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INDIA'S COVID-19 EMERGENCY

DEAD GIVEAWAY

A crematorium in New Delhi on April 21, 2021

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The Statesman 06th August 2020

"What kind of future is India heading towards with a governance framework where people's health and welfare is endangered, and where the environment, the very basis of survival, is destroyed? For whom is this development?"

By:

PROF. (DR.) TARINI MEHTA

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Governance matters

IT'S A sharp bell curve and the course of the virus coincides with a change in government. In mid-January, the US had over 200,000 daily new COVID-19 cases. On January 20, the new president, Joe Biden took over. By mid-February daily new cases fell sharply to 50,000.

You may argue that the decline was because the wave had peaked in the US; but the fact is that governance matters. It is a fact that the then outgoing president Donald Trump had derided scientific evidence on the pandemic, rejected advice against holding rallies or even wearing a mask. This changed. In every government meeting, the new president wears a mask. The message is clear. It makes a difference. Moreover, there has been an aggressive move to vaccinate the entire population. As of May 11, some 36 per cent of the US' population had got the jab and the plan is to get everyone vaccinated by July. This means the country is back in business.

Now India's horrific and apoplectic COVID-19 surge is teaching the US lessons. Top science adviser Anthony Fauci told the country's senators that the worst mistake that India made was to underestimate the virus; it opened up too soon; it let the guard down too soon. So, the US is now talking about long-term measures, including investment in public health infrastructure, even as it opens up its economy. It's working on booster shots so that its population can remain protected.

I am writing this even as I still hear ambulance sirens. I am writing this even as the virus continues to ravage and destroy families all around me. Every day is a new horror. We saw how patients died when oxygen supply failed in hospitals. Then we heard horrific and tragic news from family and friends how they struggled to give a near-decent send-off to loved ones in over-flowing cremation grounds. We heard of how the fire from these pyres was blowing to nearby areas. And now we have seen the horror of bodies floating down the river—forget the squabble between governments; it happened because too many died and there was no space or no way to cremate them. This is an image of human suffering that we can never forget.

India's shame is not the virus but the fact that we do so little to provide healthcare even in normal times

So now, as I write this, the virus has made its way into rural India. Last year, we were all convinced that there was some magical immunity in people who lived in the surroundings of our cities. The virus seemed not to make it into their homes. In spite of all the dire warnings of how rural areas did not have the health infrastructure worth its name to deal with any such catastrophe, the predictions came false. It is the disease of the rich, it was said. The poor escape the virus.

Not anymore. It's now all over; it's in villages and it's in houses where people have no access—none at all—to testing facilities or even basic health care. It's the nightmare of nightmares. We will overcome the pandemic and governments will act to do all they can to control the spread of the virus, I am sure of that. But at what human cost? What will be the scale of the suffering where families are losing loved ones; where sole bread earners are dying; where children are being orphaned? It frightens me even as I write these words.

The question now is not about the past recriminations; who is to blame or not. The only question that matters is if we will learn from our mistakes and do better in the coming times. Or else the deadly surge that has consumed us now will return again, because we were arrogant enough to believe that we had conquered nature. We did not have to learn. And so, here are the lessons we must learn and take to heart: One, will we reinvigorate our scientific institutions so that they can speak out and earn the credibility of knowledge and public trust? This way, even if politicians do not listen because they have conflicting priorities, the evidence is not compromised.

Two, will we invest in building our public health infrastructure? Not by sending token gifts of ventilators (which according to news reports are not even in working order) but by doing all that we know needs to be done; by investing real money in the hardware and software of health provisioning. India's shame is not the virus, but the fact that we do so little to provide healthcare in normal times. Three, will we procure vaccines at speed and at whatever cost it takes—best done through central government tenders—so that we can vaccinate all, as quickly as we can? All this dithering over the plan for manufacture and purchase of vaccines must stop.

Fourth, will we get serious about the art of governance so that delivery works? We are learning about the enterprise and innovation of government officials and ordinary people, who have found not just the courage but the method to change the path of the virus. This is not just about human endeavour; it is about the practice of the best tools of governance. This is what we must learn and amplify. This is our hope. But our challenge is to sustain this lesson. To not forget. DTE @sunitanar

Down To Earth

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Engage

PHOTOGRAPH: TWITTER

Did development hurt Chamoli's ecology?

Apropos "Glacier breaks in Chamoli, experts blame low snowfall" published online on February 7, 2021, I am sceptical of Professor Maharaj K Pandit's comment that using reinforced concrete in construction instead of wood and stone masonry has created a heat island in Uttarakhand. Perhaps we need to see a study which compares construction materials and their heat radiation properties. We do know that the manufacturing of traditional cement used in concrete has large environmental impacts. But the Himalayas are vast, and the buildings around them are too small to have a major impact.

JEAN
VIA EMAIL

DTE responds

Professor Maharaj K Pandit's comments in the article are based on his column "Himalaya Must be Protected" published in *Nature* on September 18, 2013, where he has made the above point about construction.

Forest officers' safety

This is with reference to the article "Debate: Should forest guards in India be armed with firearms?" (16-28 February, 2021). People who say that the country's forest department has excessive power should remember that several officers work in remote areas and constantly face threats from poachers and plunderers. It is easy to make statements on conservation and forest rights from afar, but it is the officers who face the risk. How many more of them do we want to lose? Indeed, arming forest officers is not the only solution, but it should definitely be considered as one of the solutions!

ABHILASH
VIA EMAIL

Stuck in a policy rut

This is with reference to the column "No country can control the entire critical mineral value chain" (1-15 April 2021). The problem with bureaucrats like yours truly is that we keep reinventing the wheel when it comes to forward-looking policies. Since we believe that we know best, we do not feel the need to look at what others may have done before us. We have made this mistake time and again, and only realise our errors when it is too late.

AJIT JADHAV
VIA EMAIL

Technical know-how

This is with reference to the article "How MNREGA can be used further to address water woes", published online on March 22, 2021. The article correctly states that technical expertise is lacking in projects under the scheme. The local people

ILLUSTRATION: RITIKA BOHRA / CSE

working on the project only use whatever little knowledge they have to construct water storage and infiltration structures, with no extra guidance. Earth science education would help fill this knowledge gap and should be introduced at the grassroots level.

D CHANDRASEKHARAM
VIA EMAIL

Political gimmicks

This refers to the article "Electoral homecoming" (1-15 April, 2021). In the run-up to the legislative assembly polls in five states, certain parties have promised wages or pension for homemakers. Though many countries recognise the productive work of homemakers, Venezuela was the first country to pay them a salary. However, in India's case, the promise to pay a fixed monthly salary of ₹2,000 to women homemakers without working out the modalities appears to be a mere poll gimmick. Several experts argue that in the absence of legislation, this scheme would remain only on paper. The time has come to attach real value to women's work so that they live with dignity, instead of doling out money which may not ensure protection of basic rights and gender equality.

K R SRINIVASAN
SECUNDERABAD

Erratum

In the article "Jobs around the year" of the cover story "The chase and the change" (16-31 March, 2021), Bhuanpada village of Balangir district in Odisha is misspelt as Bhaunpanda. The error is regretted.

DTE TV

Vaccines effective against double mutant

With the discovery of new strains of SARS-CoV-2, the virus that causes COVID-19, the efficacy of vaccines is in question. But both

Covaxin and Covishield vaccines being administered in India are effective against the B.1.617 variant, commonly called the "double mutant". On April 21, the Indian Council of Medical Research said Covaxin could neutralise the variant while on April 22 the Centre for Cellular and Molecular Biology said Covishield was effective against it. The variant has two mutations—E484Q and L425R—that make it more transmissible.

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Digest

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1,000 WORDS VIKAS CHOUDHARY

A COVID-19 patient uses oxygen support to breathe at the Gurdwara Shri Guru Singh Sabha Indirapuram in Ghaziabad, Uttar Pradesh. The second wave of COVID-19 pandemic has overwhelmed the country's healthcare infrastructure, constraining the supply of essential resources like medical-grade oxygen. In Ghaziabad, which is among the worst-affected districts in Uttar Pradesh during the surge, the gurdwara has started an "oxygen langar" for COVID-19 patients on its premises from April 22.

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On SO_2S duty

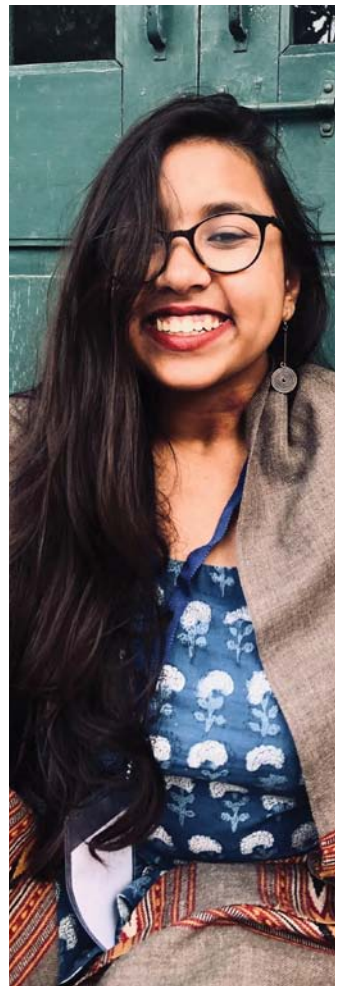
As India's broken health infrastructure fails to handle the second wave of COVID-19, volunteers step up to ensure oxygen access to patients

DAKSHIANI PALICHA NEW DELHI

WAKING UP to text messages enquiring about an oxygen cylinder or a hospital bed has almost become the norm over the past one month. Sometimes, the messages are from colleagues and friends; sometimes from their friends; but many a time they are forwarded messages by people, who probably want to help, but do not know how to do it amid the raging second wave of the COVID-19 pandemic.

Scientists say compared to the first wave, the virus seems to be invading the lungs much quickly this time, pushing up the oxygen requirement (see 'Let's fix blame', *p*24). Hospitals, testing facilities and even crematoria have all but collapsed in a matter of weeks since the surge began; medical oxygen had become the highly sought-after emergency relief material.

From the confines of my room, I quickly scan my phone for WhatsApp messages, particularly from groups specially formed to to keep people abreast of all the developments related to the pandemic for about a year now. I try to call the resources listed before sharing them with the patient's family; usually the phones are eternally engaged or go unanswered. I keep calling until I reach that one person who is able to provide some leads about procuring oxygen



(From left, facing page) Manjinder Singh Sirsa, president, Delhi Sikh Gurudwara Management Committee; Juggy Marwaha, trustee, KVN Foundation; Raunak Singh, founder, Sikh Aid; Rizwan Sheikh, team leader, Anfaal Foundation; Tavissi Jain, student volunteer and Srishti Sensarma, head coordinator, Miranda House COVID-19 Resource database; Amrik Singh, owner, Amrit Sahib Road Carrier; Milind Atrey, Dean (Research and Development), IIT-Bombay

cylinders or refilling the empty ones.

