. Meter readings and physical bill distribution work have been suspended.	1. Shutting down of thermal generators due to constraints of technical minimum; purchase of cheaper power from energy exchanges to maintain load demand and financial viability. 2. Planned to issue bills on average usage basis (provisional bills). 3. Updated to alternative payment modes, i.e., digital payment modes.	1. Maharashtra State Electricity Distribution Co. Ltd (MSEDCL) has approved average tariff reduction of 7 per cent for FY 2020–21 and almost flat tariff for most of the categories, and further reduced tariff for industry for remaining four years of Multi-Year Control Period, i.e., up to FY 2024–25. 2. In the latest tariff schedule for 2021, Maharashtra Electricity Regulatory Commission (MERC) approved an average tariff reduction of 10–15 per cent for commercial and industrial (C&I) sector in the state. 3. The Commission has also introduced bulk power supply discounts at the rate of 2 per cent to 1 per cent on energy charge including FAC (fuel adjustment charges). 5. The regulator has also introduced a concept of incremental consumption rebate of ₹0.75/kVAh to further reduce the effective tariff. 6. MSEDCL has reduced the tariff to 5 per cent for residential consumers.
Delhi	1. Overall revenue collections of DISCOMs have been adversely affected.	1. There will be no surcharge on late payment of electricity bills during the period starting from March 24, 2020 till June 30, 2020, until two weeks over and above their scheduled due date.	1. Delayed payment made by the Delhi Distribution Licensees to Delhi GENCOs, namely Pragati Power Corporation Ltd (PPCL), Indraprastha Power Generation Co. Ltd (IPGCL), and Delhi Transco Limited beyond 60 days from the date of the presentation of the bills falling between March 24, 2020 and June 30, 2020, the concerned DISCOM shall make the payment with LPSC (late payment surcharge) at the reduced rate of 12 per cent p.a., which translates to 1 per cent p.m.

Contd...

Delhi	- Under preventive lockdown, Delhi DISCOMs have suspended physical meter readings and physical distribution of electricity bills. - Also, it is a tedious task for DISCOMs to proportionately manage high percentage of RE share (must run) with considerable decrease in demand.	- Consumers will get a rebate of 0.5 per cent to 1 per cent in the electricity bill amount or ₹150–200 (whichever is lower) by the due date, respectively. - Additional rebate of ₹20 per bill shall be provided to the consumers if they furnish the meter reading on their own.	
Uttar Pradesh	Revenue loss with substantial reduction in the accounts receivables.	- Waived fixed charges on power for C&I consumers. - Launched an SMS service for urban consumers to get their electricity bills on time.	- Reducing supply hours to tube wells must be accompanied by tariff reduction. - The issues will be taken up by the UP Electricity Regulatory, which is currently receiving petitions before announcing a fresh power tariff order, probably by the first week of September.

The following interventions could provide temporarily relief to DISCOMs in such an unforeseen situation:

1. COVID-19 is an ‘act of god’ and hence should be considered force majeure: A moratorium for payment of the full fixed cost in the two-part tariff of the long-term PPAs for thermal plants could be given. If, say, the demand is lowered by 40 per cent, the DISCOM should pay 40 per cent less of the fixed cost in the PPAs. With this dispensation, DISCOMs should have no additional difficulty in paying their dues to GENCOs. The fixed cost is for debt repayment and return on equity for the GENCOs. If, for this period of crisis, GENCOs do not get return on equity, this should be fine for them. For debt payment, they already have a moratorium. After the crisis, if there are any extra costs on account of delayed payment of debt, the regulators can give the necessary relief. With such an arrangement in place, DISCOMs should find no financial difficulty

Figure 1: All India Demand (POSOCO) and Market Clearing Price (IEX)

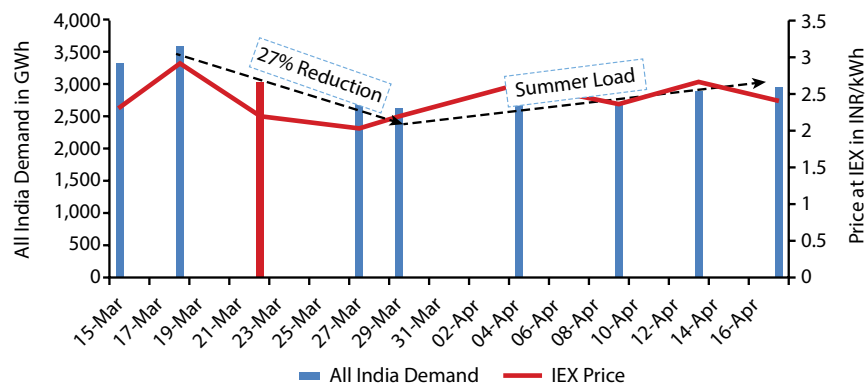
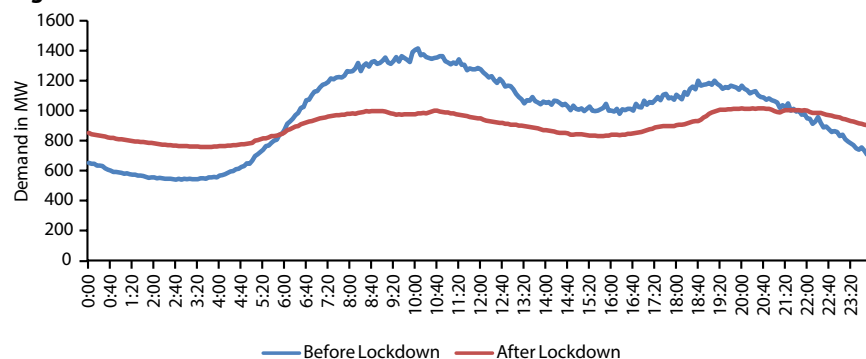


Figure 2: Demand after and before lockdown for a Delhi-based DISCOM



in maintaining the must-run status of renewables. Consequently, there should be no need for any relief package or infusion of additional liquidity for the power sector to cope in the aftermath of the COVID-19. Accordingly, the government must issue a policy directive to the Central Electricity Regulatory Commission (CERC) and the respective state governments.

2. As a short-term strategy, there should be some incentives for the consumers to pay their bills early, produce meter readings on their own, and promote cashless transactions through various online payment modes. Additionally, a penalty must be levied on those consumers who get delayed in their payment based on the proportion of their average consumption in the last six months. This would help in imposing a higher penalty on those consumers with higher consumption and lesser penalty for those with considerably lesser consumption. Those consuming less than 200 units per month should be waived from the penalty on late payments. This will not only ensure that the poor is not unnecessarily pressurized to make payments in these tough times but will also maintain the accounts receivables of DISCOMs.

3. The role of financing entities such as Power Finance Corporation (PFC) and Rural Electrification Corporation (REC) Limited becomes critical in such trying times. These institutions can provide financial assistance in the form of soft loans to either directly to DISCOMs or to generators or to both in an appropriate proportion. This will provide temporary relief and keep the ball rolling at times of liquidity crisis by increasing and maintaining the accounts receivables.

4. As a long-term strategy, the government should emphasize on Automated Metering Infrastructure (AMI) significance

and its implementation to improve collection efficiency, avoid human errors, and promote transparency. Automaton in billing, recording, and collection would ensure the maintenance of accounts receivables

to a large extent. This will further act as a preventive measure to overcome such unprecedented situations. ■

Figure 3: Report of total sales share across categories for a Delhi-based DISCOM

Consumer Category	Share in total Sales	ABR/ACOS	Status
Advertisements & hoardings	0.02%	156.54%	Not fully operational
Non-domestic	26.87%	153.31%	Not fully operational
Industrial	4.28%	134.04%	Not fully operational
DIAL	1.70%	109.99%	Temporarily Suspended
Public Lighting	1.31%	100.28%	Operational
Delhi Jal Board	1.94%	100.28%	Operational
Railway Traction	0.19%	100.28%	Temporarily Suspended
DMRC	2.83%	100.28%	Temporarily Suspended
Domestic	59.24%	74.12%	Operational
Charging Stations	0.03%	69.20%	Operational
Agriculture	0.16%	44.73%	Operational

Figure 4: Report of total sales share across categories for a Maharashtra-based DISCOM

Consumer Category	Share in total Sales	ABR/ACOS	Status
Commercial	6.92%	195.58%	Not fully operational
Public Services	1.38%	160.91%	Not fully operational
Railways & Metro traction	0.06%	122.79%	Temporarily Suspended
LT-Industries	6.43%	118.92%	Not fully operational
HT-Industries	29.51%	116.30%	Temporarily Suspended
Residential	18.76%	99.72%	Operational
Street Lighting	1.86%	90.88%	Operational
Agriculture	32.20%	58.98%	Operational
Public Water Works	2.22%	57.60%	Not fully operational

Figure 5: Report of total sales share across categories for a UP-based DISCOM

Consumer Category	Share in total Sales	ABR/ACOS	Status
Railways & Metro traction	1.72%	179.58%	Temporarily Suspended
Lift Irrigation	0.90%	171.68%	Operational
Non-Industrial Bulk Loads	2.88%	156.63%	Not fully operational
Non-domestic	6.23%	156.04%	Not fully operational
Institutions	1.55%	154.84%	Not fully operational
Public Lamps	0.80%	151.12%	Operational
Public Water Works	1.94%	147.69%	Not fully operational
Small and Medium Power	3.30%	138.75%	Not fully operational
Temporary Supply	0.00%	131.30%	Not fully operational
Departmental Employees	0.82%	116.54%	Operational
Large and Heavy Power	14.74%	110.28%	Temporarily Suspended
Domestic	42.09%	88.67%	Operational
Private Tube-wells	23.02%	37.26%	Operational

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Waterless Technologies

Key to Water Security

Dr Puneet Gupta, CEO, Clensta International, in a tell-all interview with Namrata Gulati Sapra for *TerraGreen* sheds some light on how a range of waterless hygiene products are saving bucketloads of water...



What inspired the idea to start making waterless hygiene products?

The idea of scrubbing one's hair clean with shampoos that work up a rich lather and rubbing expensive soaps on one's body that leave it sparkling and glowing is one that few can resist. Though luxurious baths end up making one feel satisfied and happy, the truth is, the use of shampoos and soaps for long hours contributes immensely to water wastage. Having recognized this as a challenge, Clensta International introduced a range of waterless hygiene products that are doing great service to the environment and also the military personnel in a hostile environment.

While working closely with the defence personnel, I got the opportunity to understand the problems faced by them. The challenge of not bathing for days in places with extreme weather conditions such as Siachin, Kargil or Drass motivated me towards coming up with an alternative solution for them.

After extensive discussions with experts, I realized that, directly or indirectly, the availability of water or

the living conditions of an individual are primary reasons for lack of access to something as basic as personal hygiene. This motivated me towards developing waterless technology products, leading to the establishment of my organization called Clensta International.

As a responsible organization, we are committed to producing environment-friendly products that do not require water. Our products cater to varied sectors such as defense, health care, homecare, travel, and space. Innovation is our core philosophy and enthusiastic response from customers motivates us to take a leap even further. Our mantra of 'clean instantly' is driven by our aim to create products that promote complete and instant personal hygiene without the use of water.

How much water is saved using these hygiene products as opposed to the products that consume water?

As per the World Health Organization, by 2025, half of the world's population will be living in water-stressed areas. In the least developed countries, 22 per cent

of health care facilities lack access to water whereas 21 per cent do not have proper sanitation facilities. The scarcity of water is the root of many socio-economic and environmental problems. The waterless technology is the way forward to solving the problem of sanitation as well as the scarcity of water. Furthermore, waterless technologies in sanitation systems can reduce the need for open defecation, besides conserving water. Their water-saving factor and low-maintenance cost make it a viable solution in a country like ours where a substantial number of people lack access to toilets. Thus, the waterless technology has the potential to transform the sanitation as well as the health care systems.

We currently offer three products: waterless body bath—a comprehensive bathing solution for healthy hygiene maintenance without the use of water; waterless shampoo—an easy application to remove dirt, dust, oil and greasiness from hair without the use of water; and we recently launched another product—Clensta Instant Hand Hygiene Solution that offers instant 99.9 per cent germ protection with antimicrobial and antiseptic properties. The product is easy to use by applying directly on your palm, back of hands, fingertips, nail grooves for 30 seconds to cover the sides thoroughly and rub until dry. It is an easy, one-stop solution that can be used to protect from 100 illness-causing germs.

Most beauty and hygiene products contain chemicals such as parabens and sodium lauryl sulphate (SLS) that are known for degrading the quality of aquatic organisms. How does Clensta stand out from such products that dominate the market and are high in consumer demand?

Dynamic changes in water availability and the problem of maintaining hygiene in water-scarce areas require effective solutions available on the go. Our innovative waterless technology comprises an easy spray formulation for



complete body cleansing without the use of water to rinse off. Our products are dermatologically tested, free from parabens, SLS and gluten—proving it a safe-to-use formulation. The formulation of our products ensures a delicate yet effective cleansing process, maintaining the moisture of the skin. The patent formulation has many benefits such as dirt, grease and odour removal, minimizing wet sheets and nurses' uniforms, maintaining the pH level of the skin, reducing washing times and ancillary costs and so on.

Clensta's Waterless Body Bath and Shampoo saves nearly 350 litres of water on each bottle. So far, Clensta has managed to save more than 25 crore litres of water with its overall sale of the products. This is in line with our commitment to promoting sustainability while ensuring adherence to the highest standards of hygiene. Also, it aligns with the Sustainable Development Goal (SDG 6) to ensure the availability and sustainable management of water and sanitation for all.

How much of such products are sold on a monthly basis and who is the target audience? How did the market first respond to such unique, unconventional products?

We cater to an array of clients for whom maintaining personal hygiene is a concern due to various circumstances. Our products have proven to be beneficial for people who face an issue of

maintaining personal hygiene instantly, due to restricted movement and in extreme conditions where there is the unavailability of water. For instance, soldiers who are unable to take a bath for many days due to the extreme conditions in which they live can now take a bath in the bunkers, thus protecting themselves from any illness. Our products are also useful for people who are bed-ridden and for whom mobility is a key concern.

Clensta International has modernized the personal hygiene segment by providing hygienic solutions for consumers in all sectors. Our major clientele includes hospitals & OTC, adventure enthusiasts, railway networks, hotels, defence personnel, home health care, and space. Our products are already being sold on Government E-Marketplace (GeM) and are being supplied to various government and private institutions. To cater to the increased demand, we have a well-connected and robust distribution network that works towards making our products available to various market segments that we cater to. Our products are priced within a range that people would be willing to pay for, making them widely accessible as well as affordable.

The products are being supplied to both government and private hospitals and defence; including the Army, Navy, private and government hospitals in India, such as the All India Institute of Medical Sciences (AIIMS), Ram Manohar Lohia Hospital, Seth Sukhlal Karnani Memorial Hospital, CK Birla, and

many more. We are enthused by the overwhelming response to our products which motivates us to innovate further and diversify our offerings. We have also been commended by the Hon'ble President of India, Shri Ram Nath Kovind, which boosted the morale of the entire team.

Do you think in the future, waterless products could lead the way in the hygiene market?

Waterless technologies are not only the solution to solving India's sanitation issue, but they are also key to water security. These waterless technologies have a promising future as they have the potential to revolutionize water usage especially, in the health care sector, with the use of innovation and scaling up of infrastructure.

The key challenge is to build the customers' trust and usher a behavioural change towards these products. Since our substantial customers are in defence and health care sectors, ensuring the quality and effectiveness of these products is also our major responsibility.

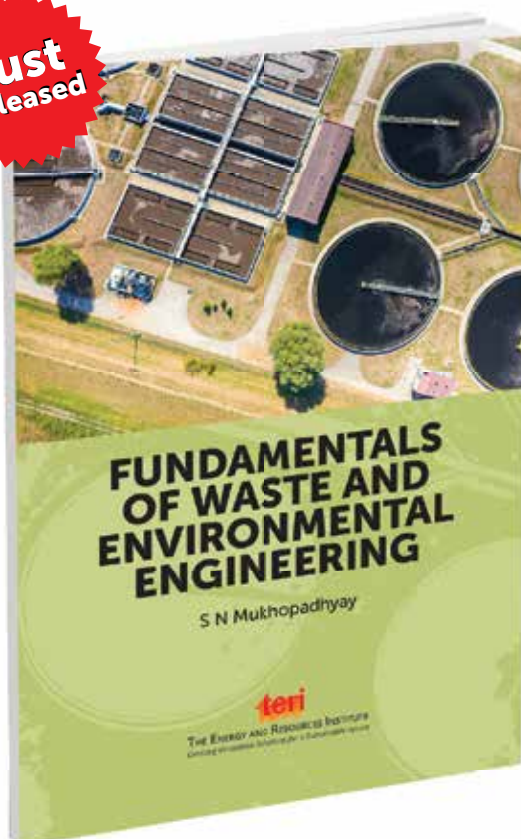
How important is to apply the principle of sustainability in the corporate sector? How can such a climate be encouraged?

Sustainability has, of late, become a new dimension for corporates worldwide. Corporates should come forward to foster a culture that promotes sustainability, ethical practices to make the planet greener for future generations. Bolstered by enabling policy reforms, the evolution of cutting-edge technologies and innovation, these waterless problems are a way forward to a greener future. Also, there is no dearth of talent and fresh perspectives that will help businesses in these segments to evolve and grow continuously. We, at Clensta International, are poised to disrupt the personal hygiene space through our cutting-edge, eco-friendly technological advancements. ■



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Climate Change, COVID-19 Burden India's Fisherfolk

Sustaining Livelihood in Lockdown



Last year, India's fishing community faced the brunt of cyclones. Most of the cyclones after 1974 happened in 2019. The community was still reeling under the losses from the previous year when COVID-19 hit hard. With the enforcement of social distancing, officials of fisheries departments began mulling how such restrictions could be put in place for the fishing harbour, landing centres, and auction houses. Though fisheries have been exempted from the lockdown rules, there are other looming concerns. With the export sector looking fuzzy, and the warehouses packed, where and how will the fisherfolk sell their catch? In this article, **Sharada Balasubramanian** shares valuable insights.





India faced almost nine cyclonic storms in 2019, the highest on record since 1974. While the fishing community was still grappling with the previous year's losses, COVID-19 emerged, denting their incomes further. The number of fishing days was reduced drastically due to both climate change risks and the COVID-19 scare.

India's vast coastline of 7500 km is a source of livelihood for almost 16 million people—the beneficiaries not just include the fisherfolk but also the populace of ice breakers, fish vendors, vehicle owners carrying fish, and boat owners among others. Pradip Chatterjee, President, National Platform for Small Scale Fish Workers (NPSSF), says, 'In West Bengal alone, if you take all categories of fish workers, fishers, fish farmers, fish vendors, there are about 3 million people. Marine fishers are smaller (communities) in West Bengal as the coastline is very short. There are 0.2–0.3 million (fishers) in the marine fisheries.'

Due to cyclones, last year, the number of months the fisherfolk spent on the sea had reduced considerably. With five months of time lost due to cyclones, and now because of the lockdown, their woes have only multiplied.

Impact of Climate Change

There is no doubt that climate change has been affecting the marine and inland fisheries. Additionally, environmental challenges such as ocean acidification, coral bleaching, and altered river flows also impact the fisherfolk.

According to the paper titled, 'The Impact of Climate Change on Marine and Inland Fisheries and Aquaculture in India', it was estimated that ecosystem services of the



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east coast of India will reduce by 25 per cent in 25 years, resulting in a cumulative loss of \$17 billion. Moreover, there is a need for an immediate action plan to ensure sustainability in both marine and inland fisheries. Our climate is affected by tropical monsoons. Strong northeast winds blow from October until February, and southwest winds prevail from May until October. When the monsoon winds change, cyclones strike the coasts, especially the Bay of Bengal.

Changes in the important oceanic weather systems such as sea surface temperature, salinity, precipitation, sea level, frequency, and intensity of cyclones and droughts are now more evident due to climate change. And these have adverse implications for the fishing community. The 2019 North Indian Ocean cyclones season proved most severe. In January 2019, India faced Cyclone Pabuk followed by Cyclone Fani, Vayu, Hikaa, Kyarr, Maha, Bulbul, and Pawan all through the year, putting the livelihoods of many fish workers at stake across the country.

In Veraval, Gujarat, fish workers have been asking the state fisheries department for compensation since August as they could not fish due to cyclones last year. As these cyclones occurred more on the sea than on land, the fish workers would often have to return from the sea midway, empty-handed. Tulsi Bhai Gohel, President of a boat owners association in Veraval, recounts, 'We spent almost ₹300,000 to hire a boat, people, spend for fuel, all of that added to the losses.'

Also, with a rise in fishing, there is more pressure on the marine resources too. Consequently, there are more livelihood challenges for fish workers as they find only a handful or no fish in the sea due to increased overfishing. Polluted seas, rivers, destructive fishing methods, commercial boats and nets have detrimental effects on our environment. Additionally, there is

more livelihood pressure on the poor fisherfolk. Chatterjee avers, 'With the polluted rivers in West Bengal, Hilsa fish does not even prefer to enter the river.'

S Velvizhi, a scientist from MS Swaminathan Research Foundation (MSSRF) says, 'Fishermen are not able to catch fish they caught earlier. For example, oil sardine, which was earlier found in Malabar Coast is now found in Tamil Nadu. According to reports, 60 per cent of the Indian Ocean has oil sardines. The larger question is: How did they come there? Scientists say, due to a rise in temperature, the population of sardines grows. Similarly, in squid fishery, we were not getting much squids earlier, but now, their population has increased.' She adds, 'If we look at mackerel fish, they are surface fish. Fishermen carry surface gill nets to capture those fish. Now, due to temperature variation, these fish have gone from surface water to mid water. If fishermen fish using surface gill nets, they cannot catch these fish. They will come back and say, there was no catch. Therefore, the fishermen have been pushed to adapt and change their fishing technique.' Such a change of technique in catching fish is a point of major concern.

Increased industrial fishing has also reduced the stock of marine resources. Consequently, small-scale fish workers have to bear the brunt. They do not have



the required resources such as trawlers for deep-sea fishing. And when these large trawlers go into the sea, the small-scale fish workers are left with an inadequate catch. 'Fishermen can predict the wind pattern and decide which net to carry for fishing, accordingly. Now, they are unable to predict the changing wind conditions. All this is affecting their livelihood. Fishermen, as a whole (community) get affected, but the most affected are the poor fishermen,' points out Velvizhi.

MSSRF trained the fish workers and sensitized them on various aspects to keep the sea and shore clean, practise habits that prevent them from using plastic, and refrain from exploiting the marine resources. For instance, MSSRF offers training on how the fish workers should not carry small plastic packets to the sea. Instead, they should carry large 20-litre cans. And they should not throw any trash into the sea. This kind of sensitization and awareness can go a long way in protecting our marine wealth along with the species dependent on the seas and oceans for their survival.

Lockdown Woes

Now, with the lockdown, the fishing days have been further reduced. Gohel says, 'When the boat goes, there are so many people whose livelihood depends on that. Eight to ten families depend on this after the boat returns from fishing. People work with fish suppliers. There are commercial vehicles, rickshaws on which all

those families are also dependent. The fish catch goes to the company and the processing plant where hundreds of people work to process and dry fish.'

In Tamil Nadu, after the lockdown, fish workers said that when they returned with a large catch, they found themselves on a deserted harbour with policemen cordoning off the area. They had no knowledge about the lockdown and its rules. They had to look for alternative ways to sell the fish they had brought with them. Some export houses bought and stocked them in their warehouses, but later, these warehouses would get full, and the fish workers would be told off. Also, the fish were procured at a price that was not profitable to the fish workers. Alas, was there really a choice for them?

In Tharavaikulam, in the Tuticorin district of Tamil Nadu, long queues of vehicles helped in transporting the produce to Kerala—the largest consumer of the fish catch. In the initial phase of the lockdown in April 2020, inter-state transportation was shut, and as a result, the fish workers were stranded. The deep-sea fisherfolk, who had returned with their catch were in dire need of a viable solution.

After being pressurized by the National Fishworkers' Forum (NFF), NPSSFW, and other such fisheries groups, the government lifted the restrictions on the inter-state transport of fish produce. The move came as a respite for the distressed fish workers. However, there were some apprehensions too. Bhaskar, a trader and exporter from Tharavaikulam recounts, 'They let the vehicles in but the Tamil Nadu police restricted us, as they





feared we might get the disease from there.' Then, they exercised caution. Bhaskar adds, 'In Kerala, they sprayed disinfectant on the vehicles before letting us in and out. They also advised the drivers to wear masks and wash their hands regularly.'

The government officials and the police are regulating the people. Bhaskar says, 'They make people follow social distancing in fish stalls like they do in vegetable shops and other meat shops. Officials have allotted a particular time for fish stalls. Within that time limit, these fish stalls must sell their stock, and after that, no one is allowed to open their shops.'

Immediately after the lockdown was announced in West Bengal, the NPSSF group immediately developed an advisory on what kind of precautions should be taken in fish landing centres, fishing harbour, auction centres, wholesale markets or regional markets, and also during the transportation of fish. Chatterjee explains, 'We developed that because we thought it was our duty to protect our community. And then we approached the government. The government came up with an advisory later. We have been telling them to relax the fisheries and allow us to function with precaution. That should be the approach. First, the government did not agree to that. And then, after a long time, on April 15 when the consolidated guidelines

came out, they accepted our suggestion.' Meanwhile, the export market suffered.

Impact on Export

Data from the Directorate General of Foreign Trade (DGFT), the Ministry of Commerce and Industry, reveal that India exported nearly \$6.3 billion (roughly ₹45,000 crore) worth of marine products in the financial year 2019. Andhra Pradesh is the top marine exporting state in the country with a compound annual growth rate (CAGR) of 15 per cent, followed by Gujarat and West



Bengal with 10 per cent. In terms of export markets, the US is the largest market for Indian shrimp, while China and Vietnam are the largest importers of Indian frozen fish and molluscs, respectively. Together, these three countries make up about 50–60 per cent of India's marine export market.