Such uncertainty and despair can be too much to handle even for adults, let alone a 12-year-old boy in Delhi who recently needed oxygen to save both his parents fighting the deadly disease. With nobody to turn to, the boy called Tavissi Jain, a student at the Delhi's Miranda House college, for help. "I have never heard anybody so desperately in need for help. It was overwhelming," says Jain, who with a few of the other students runs a COVID-19 helpdesk. Jain recalls how the team of student volunteers reached out to their individual network and "with great difficulty" managed to procure the oxygen that eventually saved the boy's parents.

"Getting food or even doctors is relatively easy even now. The challenge is to get oxygen and hospital beds. Owing to the scarcity, there is a lot of dubious database floating around," says Srishti Sensarma, another student who came up with Miranada House COVID-19 Resource database. The student volunteers now spend their time and effort individually verifying every lead they come across. "We are generating verified leads on oxygen cylinders/concentrates, hospital beds, ambulances and even food services in the city," says Sensarma. The group, like several others in the city, relies almost exclusively on the social media to disseminate the verified leads. They also have a helpline number where people in distress can call for assistance.

Jain says the recent Supreme Court ruling that says state governments cannot take action against people who are using social media for COVID-related assistance has been a great help for them. "Social media is incredibly important to reach people right now,.

While online warriors like the students of Miranda House and many more are working tirelessly to fight misinformation, there are others who are quietly risking their lives to ensure timely supply of oxygen in the current crisis. Amrik Singh of Amrit Singh Road Carrier is one such transporter, who has for the past month been running a war room out of his office in the capital. He owns a fleet of 20 trucks that are being used to transport oxygen to several

hospitals across the capital and neighbouring Punjab and Haryana. "I have to closely monitor the movement of the trucks from my office as there have been several occasions when they have been stopped en route by desperate mobs," he says. Usually, this means a delay of five-six hours till the trucks can pass, but on two occasions, his drivers were forced to leave the trucks for their own safety.

Amrik says the hospitals he serves would normally replenish their oxygen supply three to four times a month. Now the average has jumped to more than a dozen trips a week. So, the trucks are almost always on the road and ensuring their timely and safe arrival at the hospitals is a constant challenge. What keeps Singh and other transporters in the city going is the pride that is associated with the job. "It is our duty and we know our job is saving many lives," says he.

This resilience in the wake of the crisis can be seen in several individuals and institutions that are quietly supporting the healthcare system that is currently stretched beyond imagination. Oxygen *langars*, being organised by several *gurudwaras* across the country, have become synonymous with the spirit of public conscience and resilience in the face of the unnatural calamity. *Langar* is a community kitchen concept in Sikhism that caters to the basic need of nutritious food for all.

"Many *gurudwaras*, big and small, are providing oxygen to COVID-19 patients in the Capital," says Manjinder Singh Sirsa of the Delhi Sikh Gurudwara Management Committee (DSGMC). The biggest setup is at Gurudwara Damdama Sahib in the Delhi's Nizamuddin region that is running 50 cylinders round the clock to provide free oxygen to patients. A similar initiative is being carried out by Gurudwara Sri Guru Singh Sabha Indirapuram in Ghaziabad, Uttar Pradesh, that has teamed up with non-profit Khalsa Help International.

"We are all in this situation together. In our individual capacities, we are doing what we can to help people; we also help each other out so the good work continues," says Sirsa, adding that DSGMC is shortly going to open a 250-bed COVID-19 facility with intensive care at the Gurudwara Rakab Ganj Sahib near the Parliament House.

Corporate-funded groups are also pitching in to supply free oxygen. Karnataka-based KVN Foundation, that launched last year for COVID-19 relief, has started its "Mission MillionAir" initiative to supply free oxygen concentrators to the poor. "The foundation has already distributed 220 concentrators in Bengaluru and Mumbai," says Juggy Marwaha, CEO, Prestige Office Ventures and one of the foundation's trustees. Capitalising on the corporate backing, the foundation has been able to procure concentrators from different countries. "Normally, India imports concentrators from China, but that option is not available. We are now partnered with companies here and manufacturers in the US and a few other Western countries," he adds. The other members of the core team include Venkat K Narayana, CEO, Prestige Group; K Ganesh, founder, bigbasket; and Neeraj Bhargava, co-founder, Antuit.

AS COVID-19 CASES RISE, NON-PROFITS AND CIVILIAN ORGANISATIONS ARE WORKING HARD TO FULFILL THE DEMAND FOR MEDICAL OXYGEN

While DSGMC and KVN Foundation responded quickly to the need of the hour, some non-governmental organisations had prepared for it well in advance, and were able to keep aid steady amid the onset of the second wave. One such organisation is Anfaal Foundation in Mumbai. The non-profit, which works towards economic upliftment of marginalised communities, has been providing oxygen cylinders and medicines since mid-April 2020.

"Initially we had set up a helpline where people could seek advice from a panel of doctors on COVID-19 treatment and hospitalisation. Callers would often ask for cylinders, so we bought 20-25 of them from vendors and made them available for people," says Rizwan Sheikh of the non-profit. This year, it has ramped up its stock to more than 40 cylinders.

However, with limited resources, a feeling of helplessness sets in when volunteers are unable to reach everyone who needs oxygen. So the non-profit has teamed up with similar organisations across the city. The groups share information on oxygen demand in each other's areas to ensure timely interventions.

Like Anfaal Foundation, Odisha-based non-profit Sikh Aid also made an early start, providing oxygen cylinders for free in Bhubaneswar and Cuttack since August last year. "Up until the end of March 2021, we had provided a total of 120 cylinders. Since the second wave began, we supply 100 cylinders a day," says Raunak Singh, the founder of the non-profit that raises funds for underprivileged families.

At the onset of the second wave, Odisha was running short of cylinders rather than oxygen. Sikh Aid bought them from vendors in Pune, Maharashtra and keep the supply steady.

While the efforts of people and organisations are on gathering and sharing the limited oxygen available, scientists are looking for ways to ramp up the supply. A team from the Indian Institute of Technology-Bombay (IIT-B) has successfully demonstrated how nitrogen generators can be converted to produce oxygen. "Nitrogen generators have a pressure swing adsorption or PSA unit (a device that separates one gas from a mixture of gases) with a carbon molecular sieve. This helps separate nitrogen from atmospheric air," says Milind Atrey, dean (research and development), IIT-B.

"By changing the molecular sieve from carbon to zeolite (alkaline and alkaline-earth metals), we can store oxygen from the air instead of nitrogen," he adds. This process helped IIT-B, that worked along with Tata Consultancy and Spantech Engineers, a PSA-manufacturing company, capture 93-95 per cent pure oxygen. The team has shared its findings with nitrogen plants across the country and believes it can boost the oxygen generation capacity of India.

BITS GLOBAL

The World Health Organization (WHO) will set up a global data hub later this year in Berlin, Germany, to analyse information on emerging pandemic threats. The WHO Hub for Pandemic and Epidemic Intelligence will go beyond current public health monitoring systems by studying data to look for "pre-signals" of emerging outbreaks and prevent or manage global disease risks before they spread.

US President Joe Biden's administration has brought out its first regulation that attempts to reduce greenhouse gas emissions. The new rule from the country's Environmental Protection Agency (EPA) aims to phase out hydrofluorocarbons (HFCs) that are commonly used in refrigerators and air conditioners by cutting down production and imports 85 per cent over the next 15 years. Phasing out HFCs globally can avert 0.5°C of global warming, EPA said.

China has launched a satellite imaging database containing detailed information on more than 1 million geographical locations, to help artificial intelligence tools make fewer errors while identifying places from space. The Chinese Academy of Sciences claims the database—called the fine-grained object recognition in the high-resolution remote sensing imagery (FAIR1M) database—could be up to 100 times larger than any similar tool used globally.

South Africa has taken the first steps to end its multimillion-dollar lion breeding industry, by saying that it will no longer issue permits for captive lion breeding, hunting or interactions. The country's environment minister Barbara Creecy said this move came as the captive lion industry—a major contributor to tourism—is hurting South Africa'conservation efforts.

FRAMEWORKS

■ The Ministry of Environment, Forest and Climate Change has issued a **draft notification on fly ash utilisation** in coal and lignite thermal power plants. The notification directs the plants to achieve 100 per cent fly ash utilisation in three to five years and also, for the first time, introduces a penalty for non-compliance.

■ The Ministry of Law and Justice has published an ordinance for the constitution of the **Commission for Air Quality Management in National Capital Region and Adjoining Areas**.The ordinance, promulgated by the President, is for coordination and research on air quality in and near the National Capital Region.

■ The Madhya Pradesh government has issued **Draft Occupational Safety, Health and Working conditions (Madhya Pradesh) Rules, 2021**. It repeals earlier rules on employing construction, transport and inter-state workers.

IN COURT

NATIONAL GREEN TRIBUNAL

■ In a matter related to conservation of the East Kolkata Wetland area through prohibition of illegal and polluting activities, the National Green Tribunal (NGT) directed state authorities to assess compensation for restoration of the encroached area. NGT also told them to submit a status report on a management plan ordered in a previous hearing.

■ In a case against illegal extraction of groundwater for maintenance of cricket grounds, especially during the Indian Premier League, NGT has asked the Union Ministry of Jal Shakti, Union Ministry of Sports and Youth Affairs and the Board of Control for Cricket in India to consider alternative measures such as rainwater harvesting, use of treated sewage water and hiring of environmental experts for stadiums to ensure effective water conservation.

SUPREME COURT

■The apex court has directed the Pune Municipal Corporation (PMC) to find an alternative site for a wet garbage processing plant on Sus Road in the Baner suburb of the city, within two months. NGT on October 27 last year directed PMC to relocate the plants within four months, as it violated citizens' right to environmental safety.The Supreme Court stayed that order on February 8, but has now asked PMC to make plans on the shift and report on the progress by July 6.

HIGH COURTS

■ Karnataka High Court has asked the state government to decide on resuming midday meals for school students from grades 6 to 10.The court said that since schools in the state remain open and children are attending classes, food must be provided.

So far...