India's fisheries export market was shut post the lockdown. And those who fished every day to cater to the frozen fish segment, specifically meant for the export market, were left in the lurch.

Now, when the Indian government has exempted the fisheries sector from the lockdown, doubts still lurk. Exports are not open yet. So, even if the fishers go for deep-sea fishing, what will they do with the catch if the exporters buy it at a low price? And, what if the fish cannot be exported? That would be a huge loss for the fishers. Bhaskar said, the bank officials from their head offices have instructed to not export the stock to coronavirus-affected countries such as China, Italy, Spain, and so on. He says, 'Banks told us that those countries are in the red alert (zones), so, don't do any shipping. Everything got completely shut down here.'

And this is not the end, for Bhaskar explains, 'Even if we load the stock that is already in the factory, we have to get the lab report. For that, the authorities will get a sample from here and take that sample to either Chennai or Bengaluru for lab testing purposes. Inspection must be done.' Inspectors come from Cochin and there are agents from foreign countries who come to check the stock. Bhaskar says, 'They have to approve the stock for the shipment. We can't take the order. We can't do the inspection. We can't get the samples tested. So, none of those things are working.'



Vinoth Ravindran, Tamil Nadu Coordinator, Network for Fish Quality Management and Sustainable Fishing (NETFISH)—an arm of the Marine Products Exports Development Authority (MPEDA), says, 'We are taking the stock little by little without much crowd in the harbour. We were also told that social distancing norms must be followed.'

'With the ports and export markets being shut, there are no containers available for the exporters. If ports are closed, there aren't any containers available for export,' says an MPEDA official from Gujarat. Despite the opening up of fishing, how can the norms of social distancing be maintained is a question that has to be battled by the state fishing authorities, as the entire responsibility now rests with them. In a recent notification, the Central Government had clearly mentioned that the responsibility of hygiene and social distancing would be the onus of the state fisheries.

Overcoming Fishing Ban Season

Though the government has exempted fisheries from the lockdown restrictions, fishers cannot go during the fishing ban season (effective from April 15). Gohel says, 'This is going to severely affect the fishing community and the related businesses. Already 21 days of lockdown, and now the prohibition period for 45 days. It is going to be the toughest phase for us.'

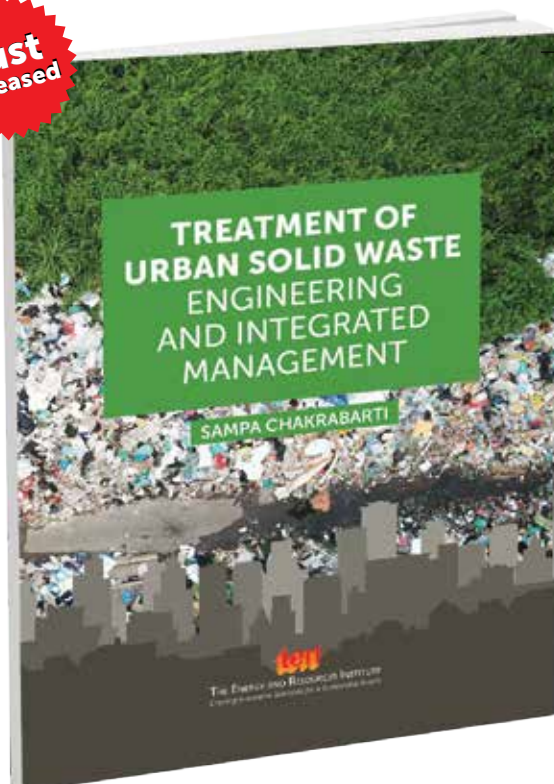
The fishers had asked the government to treat this lockdown as their ban period. However, that would further defy the purpose of the fishing ban season, which allows the fish to breed peacefully. The small-scale fishers are now in a fix. Even after the ban period, they will find it extremely difficult to commence their activities. Chatterjee says, 'Fishing needs money. Due to this prolonged lockdown coupled with the ban period, they (fishers) wouldn't have money to start fishing. It is not only true for the marine fishers, but also riverine, inland fishers, and fish farmers. It has also severely affected the small-scale fish vendors. These vendors have a hand-to-mouth existence. They used to buy and sell fish in their locality every day to meet their daily livelihood needs.'

Even after the lockdown ends, the fisheries will take much longer to recover. Till that time, the fisher groups are pushing for adequate compensations to the workers to help them keep the home fires burning. ■

Sharada Balasubramanian is the recipient of the Asian Environmental Journalism Award 2019 for Environmental Journalist of the Year, Environmental Story of the Year, and the Prem Bhatia Award for Excellence in Environmental Reporting 2019, amongst several other prominent environmental journalism awards.

CHALLENGES AND SOLUTIONS OF URBAN SOLID WASTE MANAGEMENT

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Treatment of Urban Solid Waste: engineering and integrated management describes the principles or steps of integrated solid waste management, especially in the Indian context. The Indian scenario of generating and treating urban solid waste is explained in the backdrop of international status. Latest technologies as well as current rules and regulations applicable in India are compiled for ready reference. It will be useful for the postgraduate students as well as for the practising environmental engineers engaged in the management of municipal solid waste.

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Destruction of Nature

Is it Responsible for the Emergence of Pandemics?

COVID-19 has paralysed the world as we know it. The novel coronavirus has brought the world of humans to a grinding halt. The disease has made humans retreat to their homes and nature has reclaimed the earth. One way of looking at it is this is nature's way of signalling humans to stop trying to own the Planet Earth and to end all destructive actions towards it. Although one cannot rule out nature's decisive force, in such a precarious situation it becomes imperative to understand the origin and spread of infectious diseases, in general, that cause pandemic and pandemonium.

Read more in this insightful article by **Indumathi S.**

A new study, titled 'Habitat fragmentation, livelihood behaviors, and contact between people and non-human primates in Africa' by Stanford University says that deforestation is to blame for the spread of viruses that cause infectious diseases like COVID-19. What is more perturbing is that as per the study it

will be more common in the future for viruses like coronavirus to pass from animals to human beings as more forests are cleared. The study, published in *Landscape Ecology*, analysed the degradation of tropical forests in Uganda, and its subsequent increasing risk of physical interactions with viruses carried by wild primates.

Predicting Patterns

'At a time when COVID-19 is causing an unprecedented level of economic, social, and health devastation, it is essential that we think critically about how human behaviours increase our interactions with disease-infected animals,' says the study's lead author Laura Bloomfield in a press release. Laura Bloomfield, an MD student



in the School of Medicine and a PhD candidate in the Emmett Interdisciplinary Program in Environment and Resources in Stanford's School of Earth, Energy & Environmental Sciences, adds 'The combination of major environmental change, like deforestation, and poverty can spark the fire of a global pandemic.'

Although past researches have also made a connection between deforestation and spread of infectious diseases, the present study has looked into individual-level behavioural factors. According to the researchers, the study has merged landscape-level ecological factors with individual-level behavioural factors, and analysed the risks to human health. The researchers collected the land-use survey data from the farmers living near forest fragments. They then integrated this information with high-resolution satellite images for the same time duration to determine the

connection between landscape patterns and individual behaviours. They tried to model how these two factors made certain people come in contact with wild animals.

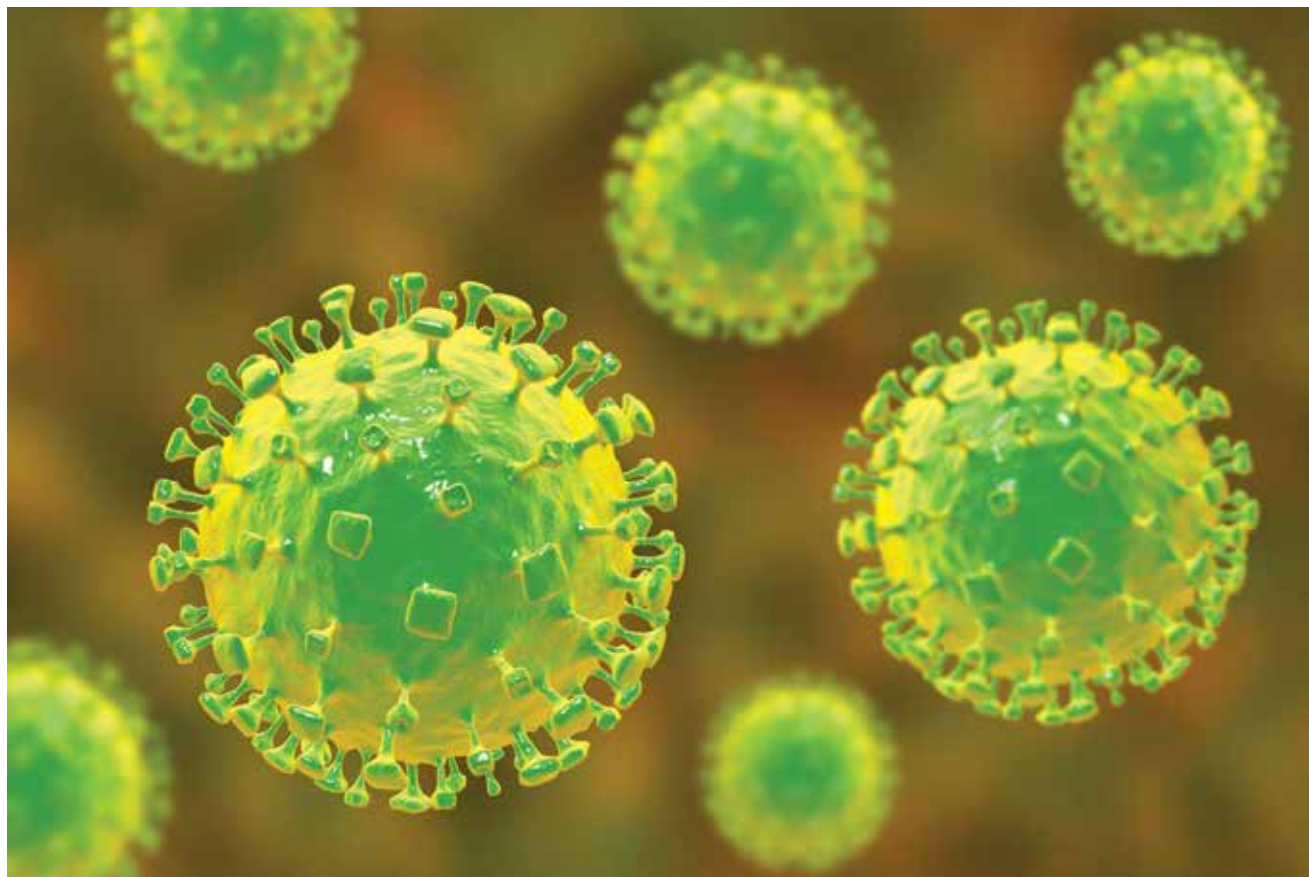
The researchers found out that the strongest interface between humans and wild primates took place along the boundary of the forest near people's homes. This further increased when people went into the forested area to collect small trees for construction purposes. The researchers explain that when people venture inside the forest in search for pole-like trees they end up spending more time in primate habitats. The increasing encroachment of forests for agriculture and the subsequent human activities could result in spillover of diseases from primates to humans.

'We found that land-use behaviours (such as collecting small trees for construction or searching for food in the

forest) as well as the degree of forest fragmentation near people's homes significantly increased the likelihood of physical contact events between wild non-human primates and people,' said Laura, in an e-mail interview. 'Our study was able to describe and quantify some of the major local drivers leading to high-risk interactions between people and wild primates,' she observed.

Danger Lurks in Forests

In the past too several studies have established the link between deforestation and the spread of infectious diseases. For instance, studies have concluded that forest clearings directly increase the spread of diseases such as Nipah virus and Malaria. In 1998, Nipah virus, a new virus at that time, caused a deadly disease among pigs in Malaysia. The disease, marked by fatal





febrile encephalitis, soon spread to humans as well. After investigation, the virus was traced to Pteropid fruit bats which serve as a natural reservoir host. A research by the University of Malaya, that analysed the spread of the Nipah virus, found a direct connection of spread of Nipah virus with deforestation in the region. The study, published in the *Malaysian Journal of Pathology* in 2002, explained how in the 1980s and 1990s the forest habitat of the fruit bats was cleared for the expansion of pulpwood and industrial plantation. The slash and burn deforestation that took place at that time resulted in the formation of a severe form of haze that hovered over Southeast Asia for months preceding the outbreak of Nipah virus.