Number of cases on environment and development tracked from January 1 to May 3, 2021

NATIONAL GREEN TRIBUNAL	SUPREME COURT	HIGH COURTS
158	44	59

Compiled by DTE-CSE Data Centre

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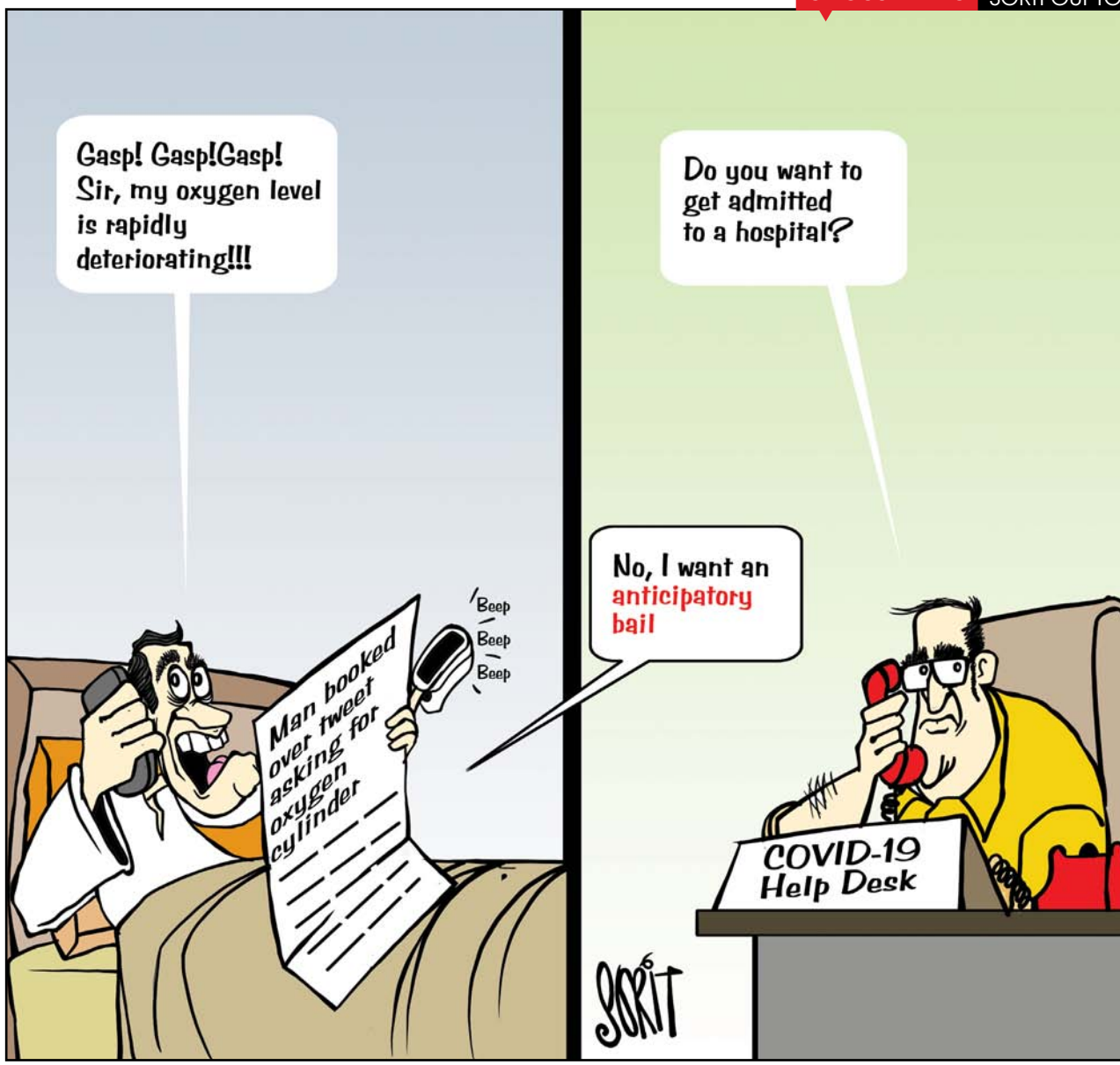

BIG NUMBER

7.3 million

The number of people in India, salaried and non-salaried, who lost their jobs in April 2021 amid the second wave of the COVID-19 pandemic

Source: Centre for Monitoring Indian Economy, a private research firm

VERBATIM

"WE NEED INTERNATIONAL COOPERATION TO URGENTLY REDUCE METHANE EMISSIONS AS MUCH AS POSSIBLE THIS DECADE"

INGER ANDERSEN

Executive Director, United Nations Environment Programme (UNEP), on the *Global Methane Assessment*. The assessment by UNEP and the Climate and Clear Air Coalition says a 45 per cent cut in methane emissions would prevent 260,000 premature deaths and 25 million tonnes of crop losses annually.

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EIA: A REQUIREMENT BEYOND CLEARANCE

COURSE DATE: July 1-10, 2021 | **LAST DATE TO APPLY:** June 27, 2021 | **COURSE FEES:** INR 2,500

In 1994, an Environmental Impact Assessment (EIA) Notification was brought in with an objective to minimize the adverse impacts of developmental projects. But it has become a mere clearance process. This is, in part, a result of weakening of the Notification through amendments. But another factor is also responsible for the enfeeblement of EIA.

There are three important stakeholders in an EIA study: project proponent, consultant and regulators. Each of them has a role to play in identifying and quantifying the impacts of a project and implementing appropriate mitigation measures. A good EIA study can actually prove beneficial to the project proponent and save them the cost incurred due to non-compliance. However, there is a lot of ignorance on the mechanism of EIA and this also leads to its non-optimal implementation.

In order to make the process of EIA substantial, clearer and deeper understanding is the need of the hour. To this end, Centre for Science and Environment, is organizing a 10 day-long online training course on the topic.

Course Objective: The online course has been designed to capacitate environmentalists and prospective environmentalists to develop a better understanding of the EIA process.

The course will be conducted through presentations, recorded videos, discussion with experts and reading material.

COURSE COORDINATOR

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Progarmme Officer, Industrial Air Pollution
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Participants will be awarded a certificate of completion on successful completion of the programme

KEY TAKEAWAYS

- Consequences of poor EIA reporting
- Methodology for EIA preparation
- Methodology for data collection
- Analysis of socio-economic impacts
- Preparation of Environmental Management Plans
- Case studies on good environmental practices
- Review and evaluation of EIA reports
- EIA legislation: India and developed countries

WHO CAN APPLY?

- Industry professionals, environment consultants and environment engineers
- Researchers and academics
- Students aspiring to work in the field of environment

Fresh hopes

The US is back on the climate stage, but is it enough?

AVANTIKA GOSWAMI
NEW DELHI

THE PARIS accord was not designed to save the environment. It was designed to kill the American economy," claimed Donald Trump, the former President of the United States, as he withdrew the country from the landmark agreement on climate change in November 2020. Fortunately, the exit did not last long. Trump lost the election to Joe Biden, who vowed to re-join the accord as soon as he entered the White House in January 2021. And he did.

He then invited 40 heads of state to a virtual Leaders Summit on April 22 and 23, 2021, to unveil the country's new nationally determined contribution (NDC) targets. The country has pledged to reduce greenhouse gas (GHG) emissions 50-52 per cent below the 2005 levels by 2030. This is accompanied by the goal of reaching net zero emissions no later than 2050. The previous and only other NDC, submitted by the Barack Obama administration, had pledged to cut emissions 26-28 per cent below 2005 levels by 2025.

The new NDC is only 12 per cent more ambitious over the previous one. And it is not enough to keep the global temperatures below 1.5°C, suggests the Climate Action Tracker (CAT), developed by non-profits Climate Analytics and New Climate Institute. It recommends a 57-63 per cent domestic target for the US to be 1.5°C compatible by 2030, with additional support to developing countries.

ILLUSTRATION: RITIKS BOHRA / CSE

Several other countries also announced their NDCs ahead of and during the Summit. Japan pledged to reduce emissions 46 per cent from the 2013 levels by 2030, compared to their earlier goal of 26 per cent. Canada pledged to cut emissions 40-45 per cent from 2005 levels by 2030, compared to its previous goal of 30 per cent. The EU and the UK announced targets to reduce emissions by 55 per cent and 78 per cent from 1990 levels, by 2030 and 2035, respectively.

With 1990 as the baseline, UK's pledge is the most ambitious, followed by the EU, US, Canada and Japan (see 'Revised ambitions').

Though not enough, the two-day virtual meet of political figureheads has put climate back on the agenda. It also establishes the US' renewed commitment to fight climate change. In April 2021, Biden unveiled a $2 trillion infrastructure package which had many elements of climate-friendly policy—R&D funds for clean energy, investment in the electric grid and so on. Though insufficient, given the scale of decarbonisation needed, it is a start. He has also advanced climate cooperation through dialogues with major countries and these are all steps in the right direction after four years of Trump's anti-science and anti-environment moves.

Truth be told

The climate community now needs to sift out the tangibles from the noise. The US is the largest historical emitter, accounting for a quarter of the world's carbon dioxide emissions since 1751. Its emissions have declined recently owing to the steamrolling of coal by the country's shale gas boom—shale gas, though less carbon intensive than coal, still emits methane which is a potent GHG. Fossil fuels still comprise more than 80 per cent of the country's energy mix.

As of November 2020, the US had the highest amount of public money, among G-20 countries, committed to fossil fuels in its COVID-19 recovery packages—far higher than to clean energy.

US special presidential envoy for climate John Kerry attempted to remind economies like India and China about the perils of relying on coal on his recent diplomatic tour to the countries. A key focus of his trip was "supporting India in mitigating its fossil energy use". And while this is not misplaced, considering India sources over 70 per cent of its energy from coal, the statement teeters on the edge of hypocrisy. In 2019, per capita fossil fuel consumption for the US was 66,525 MWh (megawatt hour), while that for India was 6,303 MWh—a figure lower by a factor of 10.

Biden plans to make the power sector carbon free by 2035, one of the main goals in his climate plans. Few specifics, though, have been provided on how they will achieve this. There is a mention of leveraging carbon capture and existing nuclear power—both methods that bring their own set of problems and can distract from a meaningful ramp-up of renewables.