According to the study, this situation was further made worse by a drought that was caused by the 1997–98 El Niño Southern Oscillation (ENSO) phenomenon. The researchers concluded that these series of events, including deforestation, formation of haze and

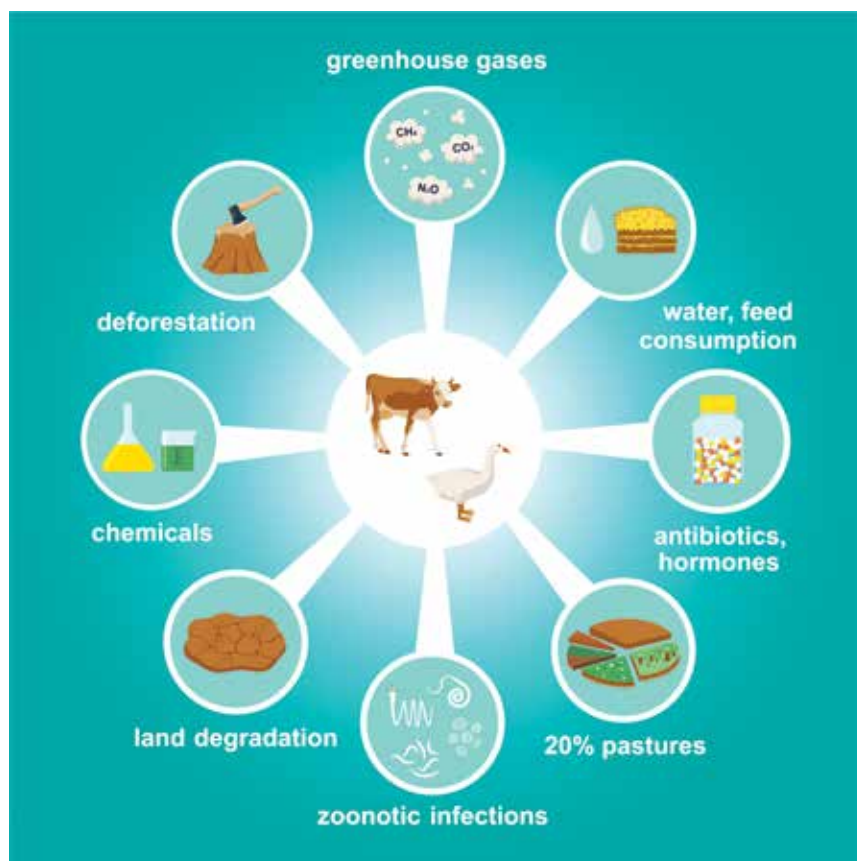
El Niño-induced drought, reduced the flowering and fruiting forest trees which are the natural habitat for fruit-eating bats. Deprived of fruits and their habitat, the hungry bats invaded fruit orchards in the region in which also the piggeries were housed. The study states that this allowed the transmission of Nipah virus from fruit bats to pigs and finally to human population.

In the past few decades, we have witnessed unprecedented rise in infectious diseases among humans, and the organisms causing these diseases are often zoonotic (derived from animals) in nature. Kate Jones, Professor of Ecology and Biodiversity, Centre for Biodiversity and Environment Research at the University College London says, 'There are a number of drivers, many of which are ultimately linked to the escalating global rate of human impacts on the environment and on ecosystems. Among the most important of these

ecologically is land-use change, which is occurring at rapid rates in many parts of the world. Deforestation, agricultural land conversion, and intensification—these changes drive losses of wildlife diversity, bring people into closer contact with wildlife, and there is some evidence that this favours the kinds of wild species that are more effective at transmitting infection to humans.' Jones states that alongside these drivers, large-scale industrial livestock rearing creates possibilities for the transfer of virus from livestock to humans when livestock comes into contact with wildlife.

Indian Connection

Abi Tamim Vanak, Senior Fellow (Associate Professor) and Convenor, Centre for Biodiversity and Conservation at Ashoka Trust for Research in Ecology and the Environment (ATREE), Bengaluru, also shares similar concerns with Kate



Jones. He says that humans have always encountered zoonotic diseases, but the rate of emergence of new animal-based viruses has increased. This is largely due to intrusion of human beings in natural habitats for industrial human activities such as conversion of forest for agriculture, logging, mining, large dams, among others. It has also resulted in demand for wild meat. 'Therefore, we are coming in to sustained contact with new pathogens from wildlife populations. We are also creating conditions that increase the rate of spread of new pathogens that have spilled over to humans—these conditions include urbanization, globalization and associated high-speed travel that can take a local disease and turn it into a pandemic in a matter of months,' adds Abi Tamim Vanak. Abi warns that if we continue with this same economic model, then such trends of infectious diseases spreading will most likely continue into the future as well.

India has seen an increase in Kyasanur Forest Disease (KFD) caused by Kyasanur Forest Disease virus over the past two decades. Also known as the monkey fever, it is a tick-borne viral haemorrhagic fever that is mostly found in south-western part of India. About 400–500 cases of KFD are reported each year, according to the Centers for Disease

Control and Prevention. Several studies have made a connection between the spike in the disease spread and increased deforestation in the area. For instance, a study in 2019 in the *International Journal of Epidemiology* states, 'It has been suggested that anthropogenic pressure in the form of land use changes that lead to the loss of native forest may be directly contributing to the expanding range of KFD.'

Way Forward

The recent COVID-19 pandemic has resulted in a major loss of life and has driven the global economic levels to an all-time low. The present situation seems grim. It is deeply disturbing to imagine that if necessary precautions are not taken, then we may have to face the onslaught of yet another pandemic. According to Kate Jones from University College London, it is imperative that we understand the factors which drive in sharing the pathogen and their ultimate spill-over to humans. She hopes that this understanding will help us in predicting and preventing the spread of diseases. Emphasizing on continued research in the area, she observes 'Maintaining intactness of landscapes and biodiversity reduces human-wildlife interaction while also being beneficial to other aspects of

(both human and planetary) health.'

Abi Tamim Vanak remarks, 'With very high human densities, amongst the highest diversity of mammals in the world, and a saturated interface between humans and wildlife, India is considered to be among the hottest of hotspots for zoonotic infectious diseases.' He emphasizes on One Health Surveillance and disease problem solving. One Health is a concept that looks at optimum health by recognizing interconnection between plants, animals, people, and their shared environment and this works at the regional, national, and global levels. 'The existing surveillance apparatus rightly concentrates on early outbreak detection among people, and includes containment and response. There is, however, neglect in including wild and domestic animal surveillance and understanding the dynamics of the pathogen-host cycles between outbreaks,' says Abi. He further adds that a long-term longitudinal surveillance gives an understanding of the disease burden and also helps to detect patterns in outbreaks.

It is important to revisit Abi's prophecy. If the present economic model continues then possibility of pandemic in future is highly likely. Governments, scientific community, and all the stakeholders including the entire *Homo sapiens* species need to rethink of not just the present economic model, but the way of life that disregards nature and destroys nature. There is a dire need to adopt a more humble, sustainable life that is in harmony with nature. Else one can rest assured that one day or the other nature will fight back and will always find a way with or without the 'mighty' *Homo sapiens* species. ■

Indumathi S is presently an Assistant Professor at the department of Journalism and mass communication in St. Joseph's Evening College, Bangalore. Alongside her academic pursuit, she has extensively contributed science and environment oriented articles over the past ten years as a freelance journalist. She has published articles in premier magazines such as *Down to Earth*, *Planet Earth* and *Energy Next*.



Impact of BS-VI Transition on the Automobile Sector

Amidst COVID-19

The cost of air pollution in India is estimated at 3 per cent of the country's gross domestic product. Making a car BS-VI compliant decreases the quantity of toxic compounds contained in exhaust gases. The BS-VI emission norms came into effect on April 1, 2020 despite the nationwide COVID-19 lockdown. The shift to the new emission norms is part of the ongoing efforts by the Government of India to mitigate air pollution. In this article, **Ramya Ranganath** analyses the effect of this transition during a period when the automobile industry is encumbered by a slump and the world economy is grappling with the cascading effect of the COVID-19 pandemic.

Keeping in sync with its efforts to tackle air pollution in the country, the Government of India announced in 2016 that the country would bypass BS-V (Bharat Stage V) norms and instead implement BS VI (Bharat Stage VI) norms by 2020. The leap from BS-IV to BS-VI emission norms came

into effect on April 1, 2020, in the midst of the nationwide COVID-19 lockdown leading to a screeching halt in the sale of all BS-IV compliant vehicles and creating a huge stockpile of BS-IV vehicles in the inventory of automobile companies. With the apex court not giving a grace period to automakers to phase out the sale of

BS-IV vehicles, any BS-IV vehicle bought till the end of March 2020 will continue to ply the road for its entire registration period. Additionally, the auto industry, already in a slump, has to now endure the coronavirus-induced slowdown and the BS-VI transition.

BS-VI: An Overview

Before assessing the impact of the BS-VI transition on the automobile supply chain, it is important to understand the nuances of the new emission norms. Barring electric- and battery-operated vehicles, most vehicles that ply the roads these days are powered by internal combustion engines (ICE).

ICEs run on diesel and petrol and produce exhaust laden with carbon dioxide (CO₂), carbon monoxide (CO), hydrocarbons (HC), and oxides of nitrogen (NO_x). Diesel engines (fuel injector based) and direct-injection petrol engines also emit particulate matter (PM) of different grades. These pollutants have an adverse impact on the human body and the environment.





Making a car BS-VI compliant decreases the quantity of toxic compounds contained in exhaust gases. The modification is made in the ICE as well as in the exhaust treatment measures.

The percentage of CO₂, CO, NO_x, HCs, and PM will decrease drastically in both petrol and diesel BS-VI compliant vehicles as compared to the erstwhile BS-IV cars. However, these changes will impact the performance and efficiency of the vehicle. Also, the cost of producing BS-VI vehicles is higher and this will inevitably be transferred to the consumer. The long-term environmental impact compensates the marginal rise in vehicle costs. The BS-VI compliant fuels have to be upgraded by decreasing the quantity of sulphur in the fuel.

BS-VI: Impact on Automobile Ecosystem

According to Rajesh Menon, Director General of Society of Indian Automobile Manufacturers, 'Auto industry has invested around ₹70,000 crore to move from BS-IV to BS-VI emission norms by skipping BS-V emission norms altogether. BS-IV vehicles are mere raw materials as of now. This will result in huge losses for the auto industry. In Europe, the transition from Euro 4 to Euro 6 was

done over a period of 9 years, while BS-IV was implemented pan-India only in 2017 and now the auto industry has already jumped to BS-VI. This is unprecedented anywhere in the world. Apart from developing the BS-VI vehicles, these vehicles have to undergo on-road durability testing which is an internal exercise of the companies to ensure the product is robust enough. Thereafter, the vehicle is submitted to one of the National Authorized Test Agencies for

type approval to ascertain compliance to BS-VI emission norms. Since too short a time, several auto makers did not have enough time to develop all their existing BS-IV portfolios to BS-VI.'

He highlighted that Europe has a very elaborate phasing-in of emission norms. Unlike India, the two-wheelers, four-wheelers, and heavy vehicles had different dates for moving to Euro 6 or Euro 5 emission norms. However, in all the cases Europe allowed existing models an additional one year for moving to next stage of emission norms from the cut-off date. Various studies have shown that contribution to air pollution from vehicles ranges from 20 per cent to 30 per cent. This includes pollution from pre-BS-I, BS-I, BS-II, BS-III, BS-IV, and BS-VI vehicles. Hence, contribution to pollution reduction from BS-VI vehicles would be only a small fraction. The environmental benefit can only be achieved if there are policies that stop old polluting vehicles plying the road and also address the balance 70-80 per cent pollution contributed from sectors other than road transport sector.

The automobile sector in India has been in a slump for the last 18 months.



The sector continues to be in recession because of weak consumer demand. Now, the COVID-19 pandemic has gripped the global economy in Q1 (quarter one) of 2020. Therefore, the task of investing in new technologies is all the more daunting for automakers. The cost of buying a BS-VI vehicle will be higher due to the higher cost of manufacturing these vehicles.

In the opinion of Maxson Lewis, Managing Director of Magenta Power, 'The automobile industry was already going through turmoil from a demand perspective. Both rural and urban demand was sluggish and impact of BS-VI just added to the issue.' He added, 'With the coronavirus pandemic all bets are off, all past plans are off the table. How I see this panning out is, this year will be about survival for the auto industry because of the economic slowdown and investments are moving away from auto to basic infrastructure and health care. With the extension of the lockdown, the rural industry will experience a depression and it will be 8-12 months before we see any recovery in the automobile sector. The post-lockdown spike in sales, like what happened in China, cannot be projected for the entire year as a trend in terms of rise in demand. Stakeholders must exercise caution, hang in there and survive until things take a better turn.' He remarked, 'Oil and manufacturing companies and automakers invested heavily in the BS-VI transition. But due to the pandemic and shelter at home order, demand will be dumbed down across categories. There were multiple attempts by stakeholders to extend the April 1 deadline. Any deferment of the deadline would not have been fair to entities that have made ardent preparations and prepped themselves for the transition before the due date. In order to mitigate the impact on demand, industry players could consider reducing costs of BS-VI vehicles to pre-BS-VI standards, until the market starts seeing an uptick. Oil and manufacturing companies had already



transitioned to the new fuel much before the slated deadline. If the government provides subsidies on fuel, owing to the drop in crude prices, the oil and manufacturing companies will be able to recover costs at a faster pace.'