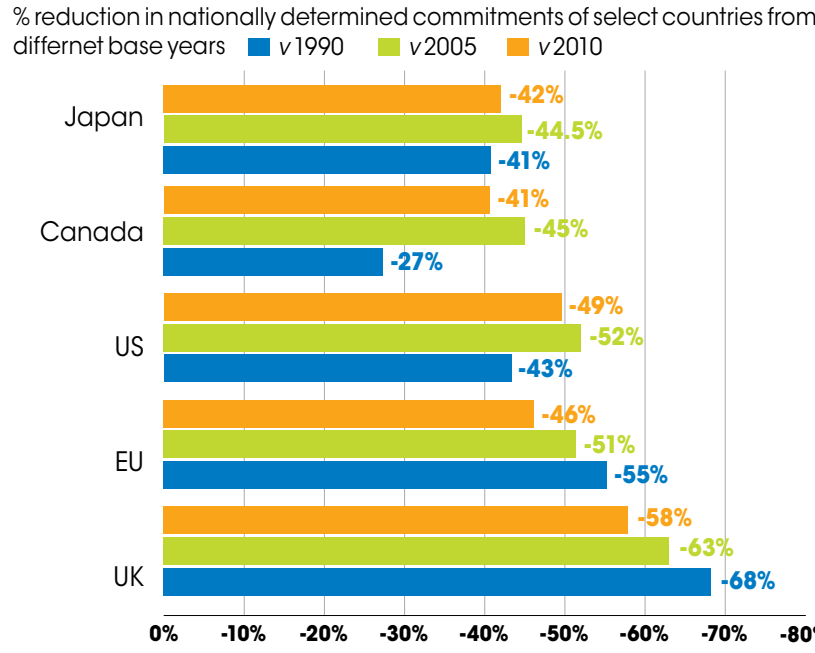
As per the US Environmental Protection Agency, the country's emissions in 2019 were 13 per cent below the 2005 levels. This gives the country just nine years to draw its emissions down another 40 per cent to fulfil its NDC.

The climate community must consider the US' role as the largest oil and gas producer in the world—and a heavy consumer as well—and push for actions that will ensure actual emissions reduction for the US, and adequate support to developing countries globally. DTE

@aygoswami

REVISED AMBITIONS

The UK and the EU have set the most abitious targets to reduce greenhouse gas emissions, followed by US, Canada and Japan



Source: Rhodium Group, UNFCCC

India's forest republics

Tribal villages in Maharashtra show how community rights over forests could change fortunes of India's poorest communities

ISHAN KUKRETI GONDIA AND GADCHIROLI, MAHARASHTRA

Gopal Mansaram Kumeti of Damditola village, Gondia district , Maharashtra, has recently taken up drumstick cultivation

PHOTOGRAPH: REUTERS

GOPAL MANSARAM Kumeti, a 48-year-old resident of Damditola village in Maharashtra's Gondia district, has been busy preparing for his daughter's wedding. A new house being built for guests is still under construction. The four people making furniture are behind on their work. A second-hand Mahindra Bolero car Kumeti has recently purchased is still with the local mechanic for repairs. "These things go on till the last minute, don't they?" he says with a heartfelt laugh. However, Kumeti is rather worried about his trials of a new crop—he is the only farmer in the district trying his hands at drumstick. "I learnt to grow it by watching videos on YouTube, but I think I gave it too much water," he says, pointing to the solar pump at one corner of his 4-hectare (ha) farm. "Now I know how to tend to it next season," says Kumeti, who has previously reaped a bountiful harvest of wheat, brinjal, okra and cauliflower from the farm.

A mid-March morning was not always like this for Kumeti. A decade ago, he used to work as a labourer in the sugarcane fields of Aurangabad. Every year, he would migrate soon after Diwali and return home seven months later, towards the end of June. "Then there was no water in the village and we could not grow anything. Now, as you can see, I have irrigated more than required," he says.

Some 100 kilometres south of Damditola, the residents of Dungartamashi village in Gadchiroli share similar turnaround stories. Over the past few years, the *gram sabha* of

this village of 60 families has accumulated so many funds that it now sponsors the tents, decor and music for all wedding ceremonies in the village. To end the water woes of its residents, it has constructed a 700-metre pipeline and a tank at an expense of ₹1.68 lakh, which now bring water from the Khobaragadi river to the village pond.

These are no mean feats for villages tucked away in forests and located in districts that have been at the lower rung of the socio-economic ladder—Gondia is one of the backward districts of the country and Gadchiroli, as per NITI Aayaog's estimates, is among the 124 aspirational districts. In fact, an analysis by *Down To Earth*, which visited these districts amid the COVID-19 pandemic, shows that at least 56 forested villages in Gondia and Gadchiroli have managed to break the cycle of poverty in the past few years. Between 2013 and 2020, these villages and their *gram sabhas* have collectively earned more than ₹110 crore just by managing their forest resources (see 'Huge earnings'). Flush with funds, natural resources and confidence, these villages are emerging as the forest republics of India.

SECOND INDEPENDENCE

Such uncanny success of the 56 villages in Gondia and Gadchiroli has its genesis in the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forests Rights) Act, (FRA) 2006, widely hailed as a law set out to do away with the historical injustice meted out to forest dwelling communities by recognising their rights over forest land. But what has also helped these villages is both their ingenuity in exercising their rights as well as their business acumen.

Under FRA, two types of rights are recognised—individual forest rights (IFR) and community forest rights (CFR). While IFR titles essentially provide non-alienable land rights over an area not exceeding 4 ha of forest land, CFR is much broader in its approach. Under CFR titles, the *gram sabha* as a collective unit gets the ownership and management rights over forest land that the community has

HUGE EARNINGS

56 villages in Gondia and Gadchiroli districts collectively earned ₹110 crore in 2013-20 by managing their forest resources

	Individual income	Gram Sabha income	Total
Tendu leaf sale	₹20,00,00,000	₹5,65,00,000	₹25,65,00,000
Fishery	Nil	₹35,79,000	₹35,79,000
Mahua flower sale	₹44,35,76,000	Nil	₹44,35,76,000
Agriculture	₹30,00,00,000	Nil	₹30,00,00,000
Government allocation under CFR management plan	Nil	₹9,67,29,000	₹9,67,29,000
Total income of 56 villages	₹94,35,76,000	₹15,68,08,000	₹1,10,03,84,000
Average income per household	₹1,75,288*		

* Total households in 56 villages: **5,383;** Source: Communication with village residents, gram sabha members

traditionally used.

All the 56 villages opted for CFR over IFR. "We realised that while IFR titles would free us from the harassment of the forest department, the real power lay in CFR. With CFR, we could own and manage our forest, with which we have an age-old relation," says Motiram Kaliram Sayam, *panchayat* member of Damditola.

But it was easier said than done. In Damditola, soon after receiving CFR title in 2011, the residents decided to wrest control of *tendu* (*Diospyros melanoxylon*) leaves from the forest department. These leaves, used to wrap tobacco and make *bidis* (hand-rolled cigarettes), are a major source of income for people in the region, particularly during the lean season. "Since *tendu* trade is nationalised, the forest department used to sell the leaves and pay us just collection wages," says Narayan Phulshingh Salame, member, CFR management committee of Damditola. In 2013, the *gram sabha* informed the forest department about its intention to set up a *fadi* (collection centre) and issued a tender notice for the sale of *tendu* leaves.

"Our initiative did not go down well with traders who used to benefit from corruption by state agencies in *tendu* leaf trade or auctions," alleges Dilip Gode, an environmentalist who helped the village draw up CFR management plan. Small wonder, no trader bid in the first year, and the *gram sabha* took over the trade. To keep things running, it took a loan of ₹56 lakh from the Maharashtra Tribal Development Corporation. "It managed to sell the leaves somehow and paid back the loan, something which was done probably for the first time in history," says Gode. The situation did not change over the next two years and the *gram sabha* had to take further loans. By 2016, the traders came around.

"We knew they would come. After all they need *tendu* leaves and the *gram sabhas* were the only ones selling it," says Gode, adding that *tendu* leaves of Gondia and Gadchiroli are highly sought after as they are softer and easier to roll.

With the market framework in their favour, a bag of 1,000 *tendu* leaves now sells at about ₹7,000 at the Damditola *fadi*; the forest department used to sell the bag at a fixed price of ₹2,500. "Advance payment is charged from successful bidders to ensure that by June, when the kharif season begins, people have money from the sale of *tendu* leaves to invest in agricultural activities," says Wasudeo Kulmethe, technical officer at non-profit Vidarbha Nature Conservation Society (VNCS).

In the Piparkhare village of Gondia, Jairam Mansaram Karame says his earnings from the *tendu* leaves have increased five times since the *gram sabha* has started managing the *tendu* trade. "I no longer have to look for any other work to make ends meet," he says. In 2017, mass migration was feared following a crop failure in the district. But that year *tendu* leaf prices hit a record high of ₹9,000 a bag, helping people tide over the crisis.

With ownership has come responsibility. The *gram sabha* has enforced fines for offences such as illegal logging (₹500 per log), hunting (₹5,000), setting fires (₹5,000), dirtying the pond (₹500) and has set up a patrol team to

A woman in Damditola village, Gondia district, prepares harvested chillies for selling. Management of forest resources has allowed gram sabhas to take steps to increase crop yield

guard the forests and ponds. "Earlier, traders had perpetrated a few practices like cutting a *tendu* tree every year to promote green shoots. We realised that bush cutting was damaging the trees and degrading the forest. So we stopped it. Now, by letting the tree grow, we are getting more and better leaves," says Kushal Valadi, sarpanch of Narotichak village in Gadchiroli district. Surveys by VNCS shows the prevention of bush cutting has led to regeneration of 14,638 ha of forest land between 2011 and 2019, with 600 to 700 saplings per ha.

POND WISE

The next step was to collectively claim ownership and management rights over traditionally used water bodies. Gondia has been historically part of the region ruled by Gond kingdom and then by the Bhonsle dynasty of Nagpur. Both the dynasties, as per historian Bhangya Bhukya at the University of Hyderabad, Telangana, laid emphasis on creating water conservation structures like ponds and tanks. While people in the region have traditionally depended on these ponds, under the Madhya Bharat Zamindari Abolition Act, 1951, the government transferred ownership of the ponds to the irrigation department, which earned by auctioning fish from the ponds.

FRA changed this, along with the financial status of the residents. "The idea behind claiming rights over the forests and ponds was that if there are forests, there will be water in the ponds and if there is water in the ponds, then agriculture will be possible in villages," says Gode. Since 2011, around 90 villages in Gondia and Gadchiroli have gained ownership rights over 150 ponds and are managing the waterbodies.

After receiving ownership rights, reviving the heavily silted up ponds appeared to be another herculean task. The ponds were desilted with funds available with the *gram sabha* and also with the

56 FORESTED VILLAGES IN GADCHIROLI AND GONDIA HAVE BROKEN THE CYCLE OF POVERTY; ALL OF THEM OPTED TO EXERCISE THEIR RIGHTS FOR COMMUNITY FOREST MANAGEMENT

Income from forest produce has helped Gopal Mansaram Kumeti of Damditola village, in Gondia district, install a solar pump in his field. With assured irrigation, Kumeti has stopped migrating to other districts for work

help of some private companies, who agreed to sponsor the work under their corporate social responsibility obligations. This increased water availability for irrigation as well as the fish yield. "We sell fish to the residents of our village at ₹100 per kg and to others at ₹150 per kg. The money is kept with the *gram sabha*. Since 2013, every year we sell 1,500-2,000 kg of fish and the village earns ₹3-4 lakh," says Manik Kisan Masram, a member of the CFR management committee. Using the money from fish sales, the Dungartamashi Gram Sabha has set up a Macchi Beej Kendra (fish egg centre) in 2015. "Every year, we sell around 300 kg of fish eggs to other cultivators and charge ₹500 per kg," says Masram.

Dhananjay Yaswant Madawe, another resident of Dungartamashi, says farm yield from his 0.8-ha field has increased to over 1,200 kg from 500-600 kg because of the ponds. "I earn ₹30,000 more a year compared what I used to earn earlier. My children now go to a private school instead of the government's Adivasi Ashram school," he says proudly. "Now we want the youth to realise the value of CFR. So in 2023, when we update our CFR management plan, we plan to make them the committee members. Right now my son is studying in Nagpur and I want ample livelihood opportunities for him here in Piparkhare," says Karame.

GRAM SABHAS CLAIMING OWNERSHIP OF FORESTS HAVE ENFORCED FINES FOR VARIOUS OFFENCES AND SET UP PATROL TEAMS TO GUARD THE FOREST LAND AND WATERBODIES

The success of these 56 villages in Maharashtra indicate the potential of CFR. At the same time it indicates the fortunes some 73,009 villages across the country are missing out on—of the 150,280 villages that have demanded CFR since January 2008, only 77,271 have received the titles till December 2020, shows data with the Ministry of Tribal Affairs. The remaining still live like encroachers on their own land. DTE

@ikukreti

VILLAGE ACTION PLAN: A PARTICIPATORY APPROACH IN IMPLEMENTING JAL JEEVAN MISSION A CASE STUDY - KARNATAKA

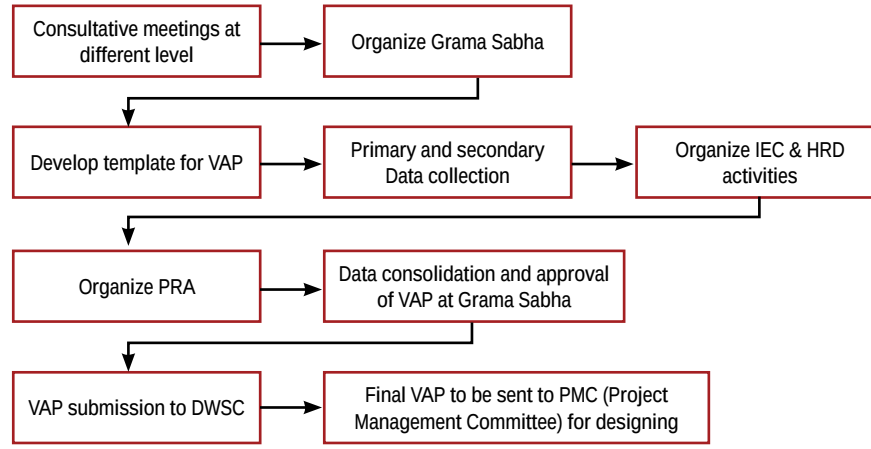
One of the key success parameters for Jal Jeevan Mission is 'community involvement' throughout the project lifecycle. The first stage of the project is planning at the village level.

The plan will be strong when it comes from the grass root level. In order to fulfil the felt needs of the villagers and also to maintain the sustainabilityof water sources in the villages; Village Action Plan (VAP) is prepared.This also involves good practices which are done in the field level.Such detailed VAP is prepared in association with 'Implementation Support Agency (ISA)'.

VAP: A Plan and IEC activity

VAP is a systematic process involving Participatory Rural Appraisal (PRA) as one of the methods to engage the community to understand about Jal Jeevan Mission. The process involves primary and secondary data collection, transect walk, social and resource mapping with the villagers, need assessment, cost estimates, implementation schedule, contribution from each household towards partial capital cost and O&M, type design of sumps, washing and bathing complex with a toilet for rural families.Such rich information is filled in a specific template and placed before Grama Sabha for approval.This activity also serves as an entry level IEC program in the village.

VAP process:



Village Action Plan (VAP) is to be prepared based on the type of scheme to be taken up in the village to provide Functional Household Tap Connection (FHTC)to every rural household. It is also about tap connection to schools, Anganawadi centres, Ashram Shala, Gram Panchayat buildings, health centres, and other community buildings in rural areas.

VAP: A Capacity Building Tool

VAP activity is to build capacity of rural people of the Gram Panchayat and Village Water and Sanitation Committee (VWSC) as to create awareness in the community about cautious use of water and keeping the water sources clean.VAP was prepared by the villagers, ASHA workers, Anganawadi workers and Panchayat staff after a deliberation on the village details by visiting the colony in village,collecting details of cropping pattern, rainfall, water quality assessment report, water sources,livestock, government buildings.The same is put up before Grama Sabha for approval.

Transect walk provides real time information, conditions of existing resources, unforeseen challenges.While visiting each street, villagers give feedback about existing conditions.

Social Map should be drawn by using various colours to identify the available resources in the village to mark the Schools, Anganawadi, Public institution, Health centre, Community hall, religious institutions, resources, etc,. The same map will be used for new proposed plan as well. Water sustainability ideas will be gathered from village folks.

Community sensitization

- Jal Jeevan Mission features and objectives
- Convergence of various schemes
- Information on water usage, cleanliness
- Information of solid and liquid waste management, toilet construction and its usage
- Rainwater harvesting
- The Role of Government and Local Government (Gram Panchayat) and Communities
- Details of grants and community contribution

VAP is not only a data collection tool but also an IEC and capacity building tool. In Karnataka, Rural Drinking Water and Sanitation Department has prepared 14,987 no. of VAPs during past one year. About 30 ISAs are working in the field to collect such a vast data pool and striving to create a mass awareness among rural community.

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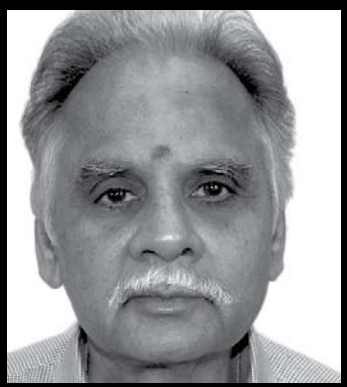
COVID-19

LET'S FIX BLAME

WHAT LED TO THE ALL-ENGULFING SECOND WAVE? HOW DID WE MISS THE EARLY SIGNALS? WHY ARE WE STILL UNPREPARED?

By Richard Mahapatra, Banjot Kaur, Vibha Varshney, Shagun Kapil Vivek Mishra, Kiran Pandey and Rajit Sengupta in Delhi with Rituparna Palit from Varanasi; Rakesh Kumar Malviya from Bhopal; Ajit Panda from Nuapada; K A Shaji from Thiruvananthapuram; Jayanta Basu from Kolkata; Jumana Shah from Ahmedabad; Tamanna Naseer from Bengaluru; and Aishwarya Sudha Govindarajan from Chennai



OCTOBER 18, 2020

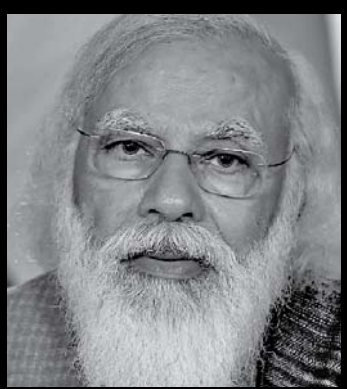
The peak of active coronavirus cases came in late September at around 10 lakh, and by this time, India was far better equipped to handle the pandemic in terms of diagnostics and vital equipment inventories. In short, the lockdown flattened the curve

M VIDYASAGAR
Professor, IIT Hyderabad, and chair of government's COVID-19 India National Supermodel committee

OCTOBER 18, 2020

We cannot rule out a second coronavirus wave this winter in India. Things can happen and we are still learning about the virus

V K PAUL
Member, NITI Aayog



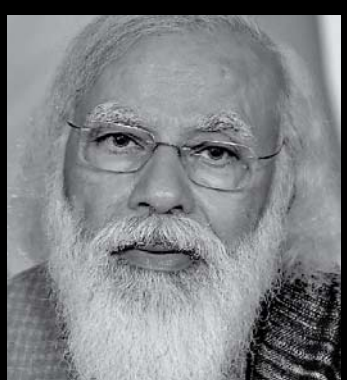
JANUARY 28, 2021

I remember what many reputed experts and top institutions in the world said in February-March-April last year. It was predicted that India would be the most affected country from corona all over the world. It was said that there would be a tsunami of corona infections in India

NARENDRA MODI
Prime Minister at the World Economic Forum's Davos Dialogue

PHOTOGRAPH: REUTERS

Owing to limited testing and delayed results, the official COVID-19 numbers are likely to be misleadingly low. This is particularly so in rural areas where people due to lack of awareness are hesitant to get themselves tested and reluctant to take treatment



PHOTOGRAPH: VIKAS CHOUDHARY / CSE

FEBRUARY 26, 2021

India is unlikely to see a second wave in infections

MANINDRA AGRAWAL
Deputy Director, IIT Kanpur, and member of the COVID-19 India National Supermodel Committee

MARCH 8, 2021

We are in the endgame of the COVID-19 pandemic in India

HARSH VARDHAN
Union health minister at a meeting of the Delhi Medical Association

MARCH 30, 2021

The situation is going from bad to worse... No part of the country should be complacent. Trends show that the virus is still very active and can penetrate our defences

V K PAUL
Member, NITI Aayog

APRIL 20, 2021

The country is today fighting a very big battle against COVID-19. The situation had improved for a while, but the second COVID-19 wave has come like a storm

NARENDRA MODI
Prime Minister in his address to the nation

DOWNLOAD RELATED EDITIONS

Sudhir Mahajan, a resident of Bhajanpura in northeast Delhi, lost his parents and younger brother to COVID-19 in just 100 hours. "My parents died due to lack of oxygen, without even entering a hospital. While I was arranging for their cremation, my neighbour called me to inform that my brother was having trouble breathing," he says. "It took me almost a day to get him admitted to the Lok Nayak Jai Prakash Narayan Hospital, while volunteers outside the hospital provided him oxygen support. Just hours after his admission, the doctors declared him dead. He was just 29 years old," says Mahajan. All the deaths took place between April 19 and April 22, he says, as he waits for the last rites of his brother at a makeshift cremation ground on the banks of the Yamuna on April 24. "First you wait for hospital admission, then for treatment, then for oxygen and, in case of death, for cremation," Mahajan says. "I was told to leave the body at the crematorium with my name and phone number. I waited for two days. When nobody called, I decided to come to the crematorium and wait. I have been here for almost 10 hours. If we can't get oxygen, what else can we expect?" Mahajan tells *Down To Earth* (DTE).