BS-VI Transition: Impact on Clean Mobility Transition

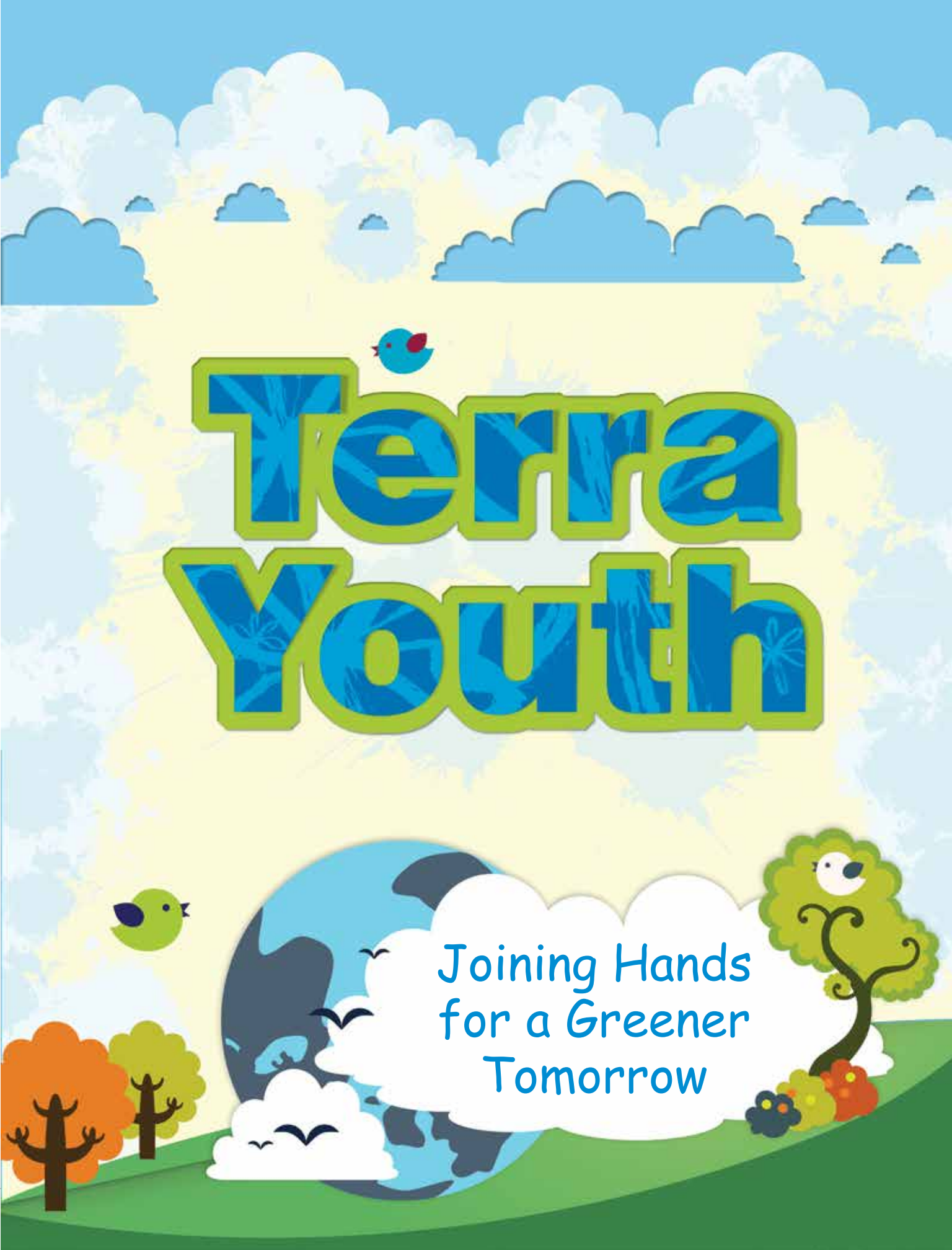
NITI Aayog charted a comprehensive road map in 2019, detailing the milestones for the adoption of electric vehicles in India. As per these guidelines, all three-wheelers sold after 2023, all two-wheelers sold after 2025, and all four-wheelers sold after 2030 respectively, will mandatorily be electric. Also, FAME India 2 (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles) has allocated 5595 electric buses for 64 cities across the country, and the process of deploying these buses by various state nodal agencies is underway. The auto industry is also committed to work with the Indian government in moving towards electric mobility for addressing concerns of urban air pollution and reducing crude oil import.

'The EV (electric vehicle) transition is real and will happen irrespective of the

BS-VI transition. In fact, given the increase in prices for BS-VI vehicles, the gap in price of ICE versus EV reduces. Also, I see this as an inflection point. Of course, the auto industry has been distracted into the BS-VI transition, which moves the R&D budgets away from EVs. Also the industry is forced to recover the BS-VI investments by holding back on EV. But it is a matter of time. EV adoption has other challenges which in the meanwhile can be sorted out,' Maxson Lewis observed.

In conclusion, the BS-VI transition is a healthy move in the right direction both environmentally and technologically. The transition is occurring during a period when the automobile industry is encumbered by a slump and the world economy is grappling with the cascading effect of the COVID-19 pandemic. Despite a bleak situation, automakers and the government together have left no stone unturned and have taken the BS-VI transition in stride. ■

Ramya Ranganath has worked with several websites and agencies as a content specialist. She writes on clean technology and her focus is primarily on renewable energy and clean mobility, with minor emphasis on other aspects of sustainability. She is passionate about contributing to the adoption of clean energy for transformation and well-being of people and ecosystems.



Terra Youth

Joining Hands
for a Greener
Tomorrow

Olive Ridley Turtles

For some time now, we have been celebrating the annual migratory tradition of Olive Ridley turtles. **Benita Sen** looks into their nests.

June 11 is commemorated as Olive Ridley Day. The Olive Ridley Turtle or *Lepidochelys olivacea* is one of the smallest sea turtles. Also known as the Pacific Ridley sea turtle, the Olive Ridley—named for the greenish carapace or shell—has a habit that has made it famous. Once a year, its females come to shore to nest in droves. This practice of mass nesting is known as *arribadas*. India is not the only country where the Olive Ridley nests. It also nests in some parts of Africa, Australia, Mexico, and Nicaragua. Smaller nestings happen in Myanmar, Malaysia, and some other countries. The tiny hatchlings born from these eggs have a carapace or shell of about 1.5–2 inches and weigh barely 12 grams. From that tiny size, they grow to an average weight of between 34 kg and 45 kg. The Olive Ridley turtle eats smaller crustaceans, small fish, and some more marine creatures.

So, you may wonder why this turtle finds itself in Schedule I of the Indian Wildlife (Protection) Act, 1972. To add to that, it is also listed as Vulnerable on the International Union for Conservation of Nature (IUCN) list. Which means, we cannot have one too many of these creatures.

Shush!

In 2018, India celebrated when, after decades, an Olive Ridley nested on Mumbai's Versova Beach, which had been cleaned of tonnes of garbage by volunteers. It is believed that the clean beach played the perfect host. In due course, about 80 hatchlings trundled off to the sea, with a little guidance from delighted human volunteers. However, the Olive Ridley connect with India is far larger, though, along the eastern coast. The western coast, according to one expert, generally gets green turtles.

About two months before the Olive Ridley turtle hatchlings trot off to the waters, their mothers can be seen laying eggs. The arrival of the mothers is always an event to be overjoyed about. Volunteers try to keep watch to ensure the eggs and later, the hatchlings are in no danger. After successful nesting and hatching, the next chapter unfolds. That ends with their return to the sea. For the human volunteers who watch the beaches to ensure the safety of the turtles, the days of joy culminate in the hatchlings going into the sea where, hopefully, they thrive and remain safe to grow into adults. Never mind where the

sighting is, the joy is overwhelming. 'We are all happy and blessed to have seen these newly hatched Olive Ridley turtles,' Afroz Shah, the lawyer who led the cleaning up of Versova beach told us.

In Danger

So, what are some of the other reasons they landed on the IUCN list? The entire life of an Olive Ridley turtle is fraught with several possible dangers. Their biggest threat comes from human beings. In 1968, more than one million of them were killed for their meat and shell. Such unnatural interventions have eaten into their numbers. People and other animals eat their eggs. The migratory journey and the trip back to the nesting site is feared to cost many turtles their lives. Countless turtles get injured or die after getting entangled in non-biodegradable nylon fishing nets. Why, even the journey of the hatchlings back from beach to sea is not without challenges. Sometimes, the newbies require a gentle bit of help to get the shortest distance to the ocean.

Not all the eggs laid result in successful hatching, either. In Versova, for instance, it is believed that the

forestry department came across a pit on the beach. In it were egg shells and some 20 dead baby turtles that had not made it beyond the first milestone. Most turtles face similar problems. Turtles are facing the wrath of shrinking beach space, industry and 'development' along coastlines and the threat of fishing with trawlers and synthetic fishing nets. They are choking on plastic waste that lands in the sea. Turtle lives are under threat from injury, some of it from human-caused causes.

The most famous turtle, perhaps, is Peanut. In the 1990s, Peanut, a turtle that got its name from its unusual, human-induced shape, shot into fame for tragic reasons. This red-eared slider turtle was seen swimming in Missouri. Peanut got the strange shape and therefore, his name, because he had become entangled in one plastic ring of a six-pack can holder. Peanut grew, but the plastic did not. It held on like a vice around him and pinched his shell into a peanut shape. Peanut lost the natural aerodynamic shape of a turtle and was in danger. He was caught and rescued in 1993. The plastic ring was removed around from him. Peanut's startling

photograph reminded us of the impact our plastic trash has on other forms of life. That is why every milestone crossed by a turtle is a cause for cautious celebration. Visakha Society for Protection and Care of Animals or VSPCA is, as the name suggests, an animal welfare organization in Visakhapatnam. Pradeep Kumar Nath, founder-president of VSPCA, tells us that his team has been busy since 1996 in the protection and conservation of sea turtles. VSPCA sets up and protects hatcheries so that the turtles can be provided with more security. He calls it 'compassion-based work.' 2020 may be a happy year for India's Olive Ridleys. Nath is thrilled that this season, there has been an increase in the number of nestlings. 'We could surpass last year by 20 per cent,' he shares with us.

The biggest nesting site in India and perhaps the world, is Gahirmatha Beach, part of the Gahirmatha Marine Wildlife Sanctuary, in Odisha. Gahirmatha plays proud host to about one hundred thousand to five hundred thousand Olive Ridley turtles. In 2017, Gahirmatha saw about two lakh baby Olive Ridley turtles in just one day!

Time for More

Traditionally, in India, it is the Odisha and Andhra Pradesh coastline that plays happy host to one of the world's largest turtle nesting grounds. However, there are other favourable places in other parts of the world. The Olive Ridley Project, for instance, is working to protect not just the turtles but also their habitat. Wherever possible, people need to be encouraged to reuse the nylon 'ghost' nets. The Project has a Marine Turtle Rescue Centre that can house at least eight injured turtles. Some require only a few days of care before they can return to their natural habitat. Others, with deeper injuries, require to be hospitalized for months. Some, sadly, cannot be saved.

Can You?

Yes, you can do something to help. First, read up as much as you can about the Olive Ridley turtle. Most of us never see an Olive Ridley turtle, so we often forget about them and their problems. To counter that, you could also spread the information you have gathered, among your friends and family. Then, you could go online and 'e-adopt' a turtle. There are organizations like the Olive Ridley Project that is turning the dangerous ghost fishing nets that they collect from the ocean, into bracelets that are sold. Each bracelet is made by villagers in coastal regions who earn from the sale of every bracelet. The Olive Ridley Project rescues, treats and tries to rehabilitate injured turtles. They are harmed by ghost gear that lies around in the oceans because they are not biodegradable. We need to remove as much as we can of such harmful gear from the ocean and encourage users to reduce the use of such things. We need to make every day special for the Olive Ridley Turtle. ■

Benita Sen is a journalist and award-winning children's author. She has authored over 20 books for children published by TERI Press. She volunteers to help abandoned and injured urban animals.



Himalayan Ecotourism

A Cooperative-Based Model of Social Enterprise

In the wake of catastrophic climate change, the term 'ecotourism' has become something of a catchphrase. It is everywhere, and often gives people a false sense of goodwill and responsibility. However, the ground reality shows a great discrepancy. There are only a handful of entities whose concern for the environment ultimately culminates into initiatives that make an impact.

Functioning in the remote Tirthan Valley of Himachal Pradesh, Himalayan Ecotourism is one such organization. When establishing the enterprise in 2014, Stephan Marchal, a founding member, had a singular vision in mind: to create a sustainable model of development in the Himalayas while preserving and regenerating its natural environment.

Operating under Himalayan Ecotourism, the GHNP Community-based Ecotourism Cooperative is a group of local villagers organizing treks and other outdoor activities in and near the Great

Himalayan National Park (GHNP), as well as marketing and environmental experts. The logic behind their association is collaboration rather than competition, and economic self-reliance. With community and environmental welfare as their mission, Himalayan Ecotourism developed a way to utilize tourism business as the financial backbone of their social and conservation work.

What may be considered Himalayan Ecotourism's greatest achievement is having instilled a sense of ecological responsibility where it was once lacking. The foundation of achievement lies in mutual trust, and it is the Himalayan Ecotourism's commitment to personal interaction and financial transparency which ensures equal opportunities for growth in a space conducive to learning and creativity. Shiviya Nath, a renowned travel writer from India, calls Himalayan Ecotourism the 'only organization in the region based on fair-trade principles.'

On being shown the entire breakdown of costs for her trek, she felt that such transparency could revolutionize the travel industry. By implementing such business ethics, this social enterprise has brought people together for a cause, and into a system where the locals themselves are the initiators of change.

Their success, however, has not come easy. Navigating the lack of local administrative support and political tangles has proven to be difficult. Adding to that was the stiff competition from existing businesses which tried to bring their movement down.

What Really Worked in the Himalayan Ecotourism (HET) Model?

The initial motivation for the locals of the Tirthan Valley to join the movement was to benefit from employment





opportunities through tourism. An economic incentive attracted the locals to the movement whereas the first social and environmental projects of HET originated from Stephan's personal mission. The core members of cooperative society—the local people who took the lead in the movement—shyly participated in the early actions and did not become the initiators of the social projects until later on.

Women's empowerment, development of green technologies and the problem of forest fires were the main focus of Stephan, besides promoting and operating the trekking business. Surprisingly, the first tangible impact of these actions was the drastic decrease of intentional forest fires in the Tirthan Valley and the GHNP which resulted from the 'Stop Forest Fire' campaign. The constant efforts to economically empower the local women and to introduce clean wood stoves and solar cookers did not receive the intended positive response from the local community. This was discouraging, however, simultaneously, the trekking business took off, enhancing the economic status of the cooperative members.

The real transformation took place when Himalayan Ecotourism was declared the overall winner of the Indian Responsible Tourism Award 2019. It was also recognized internationally as the winner of the Skai Sustainable Tourism Award 2019.

The core members of the cooperative society, whose awareness level is hyperlocal, suddenly realized that they had shaped an innovative and

pertinent business model and as a consequence, they had been brought into the international spotlight. The five initial years of struggle in establishing the business finished with medals and awards and boosted their self-confidence highly. Members of the cooperative society began to believe that they could play an active role in the development of their villages. They could eventually conceive that any visible problem that affects their community can be addressed independently.

The degradation of the forest ecosystems in their valley is a reality that was seen earlier with fatalism, leading to no further thoughts and actions. That was no more true for the members of the cooperative after their socio-economic empowerment. From then, the vanishing forests were seen as a process that threatens their long-term well-being, and they decided to reverse the process by planting trees. A reforestation project was born as the initiative of the locals.

Since then, hundreds of trees have been planted, but at the same time, they realized that to be successful, they have to make their reforestation project, a community-approved and community-supported project. Stephan alone could not do this. The success of the Stop Forest Fires campaign was not because of the participation of the local community but was rather the result of a massive awareness movement in the pristine valley.

For the cooperative members, the next step was to spread their ideas and motivation from the level of their group to a broader community level, to ensure sustainability. Protecting their re-forested

area from overgrazing, forest fires and other non-sustainable practices was the primary concern. Consequently, they went door-to-door explaining to the villagers the practices they can adopt to help them to preserve the newly planted trees. This strategy has proved to be very effective and has led to the cooperation of many villagers.

Moreover, as Keshav, the president of the cooperative society explained, 'the only fact that the other villagers observe them engaged in a reforestation project strongly conveys a sense of sustainability among all other villagers.' The motive is not just to plant trees but to create a movement within the community which will be repeated for decades to come and benefit future generations.

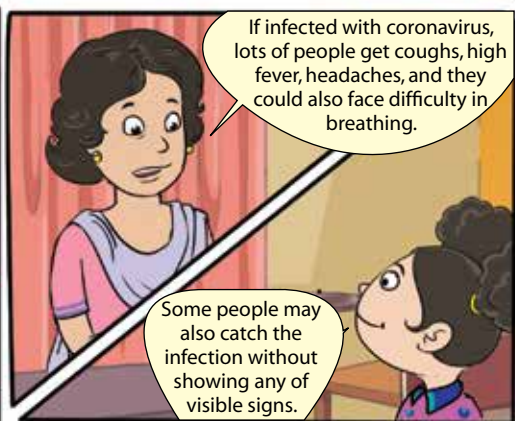
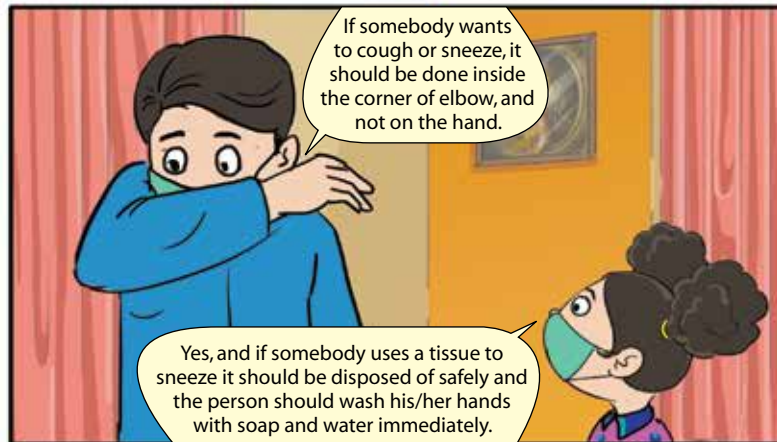
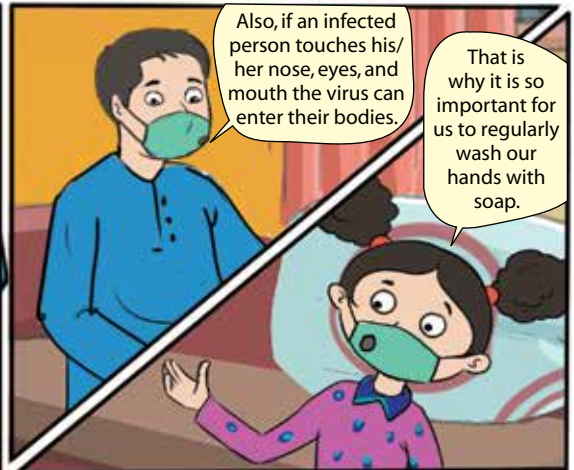
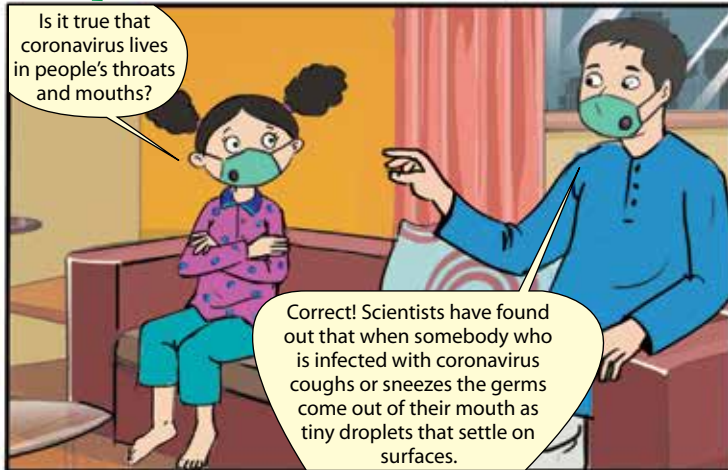
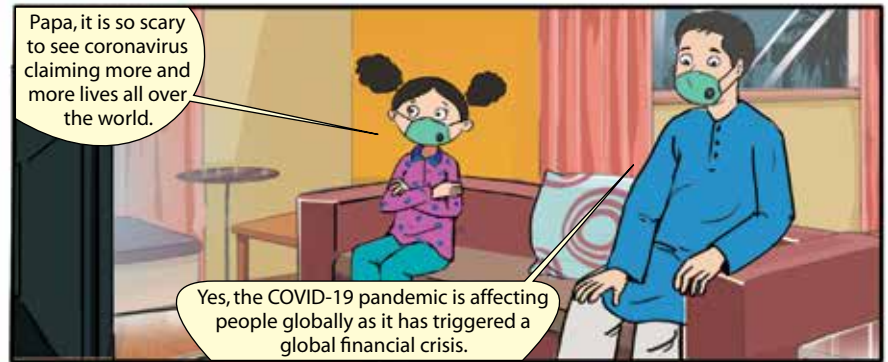
This is where the HET formula has proven to work; going beyond the dichotomy: locals versus outsiders. Bringing people from different horizons and cultures as well as bringing diverse sets of expertise together to trigger dynamics in the society which is otherwise reluctant to change. As a social activist interested in the global issues that threaten the future of the local community, Stephan attempted to steer the locals towards a sustainable way of living. However, this did not work until his local friends started to become the real actors of the process.

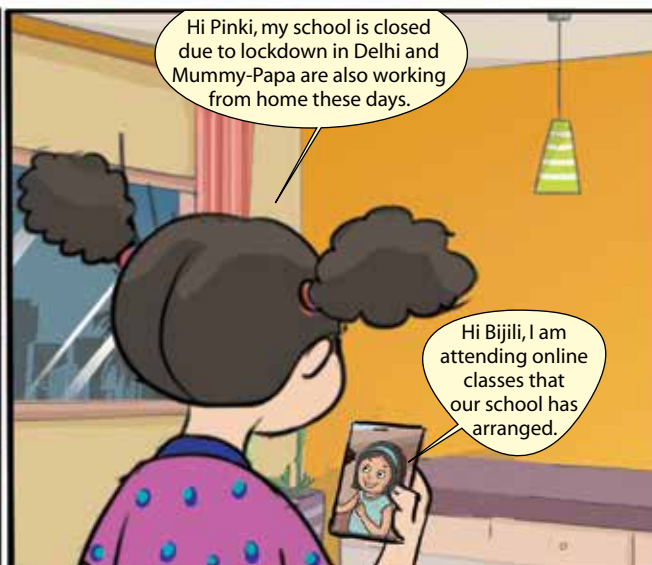
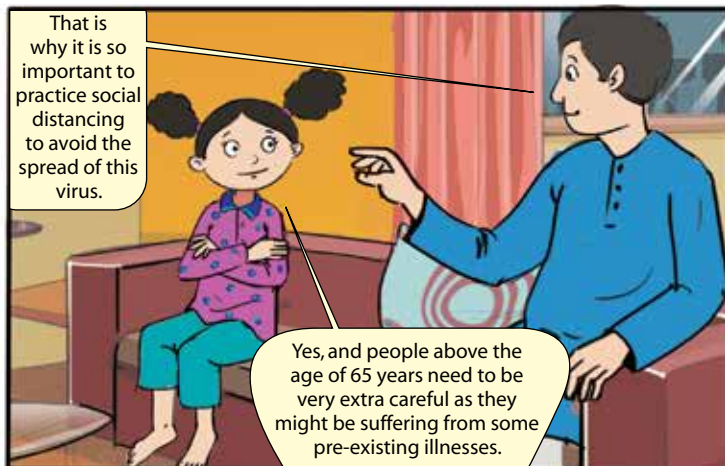
Considering the fact that a part of the fund goes to social projects and having limited human resources, the commitments of researchers, volunteers and interns from all over the world have made significant contributions to Himalayan Ecotourism's mission. External supports and volunteers have become an integral part of the HET working culture. While the works of the volunteers serve the mission of HET, the organization nurtures them and develops their skills to navigate them towards a life of social entrepreneurship. ■

Article contributed by Sneha Harsh, Intern at Himalayan Ecotourism.

BABU & BIJILI

FIGHT coronavirus TOGETHER





Story and Illustrations by Abhas, Vijay



Long-term Data Show Hurricanes are Getting Stronger

In almost every region of the world where hurricanes form, their maximum sustained winds are getting stronger. That is according to a new study by scientists at the National Oceanic and Atmospheric Administration National Center for Environmental Information and University of Wisconsin-Madison Cooperative Institute for Meteorological Satellite Studies, who analysed nearly 40 years of hurricane satellite imagery. 'Through modelling and our understanding of atmospheric physics, the study agrees with what we would expect to see in a warming climate like ours,' says James Kossin, a NOAA scientist based at UW-Madison and lead author of the paper, which was published recently in the *Proceedings of the National Academy of Sciences*.

Source: <https://www.sciencedaily.com/>

Climate Change will Turn Coastal Antarctica Green, Say Scientists

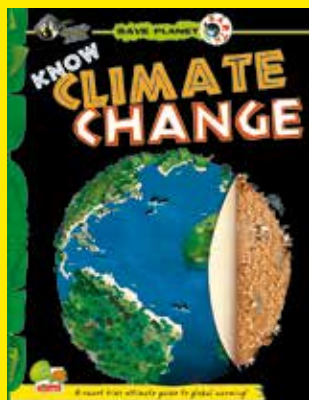
Scientists have created the first ever large-scale map of microscopic algae as they bloomed across the surface of snow along the Antarctic Peninsula coast. Results indicate that this 'green snow' is likely to spread as global temperatures increase.

The team, involving researchers from the University of Cambridge and the British Antarctic Survey, combined satellite data with on-the-ground observations over two summers in Antarctica to detect and measure the green snow algae. Although each individual alga is microscopic in size, when they grow en masse they turn the snow bright green and can be seen from space. The study was published recently in the journal *Nature Communications*.