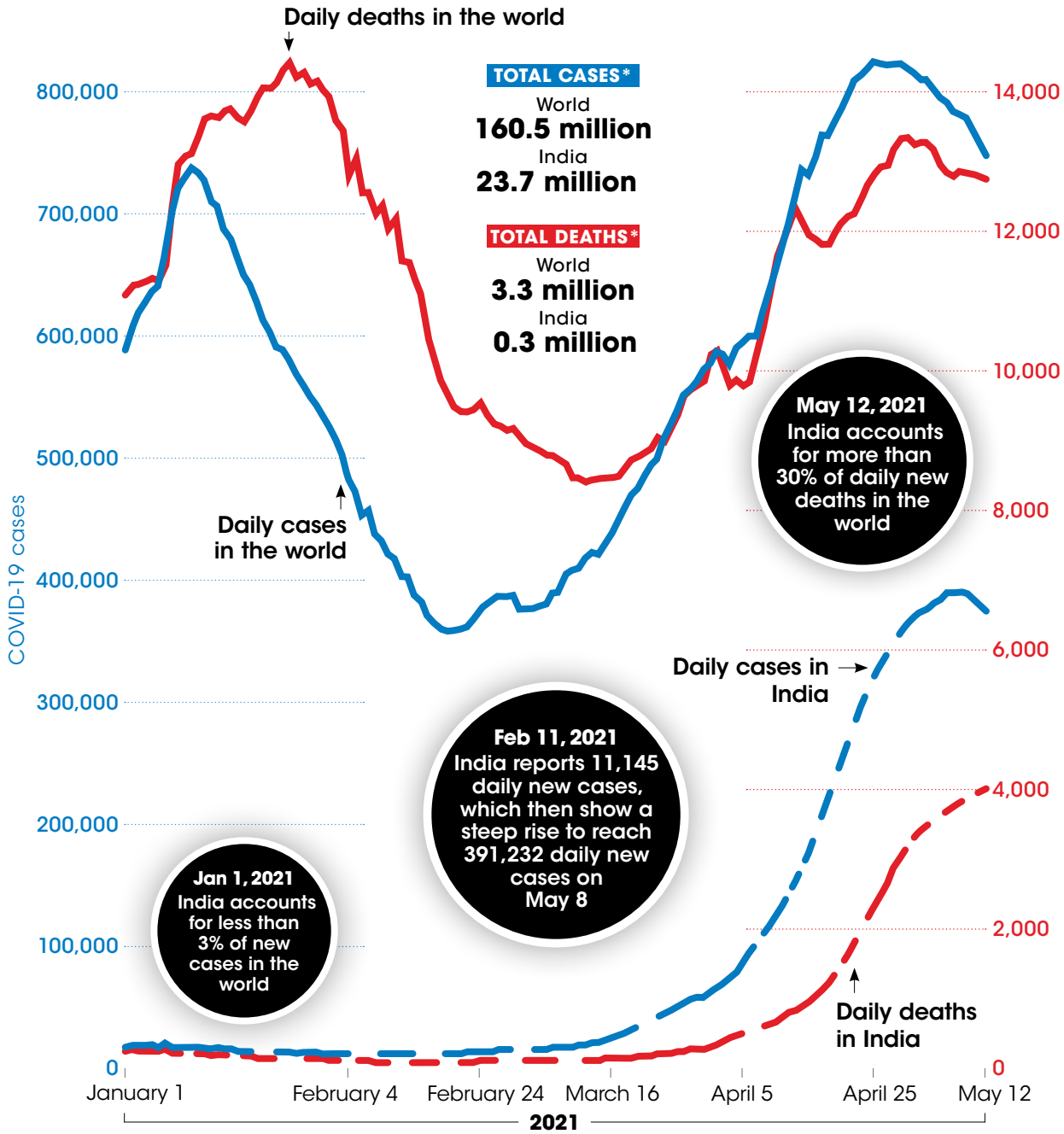
The whole of April, Delhi gasped for oxygen. As COVID-19 cases soared, so did the number of people seeking hospitalisation. Doctors say that unlike last year, the COVID-19 patients in the second wave have severe bloating of lungs, which could be due to the new virulent SARS-CoV-2 strains. The mutant strains seem to cause lung inflammation on the very first day of infection, and by the third day, the body's immune system triggers what is called a cytokine storm. Cytokines are proteins deployed by the immune system to kill the body's own cells and tissues. The cytokine storm results in lung inflammation, severe damage to lungs and ultimately leads to hypoxia, a condition in which the body or a region of the body is deprived of adequate oxygen supply at the tissue level. At this stage medical oxygen (contains at least 82 per cent pure oxygen, as per the World Health Organization) is vital to help the patient keep breathing. Ajoy Sarkar, a critical care expert at Peerless Hospital, Kolkata, says the second wave is different from the first in many ways. "Infectivity is extremely high which has led to such a high spike compared to the first wave. The virus also seems to be invading the lungs much quickly compared to earlier, pushing up the oxygen requirement." Agrees Arup Haldar, a pulmonologist based in Kolkata. "Compared to earlier, the number of critical oxygen dependent patients is much more in hospitals," he says.

Patients with such conditions thronged hospitals in Delhi by the thousands everyday throughout April, with the number of new cases shooting up from 3,548 on April 5 to 28,395 on April 20, as per the Center for Systems Science and Engineering at Johns Hopkins University in the US. By the second week of April, hospitals started reporting shortage of beds and oxygen. Hospital after hospital went public with SOS calls for oxygen supply. Eventually, the Delhi High Court and the Supreme Court of India took note of the emergency situation in the capital city, which had more people dying due to oxygen support than other COVID-related complication. On May 1, a Saturday, the Supreme Court ordered the Union government to ensure supply of oxygen to the city hospitals within two days. The Delhi High Court passed a similar order the same day: "Enough is enough. No one is asking for more than allocated. If you can't supply the allocation today, we will see your explanation on Monday (May 3)."

The High Court had ordered the Centre to supply 700 tonnes of oxygen per day to Delhi. The Centre allotted 590 tonnes of oxygen per day while the Delhi government had asked for 970 tonnes. The Delhi High Court on May 3 initiated contempt proceedings against the Centre for failing to comply with its as well as the Supreme Court's directions to supply oxygen to the

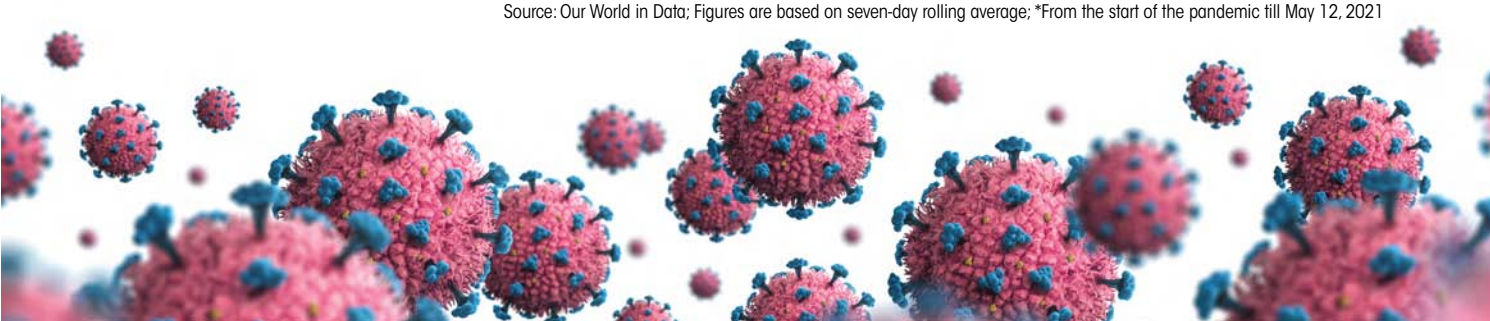
UNWANTED PEAKS

India's COVID-19 cases have been rising since February, and in the first two weeks of May, there were five days when the country had more new cases than rest of the world put together



GRAPHIC: SANJIT / CSE

Source: Our World in Data; Figures are based on seven-day rolling average; *From the start of the pandemic till May 12, 2021



capital. The Centre moved the apex court, which stayed the order on May 5 but asked for an explanation. The Centre responded saying it had released 730 tonnes of oxygen to Delhi that day.

Ironically, on August 18 last year, the Solicitor General of India told the Supreme Court that "there was no requirement of special plan" for the situation. According to a calculation by Milind Sohoni of IIT Bombay and independent researcher Alakhya Deshmukh, India should have planned for five deaths per million people per day, while currently all medical emergencies and stock of essential supplies like oxygen are based on two deaths per million a day—the mortality rate witnessed during the first wave. With this planning, we would have known that "the national capacity of 7,000 tonnes per day of oxygen was not adequate and urgent measures were required," the researchers say. Currently, India's estimated demand of oxygen stands at 4,000 tonnes per day. On May 2, at least 15 states reported 10-50 per cent deficit supply.

Throughout the last two weeks of April and in the first week of May, crematoriums in the National Capital Region were overwhelmed with the constant arrival of bodies. Additional spaces were carved and platforms built for funerals in Delhi; the government allowed cremations on pavements in Ghaziabad, Uttar Pradesh; while at Dwarka, in southwest Delhi, a cremation ground for dogs was opened up for human use. In many instances, multiple bodies were cremated together to reduce the queue. At most crematoriums, bodies were burnt at undesignated spots, with the protective clothing on. Sights of half-burnt bodies were quite common.

"I have never seen a war, but the situation in Delhi must be similar to it," says Rishab Gupta, a student at Delhi University and member of a volunteer group that has been helping COVID-19 families with basic facilities. "I never imagined that in a health emergency, I would be more involved in organising cremations than arranging medicine," he says.

Like Rishab, the world watched the lethal second wave of the pandemic in India with disbelief and shock. Between April 26 and May 2, India recorded the highest number of new cases of COVID-19 in the world—2.6 million—with 23,800 deaths (see 'Unwanted peaks' on *p*21). This was the second consecutive week India held this unfortunate record. In the week before, there were 2.25 million new cases. By comparision, the US—the world's most COVID-19-affected country—recorded 1.77 million new cases as its worst outbreak in January 4-10. On May 11, India had more new COVID-19 cases than the rest of the world put together.