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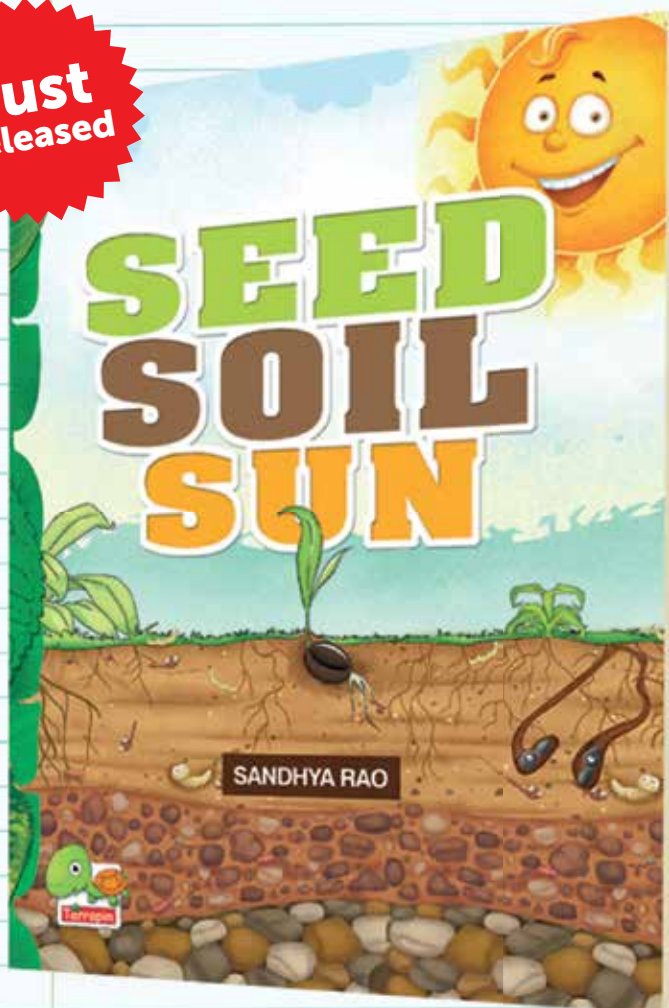
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Does Social Distancing Give Way to Emotional Distancing?

In this article, **Megha Jain** and **Saurabh Jaiswal** throw light on the psychological impact of social distancing in the era of COVID-19 pandemic.

Today, when the entire world is struggling hard to find out a permanent solution to COVID-19, aren't we heading towards bigger ill-treated problem of psychic spacing due to social distancing? Let's first understand the actual connotation of 'social-distancing'. According to the World Health Organization, social distancing is 'to maintain at least 1 metre (3 feet) feet distance between yourself and anyone who is coughing or sneezing'. The problem is further aggravated by the subsequent measures taken by the bureaucrats globally 'to lockdown' with the only solution for the corporates to choose 'work from home' which may impact the employee productivity invincibly (Source: Harvard Business Review, 2014). Also, it is quite challenging

to stay connected while staying away from your loved ones.

Emotional distancing could be inferred directly from 'E-motional detachment' which means that in the eventualities of a situation like today, when humans are made immobile (motionless); the 'E-motional detachment' could mean a situation where people experience extreme anxiety due to physical spacing with their loved ones. Alternatively, it could be understood that humans are tamed to shift to a different space where 'E' means 'Electronic' (run through internet/virtual platform) and 'E-motion' would be electronic movement (without physical connect). Further, psychologists treat emotional distancing (detachment) as a mental (psychic) disorder. Therefore,

'Emotional distancing' could be assumed synonymous to 'mental spacing'. In a way, the state of 'being alone' (social distancing) is steadily transforming to the state of 'being lonely' (emotional distancing).

Indeed, virtual reality cannot substitute the sense of touch. Some of the existing studies have established that a mind processes things faster when associated with a touch (feel) in comparison to the virtual platforms. In a new study conducted just prior to the COVID-19 pandemic, Leuwen's Haemy Lee Masson and colleagues (2020) compared brain responses to touch and non-touch social interaction. Their findings can help you understand how to make up for the lack of physical touch in your everyday life by exchanging virtual for real touch.

Firstly, if humans are making an effort to remember, this certainly hints towards deviation from the natural thinking process. If it is true, then, does social distancing in a way, channelling to emotional distancing? As per experimental study at the University of Munich, there is a mutually responsive exchange between an individual and any sort of extreme adjustment in the surrounding. It may have far irreparable effects on the human psychology and physiology from longer period confinement and isolation. Social spacing creates a vicious circle among an





individual, his/her anxiety and depression (University of Houston). As per H Taylor, this has the potential of having the mortality effect, equivalent to smoking 15 cigarettes (approx.) per day.

Further, could emotional distancing be regarded as key fundamental behind psychic disorder? So far, we are taught that Man is a social animal, but this seems to have reversed in the current scenario where we have been told to accustom ourselves to behave 'un-social'. The extreme stress and depression germinating from seclusion and social spacing could be as fatal as having a cardiac arrest, acute depression, dementia, cognitive incompetence or even death in severe situations (Wired, Mar 2020). As per the meta-analysis conducted at Brigham Young University (2015), chronic social isolation could amplify the risk of mortality by 29 per cent. Further, the study has drawn a positive correlation between perceived social connectedness and associated stress responses. Needless to mention, approximately eight hundred thousand people commit suicide each year that tantamount to one person every 40 seconds (as per WHO). The *Accidental Deaths and Suicides in India* report of NCRB (2018) confirms that India has accounted for 7.53 per cent of the total suicides in the year owing to mental-

illness standalone to qualify in the top 5 reasons out of 20, stated in the report. The psychic impact of COVID-19 combined with remedial action, social spacing has witnessed immediate suicidal responses.

Specifically, for a nation like India where on the one hand we are talking about demographic dividends coming from the greater number of youths, does it also convey more depression patients (since evidence have supported more depression cases in this category)? Almost 80 per cent of the mental-illness suicides in India belong to the working-age group (NCRB, 2018). The data and its validation have precedence that suicide cases may indicate a temporary fall during such a global crisis with a permanent increase in the post-crisis period (as per National Association of School Psychologists, the USA). The 'fear of unknown' due to uncertainty is aggravating the anxiety levels more profoundly for those who are suffering from the virus and those who are not (in terms of lockdown period). Unfortunately, the distancing will continue even longer for them who have been cured physically from the virus but not from the emotions of others; who will maintain distance from the healed individuals, but for how long?

What could be the effective solutions to address impending psychic concerns

due to distancing? In the words of yoga gurus, meditation (niyama/yoga) could be one of the recommended plausible ways forward to tackle distancing, while some other mentions 'talk therapy'/ relaxation exercises. Others have suggested a 4-step approach to manage any sort of emotional disorder due to distancing – Pause, Acknowledge, Think, and Help. Other possible ways to process feelings in order to build a safety net around include doodling, punching a pillow, screaming, letting yourself cry, etc.

Much to a surprise, nearly two dozen of the companies in India have adopted novel ways to engage their employees, not just engage but ushering into fruitful exercises such as psychological counselling, meditation, and so on, to instil motivation in a new era of 'work from home' space (The ET, April 2020). Recently, the Hon'ble Prime Minister of India in 'Mann Ki Baat' has clarified that social distancing should not be considered as emotional distancing, but it seems that the Indian citizens are on a gradual path towards emotional numbness (a feeling of disconnection from the body). Satirically, Taylor has compared the current scenario, mentioning 'no one would have ever imagined that social spacing too could be a solution to live through'. The situation is grave in terms of impending far worse financial, economic and social crisis as per IMF recent report. People in a way are conditioned to isolate themselves due to longer period of lockdown detainment in the absence of any means to ease stress. Could social distancing be treated a 'new normal'? In the words of Shakespeare, 'Life has to go on' — with or without VIRUS. ■

Disclaimer: The views expressed by the authors in this article are their own and do not necessarily reflect TERI's views and their respective institutions..

Megha Jain, Assistant Professor/Sr Research Scholar, DRC/ FMS, University of Delhi; and Saurabh Jaiswal, Officer, DSP Investment Managers Pvt. Ltd., UP /aspiring researcher.



Bovine Tuberculosis

The Real Pandemic

Does the milk you give your children come from a cow with tuberculosis? Probably. Can you get it from milk? **Maneka Sanjay Gandhi** talks about bovine tuberculosis, a major public health threat which has been hidden by the industry.

We select one disease to be mortally afraid of—and ignore all the diseases that we should be scared of. One of these is bovine tuberculosis.

Bovine tuberculosis (bTB) is a disease of cattle that is a major public health threat. It is transmitted within herds by inhalation of infected aerosol droplets from infected cattle.

Despite the considerable economic costs and zoonotic risk India still does not have any accurate estimates. No surveillance, no checking systems, and absolutely no national disease control programmes. Not even the education of farmers. In fact, India has the poorest veterinary system in the world. It is one of the few countries left where the disease is considered endemic.

A metastudy, which included 44 different research articles, called *Prevalence of Bovine Tuberculosis in India: A systematic review and meta-analysis* done by Srinivasan, *et al.* published in June 2018, reveals that there are about 21.8 million infected cows

and buffaloes in India, more than the total number of dairy cows in the USA. Bovine tuberculosis is caused by a bacterium called *Mycobacterium bovis*. While it mainly affects cattle, the bacteria affects a large number of species and it has been estimated that *M. bovis* causes 10 per cent or more of the total human TB cases in India and poses a significant threat to global health (Olea-Popelka, *et al.*, 2014). Bovine tuberculosis is strongly zoonotic (spreading from animals to humans) and causes tuberculosis in humans.

To remove tuberculosis from humans will require removing bTB from cattle simultaneously. A government survey done in 2018 showed 2.690 million cases of tuberculosis, 199 people per lakh in India. Mortality is 32 people per lakh—a million times more than the ‘pandemic’ coronavirus. India has the highest number of sufferers in the world with 2.8 million cases annually, more than a quarter of the tuberculosis patients all over the world. Much worse is the fact that India has the largest burden

of multi-drug-resistant tuberculosis among all countries, with almost 150,000 cases every year.

Much of this is from drinking milk, eating milk products, and eating beef. The bacterium *M. bovis* survives 1–8 weeks in cattle faeces, so anyone handling cow dung is at risk. Pasteurization kills the bacteria but is your milk pasteurized? Forget the consumer, when the dairy owner is physically taking out the milk from the animal, he stands a strong risk of getting bTB. Do you know where your milk came from? If you were to get bTB today would the government know where to trace the milk back to? Are there any records of dairies kept by the local district Chief Veterinary Officer? We are told that pasteurization kills the bTB bacteria. But most people in small towns (70 per cent of India according to FAO/OIE/WHO, 1993) get their milk unpasteurized from the dairy next door—the man who keeps a few cows in a makeshift shed and allows them to roam around and eat garbage the whole day so that he does not have to feed

them. He has no licence, no parameters, no government controls. The milk that is bought from him is simply boiled by you—killing no tuberculosis bacteria.

Before pasteurization was made compulsory in western countries a century ago, *M. bovis* accounted for 25 per cent of all TB cases in children (Roswurm and Ranney, 1973). But it is not compulsory in India. So how many lakh Indian children have it? All studies say that the disease is going to increase in the coming years due to the growing intensification of dairy and cattle grown for export. For instance, cattle herds in Puri, Odisha have increased in bTB from 9.1 per cent to 84.7 per cent (Dhanda and Lall). We have 300 million cows and buffaloes, the largest population of cattle in the world (Basic Animal Husbandry and Fisheries Statistics, Government of India, 2017). We have the largest beef export. Therefore, we have the potential to infect the whole world with bTB.

Animals are more likely to be infected by *M. bovis* when they are poorly nourished or under stress. There is evidence that intensive dairy farms have a higher risk of infection. The bacteria is spread by infectious animals—in their breath, milk, open lesions, saliva, urine or droppings. In cattle, excretion of *M. bovis* begins around 87 days after infection occurs. It spreads from cows to calves via the milk.

What are the symptoms in cattle?

In the early stages of TB, clinical signs are not visible. In the later stages, clinical signs may include: sluggishness, emaciation, lethargy, weakness, anorexia, low-grade fever, and pneumonia with a soft chronic, moist cough and a chest wheeze. The lymph nodes may be enlarged. If the animal is killed for its meat in an early stage of TB, the microscopic lesions will be missed, that is, if someone is looking. No slaughterhouses in India have even the most basic TB skin test. Cattle need to be isolated and treated with a combination of antibiotics for 6–12 months. But who will do this? In the unlikely event that the cattle are tested for bTB, which dairyman will spend money on their treatment? It is too expensive and too long. He is more likely to keep taking the milk and then as they grow sicker and the milk dries up he will sell them for meat. The meat is sold with no warning to processors or consumers that it comes from TB-infected cattle.

Here is a report from England: 'Tens of thousands of diseased cattle, slaughtered after testing positive for bTB, are being sold for human consumption by Defra, the food and farming ministry,' reported *The Sunday Times* in 2013. Following an investigation, the paper says it found that the meat is being sold to caterers and food processors by the government's food and agriculture department, despite being banned by

most supermarkets and burger chains. Tuberculosis is often fatal. It is a long-lasting disease that cripples through emaciation, coughing, abdominal infections, enlarged lymph nodes, and general bad health. *M. bovis* causes the same problems as *M. tuberculosis*—except that it is even more resistant to drugs. Not everyone exposed to the *M. bovis* bacterium will develop symptoms. If symptoms of bTB occur, they can include: fever, night sweats, persistent cough, diarrhoea, weight loss, and abdominal pain. According to WHO, about 143,000 people die of *M. bovis* annually. The BCG (Bacillus Calmette–Guérin) vaccine invented in the 1920s by Calmette and Guérin had proved to be ineffective. It reduces the severity of the disease but does not prevent infection. Cattle that are vaccinated with the BCG vaccine, which contains a harmless strain of the bTB pathogen *M. bovis*, make it impossible to distinguish, with the skin test, if the animal has TB or has simply been vaccinated. The vaccine is banned in most countries.

This is what the study says: 'bTB has a high and widespread prevalence in India as no national control strategies have been implemented in the country. These data suggest that India, as the world's largest producer of milk accounting for 18.5 per cent of the world's total milk production and the world's largest red meat exporter has an urgent and as yet unmet need for control of bTB for both economic and public health reasons.' The study recommends a national surveillance programme using a single, well-standardized skin test performed by independent, well-trained operators using approved protocols and well-standardized tuberculin antigen.

Is the government going to do this? No. So, human tuberculosis in India will not slow down in spite of our signing the World Health Assembly protocol in May 2014 to end the global TB epidemic by 2035. Any attempt to eradicate the disease from humans without eradicating it from cattle is futile. ■



Migrant Crisis in COVID-19

Reaching Out to the Distressed in Doon

Indian migrant workers during the COVID-19 pandemic have faced multiple hardships. With factories and workplaces shut down due to the lockdown in the country, millions of migrant workers had to deal with the loss of income, food shortages, and uncertainty about their future. In this article, **Dr Rakesh Agrawal 'Ridh'** highlights that in such distressing times individuals and members of many groups in Dehradun decided to form Doon Nagrik Rahat Samuh to extend help to all not getting any relief in this lockdown, especially casual labourers, irrespective of any bias.

Totally shattered, Radha Devi 35, living in ramshackle, derelict two-room hut in the labour colony, attached to Transport Nagar, Dehradun, was reduced to tears; once again she had to return empty-handed for not finding any work at the truck depot as no goods were coming to the city, following the lockdown. She had migrated with her family from Bihar 15 years ago, when the construction boom hit Dehradun. She

along with her husband, also a labourer, engaged in loading and unloading goods in trucks, and three children were living on a fringe, but surviving. Now after the nationwide lockdown, even this was threatened, so were millions of other disenfranchised and deprived labourers, mostly migrants, all over India. Radha was shocked to see a group of four people standing outside her hovel, holding a bag. 'Sakhi (friend), we were waiting

for you. Take it and feed your children,' welcomed Kavita Krishnapallavi of Stri Mukti League.

Stri Mukti League is a Dehradun-based forum, working for women's empowerment. During the present global crisis due to the COVID-19 pandemic they are helping disenfranchised and deprived labourers, mostly migrants, from all over India. They help them by handing them a bagful of dry ration, containing 5 kg wheat flour, 5 kg rice, pulses, sugar, potatoes, onions, oil, spices, salt, soaps, toffees, and biscuits.

Kavita Krishnapallavi and many like-minded individuals and groups have joined hands to extend a helping hand to these dispossessed people, mostly labourers, in Dehradun, in April 2020 when they could not stand their miserable condition (during the lockdown period) anymore and decided to act. 'We, individuals and members of many groups, decided to form Doon Nagrik Rahat Samuh (DNRS) to extend help to all not getting any relief in this lockdown, especially casual labour,' tells Kamla Pant, convenor, Uttarakhand Mahila Manch, a state-wide forum of struggling women. The effort was to provide the much-needed relief to all



Survey by DNRS team

DNRS Members reaching out to a colony with relief material



such people, especially to those who do not have any formal registration, such as Aadhar and BPL Card. 'We strategized to make it well-planned and effective, and formed a committee, who would conduct a survey to identify the neediest in the city, opened a bank account and started a WhatsApp group,' informs Bhargav Chandola of People's Forum, another Dehradun-based group.

Soon, the financial and human resources of the mission expanded from seed-money of ₹10,000 to, 'About

₹85,000 at present and growing as many people are donating daily,' tells Chandola. Members also used their own two- or four-wheelers for the relief work. 'I and five others have motorcycles and two others (Kamla Pant and Bhargav Chandola) used their cars to conduct surveys and reach out to the distressed people, for storing the relief materials and carrying them, meeting fuel expenses ourselves,' tells Imran Rana, a group member. With the expansion of the group's membership from 20 to 43, their

reach also expanded. 'We identified needy labour families in Nehru Gram and helped them with dry ration kits, each costing ₹600 and also helping people of lower-middle class who have lost their jobs,' tells Puran Barhtwal of People's Science Institute, a city-based NGO and member, DNRS.

As the lockdown entered into its third phase, the predicament of people multiplied, so did the resolve of the helping hands. Not just food, labourers also got sanitizers and masks. 'As they could not afford readymade masks and commercial sanitizers, so we also distributed about 800 homemade masks made by group members and 200 litres of sanitizers that we prepared for their safety,' tells Chandola. However, many homeless and migrating to their homes up in the hills could not use dry ration and wanted cooked food. National Association for Students and Parents Rights (NAPSR), a Dehradun-based voluntary group, aiming to help students and parents, came forward. 'We expanded our mission in this desperate time and provided cooked food and milk to hundreds of deprived and hungry



DNRS Team reaching out to a colony in Dehradun

THE NAPSAR Team getting ready



people,' tells Arif Khan, President, NAPSAR. Daily, two vans with 100 plates of cooked food, having *roti*, rice, *sabzi* and *dal* visit different localities to feed such people, 'We started this mission on March 23, before the lockdown, spread the message through social media, WhatsApp groups and personal contacts, to feed the homeless hungry people,' says Kavita Khan of NAPSAR and also Arif's better half.

Besides, the group also takes care of children and arranges milk for them. Several volunteers have chipped in to make the mission possible. For instance, Aaliyah Khan of Sasastradhara Road has taken the responsibility of providing milk to two children for one month and Madhav Negi of Nehru Gram for three children for a month.

Going a step further, the group motivated 40 individuals to 'adopt' 150 families of five for a week or two or a month. Many like Vikas Dobhal, a social worker from a city colony, Nathuvawala, had 'adopted' 20 households for a week and CS Joshi of EC Road, six for a week.

Also, the group's original mission: spreading education continues, 'When they started a book exchange programme where parents of children who have passed out can donate their old books, I jumped into it and donated all books of class X of my son who graduated last year,' says Kiran, a city-

based mother. The recipients are equally happy, 'When schools and markets are all shut, these books would be a boon to my daughter who would be in the same class when the new session restarts,' hopes Virat Gupta, the recipient. Not just these two groups, but also a spirited

individual, Trilochan Bhatt, a Dehradun-based journalist and social-activist has also used social media for a noble cause in this distressed time, 'My Facebook friends donated ₹156,000 and I have helped around 100 households from it,' tells Bhatt.

DNRS, NAPSAR and Bhatt dutifully followed lockdown's rules, such as maintaining physical distance, supplying food and ration from a safe distance, wearing masks, and using sanitizers. While all of us were following social distancing and quarantine rules during the nationwide lockdown in the safety and comfort of our homes, these brave soldiers of humanity are out on the 'hungry streets' of Dehradun to feed the poor and deprived, spending their own financial resources and other assets. ■

Dr Rakesh Agrawal 'Ridh' is a doctorate in International Relations from JNU and has been writing on grassroots development and people's rights, especially related to land, water, and forests.



Wet Waste

A Resource Undervalued in India!

The Swachh Bharat Mission (SBM) was launched by the Government of India on October 2, 2014. A visible improvement has been observed in waste management and sanitation since implementation of the SBM. Open defecation was a normal practice in India; through the effective implementation of SBM almost all parts of the country are now open defecation free. Even years before the SBM, the legislative framework has been in place under the aegis of the Environment Protection Act, 1986 in India. For different kind of wastes, we have a set of well-defined and well-framed rules, like the Hazardous Waste (Management and Handling) Rules, Municipal Solid Waste Management (MSW) Rules, Biomedical Waste (Management and Handling) Rules, E-Waste Management Rules, and so on.

However, even after having legislations for many decades, the desired level of waste management has not been achieved in India. The proper waste management requires sustainable performance of all stages of waste management, that is, collection, treatment, and disposal of waste. In all large cities, the MSW is collected efficiently from the household level but its segregation and disposal are not performed in scientific way. In most cases, MSW is removed from the houses but it is ultimately dumped in an open area nearby the city, this practice is very unhygienic and not sustainable, hence it doesn't fulfil the criterion of either existing waste-related legislation or the SBM.

In large cities, the door-to-door waste collection is improved after SBM but segregation and disposal of MSW are

not happening in scientific way. In the following table, some of the minute concerns of segregation of wet waste are highlighted.

In India, we have very rich organic content in our garbage as compared

to western countries. Almost at no cost we can utilize wet waste and generate many co-benefits, while solving the long-pending environmental issues. Wet waste is a resource in our control, its wise use could provide many benefits including

Analysis of wet waste segregation practices and recommendations

Sr. No.	Issue	Present Practice	Recommendation
1	Segregation at source	Mostly, the wet waste and recyclable waste are not segregated at household level. The composite waste is dumped into single container and handed over to the collection van of Municipal Corporation.	Wet waste of every household has to be segregated and collected in different bins. The wet waste is mainly the kitchen and food waste. There must not be any contamination in the wet waste, such as stapler pin, metal parts, small plastic, glass, etc.
2	Treatment of wet waste	The composite waste is taken by Municipal Corporation and they dump this composite waste into landfill site. In many cities, manual scavenging of recyclable items is being done by very poor and vulnerable people.	The wet waste shall be treated onsite in a society in common area. The wet organic waste is a rich source, which can be converted into very useful manure. The manure can be made very easily by following some simple but regular practices.
3	Awareness of members of family and resident society	People do not understand scientific necessity of waste segregation at source. Even in segregated waste, they mix-up small contamination of plastic, metal or glass.	A comprehensive, continuous and demonstration-based awareness is required. This awareness shall be converted into daily habit of scientific and regular practice of segregation of waste.

Contd...

4	Defining priority	Waste management is not a priority from its treatment and final disposal point of view. People just want to remove garbage from home. They are not concerned for its end-of-life process and disposal.	It is high time to communicate to our families, neighbours and friends that waste is our own responsibility. If we are not seriously taking care of it, it is making our air unfit to breathe and also contaminating our water, land, and entire environment. For such negligence, we have to pay a very huge price for generations to come.
5	Skilled manpower	Presently, even sometime segregated waste at household level, mixed up with other recyclable waste by housekeeping workers. Or the segregated waste is not properly used. Therefore, the purpose of waste segregation is not solved or not showing its impact as a whole.	Skill development of our housekeeping staff and their motivation is very important. We must train them professionally not only to collect segregated waste, but also for making people aware and inspire them about waste handling practices. Each one in our society shall be communicated to contribute for better waste management practices. Dignity of labour handling MSW should be well recognized.
6	Kitchen gardening and plantation at grassroots – community/ society level	Presently, very few people or societies are using the collected wet waste as resource. At some places it is being used as a resource to make manure or biogas, or at very few places it is directly used in growing vegetables in kitchen gardens or raising green plants around the society.	The wet waste is considered as black gold if it is used in a systematic manner. It is high time to value this resource and internalize its value in our social system. A good quality manure can be made out of wet waste, which must be used to either raise plantation or in growing vegetables locally. It is very much possible to grow vegetables in common areas, terraces, balconies in our societies, and so on. Alternatively, wet waste could be used in making biogas.



reduction of methane emission, reduce burden on city waste management, circular economy at city level, healthy and local food, organic living, and so on. Moreover, it seems that failure in waste segregation is collective responsibility of society rather than that of the government.

As per an estimate, contribution of approximately ₹200 to ₹300 per month from every household of a society could result in an effective wet waste management. Properly trained and skilled manpower should be engaged in waste collection while quality of wet waste is ensured. This manpower should be rewarded with attractive salary and could become a change agent of the community. Apart from the manpower, from the financial contribution required equipment for handling and processing wet waste into manure and development of kitchen garden would be possible. This system will again generate cash flow from organic produces from such locally grown vegetables. In some of the communities and societies, such initiatives are successfully running. The only need is to change: (i) assertiveness towards our own garbage, (ii) our habits of disposal, and (iii) its regular maintenance. In our recent experience of COVID-19 situation, we have felt that the desired state of health can be achieved with determined collective actions at society or community level, similarly, a sustainable state of SBM can be achieved with our committed approach towards our household level garbage. Let us try it committedly. ■

Article contributed by Mr Shwetal Shah, Climate Change Department, Gujarat.

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