"Our analysis shows the infection detection rate is below 5 per cent...This means the number of cases being detected needs to be multiplied by 20 or more to get the number of infections occurring in India"

CHRISTOPHER J L MURRAY
Professor at the Institute for Health Metrics and Evaluation, University of Washington, US

LEADING CAUSE OF DEATH

COVID-19 has emerged as the biggest cause of death in India (earlier, it was ischemic heart disease) in merely nine weeks preceding April 26, estimates the Institute for Health Metrics and Evaluation (IHME) at the University of Washington in the US. On February 22, it was the 26th main cause of death, accounting for an average 180 deaths per day. By April 26, it was causing an average 4,800 deaths a day. The death toll from COVID-19 in India will be 0.96 million by August 1, 2021, according to the latest projection by IHME. With an estimated global toll of over 5 million, India would account for nearly a fifth of the total deaths.

There were many more COVID-19 cases in India than the Government of India has declared, says Christopher J L Murray, professor at IHME, in a statement on the analysis on April 27, 2021. "Our analysis of seroprevalence surveys shows that the infection detection rate is below 5 per cent—maybe even around 3-4 per cent. This means that the number of cases that are being detected needs to be multiplied by 20 or more to get the number of infections that are occurring in India. The number of infections right now is extraordinarily large," Murray said. "Our latest projections show that the number of infections driven by the surge in India (and perhaps also driven by the surges in Bangladesh and Pakistan) will be reaching 15 million a day globally," he adds.

Murray argues that infection in India is so high that "COVID-19 may run out of people to infect pretty soon". This means after mid-May transmission in India would start declining, estimates the report. IHME projected India's daily death toll at 13,050 by May 15.

SURGE IN CASES

April turned out to be the cruellest month for India in the 15 months of the pandemic so far. The country recorded an unprecedented 6.6 million new cases, with 46,000 deaths, according to the World Health Organization. On the last day of the month, India became the only country to record over 400,000 new cases in a single day, suggesting that the onslaught is unlikely to ebb anytime soon. By the last week of April, the countrywide demand for medical oxygen went up by eight-fold—from 700 tonnes a day to over 6,000 tonnes a day.

Uttar Pradesh, given its poor health infrastructure and high population density, become a veritable COVID-19 hell in the pandemic's second wave. Some 12,238 people have succumbed to the disease in the state, as of April 30, 2021, while 1.2 million have tested positive, making it India's fourth worst-affected state. Hospitals have run out of oxygen and beds, and crematoriums are falling short of space. While the situation went out of control, the chief minister kept claiming the numbers were not "significant", there was "no scarcity of oxygen". The government also promised "free cremation for COVID-19-related deaths".

Between April 19 and May 3, the oxygen demand in the state increased by over 300 per cent. Of the state's 0.28 million active cases on May 5, a huge 82 per cent were in home isolation, and, as health officials say, might be needing hospitalisation if not properly treated. That adds on to the already collapsing health system. Giridhar R Babu, professor and head of life course epidemiology at Public Health Foundation of India, a public-private initiative, says, "In Uttar Pradesh and Bihar, the health infrastructure is poor and human resources to provide critical care at the field level are not enough. Owing to the chronic weakness in the health systems of these states, it is unrealistic to expect them to perform better than metropolitan cities during such a health crisis."

On May 5, the Allahabad High Court directed the district magistrates of Lucknow and Meerut to verify news of COVID-19 patients dying due to oxygen shortage and observed: "Death of COVID patients just for non-supplying of oxygen to the hospitals is a criminal act and not less than genocide."

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Doctors are in a dilemma, as resources are scarce. "I had only seen these real life ethical dramas in sci-fi movies. It is so overwhelming when a group of 15-20 patients, all with oxygen saturations ranging from 30 per cent to 40 per cent (the normal level is 95-100 per cent), arrive at the same time and require ventilator support. Whom should we give it to? Should it be on a first-come-first-served basis? When I did this the first time, I had to deny a ventilator to a 30-year-old against a 73-year-old. The senior person passed away within a few hours. The younger one, too, died later. I wondered if I should have given a chance to the 30-year-old. But who am I to choose; everybody has an equal right to live. I will always feel guilty that I couldn't save either of them," vents Vivek Gundappa, deputy medical superintendent and assistant professor of pulmonology at Rajarajeswari Medical College and Hospital, Bengaluru, one of India's worst impacted metropolitan cities.

RURAL SPREAD

In April, the worst fears of health experts also came true. Unlike the first wave, the virus spread to rural districts, causing much more deaths. In fact, India had more deaths in rural districts than in urban districts in April, even though the overall caseload in rural areas was lower—a first since the start of the pandemic. An analysis by DTE shows rural districts accounted for 45.4 per cent (3.1 million) of the new cases in April 2021, but saw 50.8 per cent (24,000) of COVID-19 deaths (see 'Hinterland hit hard' on *p*34). This is a deviation from the overall trend (March 2020-April 2021), where urban districts accounted for 54 per cent cases and 56 per cent deaths. September 2020 is the only other month when rural India recorded more than 50 per cent deaths; but at that time, the rural caseload was also higher than in urban areas.

The spread in rural areas that started in April is likely to worsen in the coming months because of two reasons. First, the second wave is yet to peak in India—with health experts predicting an upward trend for at least another month. Second, most of the worst-hit states including Delhi, Karnataka and Maharashtra, are imposing lockdowns, triggering reverse migration which leads to rural deaths. This was seen last year, when after a nationwide lockdown between March 24, 2020, and May 30, 2020, the Centre started the unlocking process in a phased manner. This continued till September 2020, when the first wave peaked in the country.

Health infrastructure in rural India is substantially weaker than that in cities. Over 65 per cent of India lives in rural districts, as per the World Bank, yet only 37 per cent of beds in government hospitals are in rural India, says the Union Ministry of Health and Family Welfare's National Health Profile 2019. Lack of awareness, hesitation to get tested and reluctance to take treatment make the rural population more susceptible to COVID-19. Owing to limited testing and delayed results, the official COVID-19 numbers, especially in rural districts, are likely to be misleadingly low.

Nuapada, a rural district of Odisha and one of India's poorest, offers a snapshot of the havoc that the pandemic can wreak in such areas. The biggest problem here is shortage of oxygen, which leads to deaths. Duryodhan Majhi, a member of the Silva Gram Panchayat in the district, had COVID-19 and died on April 24 when the supply ran out at the district COVID-19 hospital, says his brother Sadhuram. Dolley Hota, a resident of Bhubaneswar, sent a letter to the chief district medical officer (CDMO) of Nuapada after her father Janmejaya Joshi died at Khariar's COVID hospital on April 24. She claims her father died due to oxygen shortage.

"The situation in the COVID hospital at Nuapada was good during the first wave of the pandemic. But the situation now is bad," says a local journalist, requesting anonymity. "There are no timely visits by staff. Patients have to run to the emergency section frequently to complain of their problems," says the journalist whose wife

Humanity's experience with pandemics shows that these scourges can have multiple waves. What was, then, the hurry for India to bestow upon herself congratulatory superlatives of having fought off the disease?

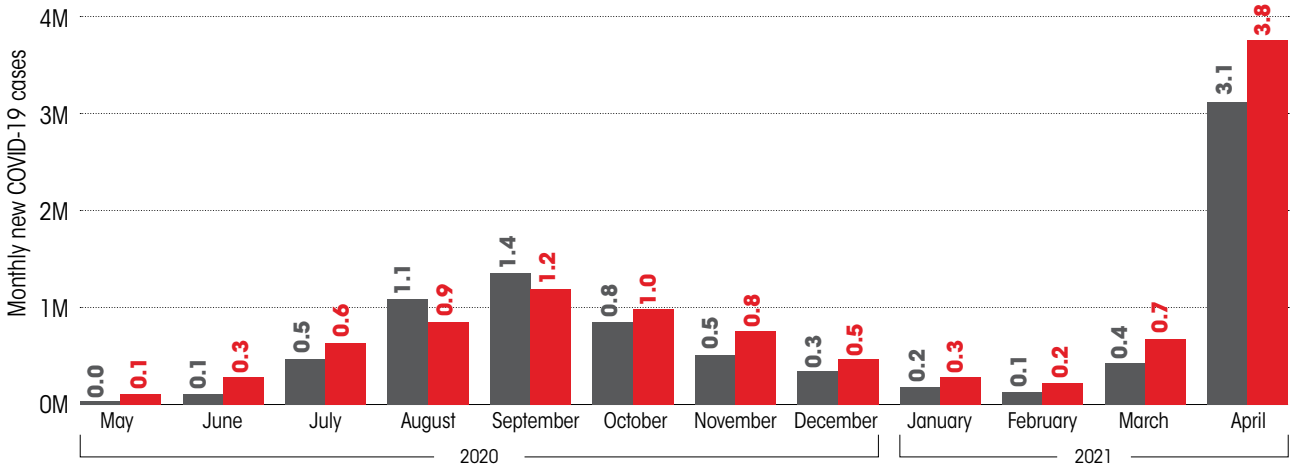
PHOTOGRAPH: REUTERS

Hinterland hit hard

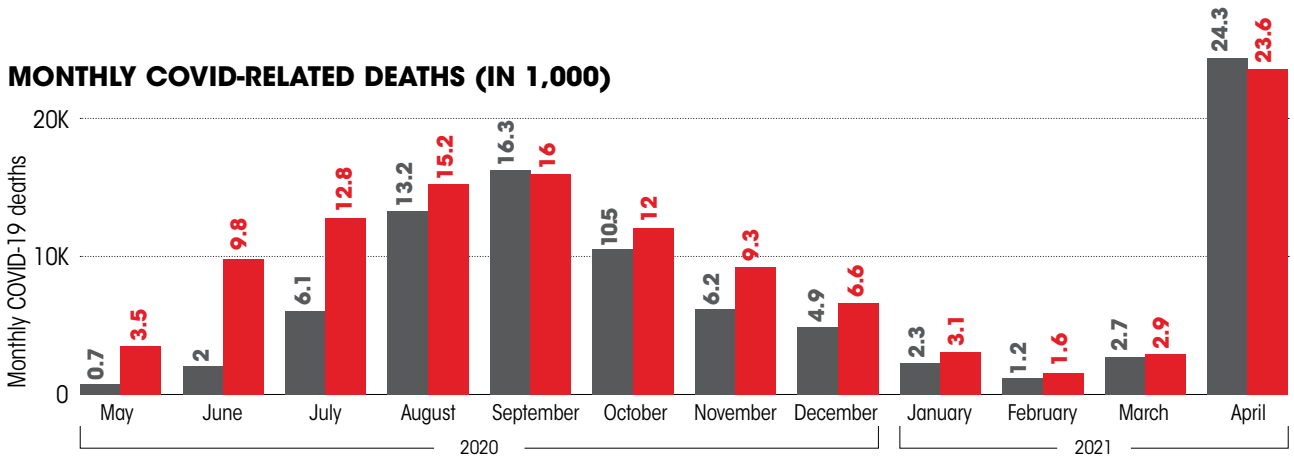
India had more deaths in rural districts than in urban in April 2021, even though the overall caseload in rural areas was lower—a first since the start of the pandemic

Rural Urban

MONTHLY NEW COVID CASES (IN MILLION)



MONTHLY COVID-RELATED DEATHS (IN 1,000)



Source: How India Lives; Census 2011; Data as on April 30, 2021

died of COVID-19 in the hospital. Kali Prasad Behera, CDMO, Nuapada, told DTE that there was no question of negligence at the hospital, nor was there a shortage of oxygen, and that the hospital was getting 250 cylinders every day.

The number of daily new COVID-19 positive cases in the district as well as the percentage has not shown any decline in recent weeks. This indicates the spread has not just continued but the demand for hospitalisation is also increasing. The total number of positive cases from March 1 to April 25 was 5,399, which was 10.16 per cent of the total people tested. The number of people found positive in the district on April 25 was 300, which is about 30 per cent of the total 1,003 people tested. Deaths due to COVID-19 in Nuapada have also significantly increased in April, at an average of five deaths daily. Nuapada has already witnessed 87 deaths in the second wave of COVID-19, with the number rising by four to six deaths every day. Sill, most people

GRAPHIC: SANJIT / CSE

in the villages of the district are shy of testing. Radheshyam Behera of Sargimunda village says most people in his village had COVID-19 symptoms. Hence, he requested the CDMO to depute a team to conduct antigen tests. "When a team reached the village the next day, only three families volunteered for testing. Six of the 20 people tested were found COVID-19 positive," Radheshyam says. For most people in the villages, COVID-19 carries a stigma that leads to restrictions on the use of village commons, especially the water sources.

Rural areas in India's relatively more developed states have similar stories. Take the case of Gujarat, where Prime Minister Narendra Modi served as chief minister for over a decade. The state's 18,000 villages spread over 33 districts face a severe shortage of doctors and medical personnel, oxygen supply, beds and other life-saving equipment, say senior government officials on condition of anonymity. Many districts in Gujarat have a single community or healthcare centre for some 10 villages. Some of these centres do not even have facilities for rapid antigen tests. People's reluctance to follow COVID-19 guidelines and social distancing norms as well as "vaccine hesitancy" is making the situation worse.

Mehsana district in north Gujarat has the highest caseload among the rural districts of the state. It is the home district of Gujarat's health minister, Nitin Patel. Chandrakant Parmar from the prosperous Kherva village in Mehsana told DTE that there were more than 80 deaths in March and April.

The village that lies on the state highway between Gandhinagar and Mehsana, has a population of 15,000 and is reportedly seeing three to four deaths daily after the infection numbers surged in April. The village has a primary healthcare centre with a staff of 25 to 30 people, including a doctor, 10 to 15 nurses and paramedics. But it lacks intensive care units, CT-scans, sonography and oxygen cylinders. The village sarpanch did arrange for a 200-bed quarantine centre, but a lot of people are still quarantined at home. Kherva also receives patients from some 15 neighbouring villages. The administration has converted the Ganpat University in the village into an isolation centre. COVID-19 testing and vaccination are free but village residents are hesitant. Kherva has about 500 COVID-19 patients, says the sarpanch of the village.

Another affected village is Khanpur in Patan district in north Gujarat. The village is inhabited by 800 families and has seen three deaths so far. Dev Desai, a resident of Khanpur says people in the village die within three to four days after getting fever.

"Compared to the first wave, the infectivity this time is extremely high which leads to such a high spike. The virus seems to be invading the lungs much quickly pushing up the oxygen requirement"

AJOY SARKAR
Critical care expert at Peerless Hospital, Kolkata

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FALSE NEGATIVE

The Centre said worst was over, states dismantled hospitals, people celebrated festivals and polls were held. All too soon

There is no definitive way to pronounce the arrival of a second wave in a pandemic. Still the pertinent question for India now is: why did the country look so hapless in face of the second wave? There are reasons for us to ask this question. Across the world, countries were reporting a second wave deadlier than the first one. The Spanish Flu in the last century and even other recent pandemics, like the 2002 SARS outbreak and 2009 H1N1 influenza, show these scourges can have multiple waves. What was, then, the hurry for India to bestow upon herself congratulatory superlatives of having fought off the disease? There has been a distinct difference between the approach of the scientific community and the political leadership, particularly the prime minister and his cabinet, who have been declaring India's success in curbing the pandemic.

India, thus, entered 2021 with the bravado of having tamed the once-in-a-century pandemic. In September 2020, new cases had peaked at 93,000 a day before the curve started to flatten. In mid-February this year, India was registering some 12,000 cases a day, which was much less than what rich countries in Europe were reporting. Soon, the call for lockdown was replaced by "unlockdown", and the country almost returned to its pre-COVID-19 level of activities.

Complacency set in. Many states dismantled the emergency COVID-19 treatment facilities that were put in place in March-July 2020. Madhya Pradesh created 40,000 extra beds for COVID-19 patients last year. By April 2021, at least 50 per cent of them were dismantled, as per the Union health ministry data. Similarly, Uttar Pradesh had set up 503 COVID-19 hospitals, with 0.15 million beds, but by February this year, just 83 hospitals with 17,000 beds were functional. People continued to report symptoms and got cured as well. Testing came down as a result of complacency.

Even amid a second surge, Haryana, Punjab, Puducherry, Goa, Himachal Pradesh, Rajasthan, Assam, Andhra Pradesh, Telangana and Jharkhand decreased the number of ICU beds. Haryana and Punjab, where cases are still rising, reduced ICU beds by 79 and 70 per cent respectively in the past one year, according to health ministry data presented in Rajya Sabha on February 2, 2021. These states have also reduced the number of ventilators by 73 and 78 per cent respectively. While 26 states, including Maharashtra, have strengthened their critical care infrastructure by adding ventilators, the number has reduced in nine states, shows the data. Overall, India has added 10,461 ventilators since April 2020.

PREMATURE VICTORY

The first assurance that India was winning the battle came in October 2020 from the COVID-19 India National Supermodel Committee, a 10-member panel appointed by the Department of Science and Technology. In its study titled *Progression of the Covid-19 Pandemic in India: Prognosis and Lockdown Impacts*, the committee said without the stringent national lockdown imposed in March 2020, we would have hit a peak load of over 14 million cases in June 2020—the month when restrictions were withdrawn gradually. "No fresh lockdowns should be imposed on district or state level

PHOTOGRAPH: REUTERS

COVID-19 has emerged as the biggest cause of death in India in merely nine weeks preceding April 26, 2021. Earlier, the cause was ischemic heart disease

After the initial success in flattening the curve, priorities of the state changed drastically. COVID-19 took a back seat in the face of two successive elections and the celebration of different festivals

V RAMAN KUTTY
Public health expert and epidemiologist based in Thrissur, Kerala

to contain the spread of COVID-19 unless there is an imminent danger of healthcare facilities being overwhelmed," committee chairperson and professor at the Indian Institute of Technology (IIT) Hyderabad M Vidyasagar told the media on October 18, 2020, based on the supermodel, Susceptible, Asymptomatic, Infected, Removed (SAIR). "If all protocols are followed, the pandemic can be controlled by early next year with minimal active symptomatic infections by the end of February," said Vidyasagar. "The peak of active coronavirus cases came in late September at around 1 million, and by this time, India was far better equipped to handle the pandemic in terms of diagnostics and vital equipment inventories. In short, the lockdown flattened the curve."

The same day, V K Paul, member of the NITI Aayog and head of the National Expert Group on Vaccine Administration, while reiterating that the spread of the pandemic had "stabilised" in most of the states, cautioned of a second wave in the winter months. He cited examples of European countries that were witnessing second waves with the onset of winter. Like Vidyasagar, he also warned that without COVID-19-appropriate behaviour during the "festival season and winter months" the disease could pose a challenge.

On January 28, 2021, while speaking at the Davos Dialogue of the World Economic Forum, Prime Minister Narendra Modi declared that naysayers had been proved wrong. "I remember what many reputed experts and top institutions in the world said in February-March-April last year. It was predicted that India would be the most affected country from corona all over the world. It was said that there would be a tsunami of corona infections in India…In a country which is home to 18 percent of the world population, that country has saved humanity from a big disaster by containing corona effectively," he claimed.

On February 26, 2021, Manindra Agrawal, deputy director, IIT-Kanpur, and part of the COVID-19 India National Supermodel committee, told media that a second wave was unlikely despite a surge in cases weeks before his forecast. The "supermodel" forecast said that there would be up to 11.5 million total cases by April 2021 (all cases since March 2020), or 30,000 to 50,000 new cases a week till April 2021. At that time, Maharashtra was reporting the highest number of cases. Agarwal claimed that as per the model, 60 per cent of the population was already infected, thus, reaching herd immunity.

On February 4, 2021, Balram Bhargava, director general of the Indian Council of Medical Research, told media that only 21 per cent of population was infected, based on its third national serological survey conducted from December 17, 2020 to January 8, 2021. While these multiple forecasts churned out conflicting messages, the month saw the forecast by "supermodel"

SUTRA going wrong. In October 2020, this model said that there would be just 40,000 active infections by February. The actual number was four times higher.

On March 8, speaking at a meeting of Delhi Medical Association, Union health minister Harsh Vardhan declared: "We are in the endgame of the COVID-19 pandemic in India." While he was speaking, his officials were collating data that would contradict his claim. For the week ending March 12, the seven-day average of new COVID-19 cases across India rose by 67 per cent from the lows seen after the end of the first wave of the pandemic. Seventeen of India's 20 most populated states reported 20 per cent more new cases from their troughs.

Again, on March 30, the health minister, while releasing a status report on India's battle against the pandemic, said: "This is a historical moment for all of us. On 30th January we had our first case and today, after one year and two months, we have chased more than 1.2 crore [12 million] COVID-19 cases." He termed India's experience as an "exceptional opportunity", adding, "We have fared better than many countries." The same day, NITI Aayog member V K Paul went public saying the "situation was going from bad to worse" and that the virus almost "penetrated our defences".

Two days later, scientists working on another government-backed model for charting the trajectory of COVID-19, using SUTRA (Susceptible, Undetected, Tested-positive, and Removed Approach) predicted that India's second wave will peak by the third week of the same month at 100,000 cases a day (see 'Model talk' on *p*43). A month later, the scientists admitted that the model predictions were incorrect, primarily because of the nature of the virus that has been changing very rapidly.

By then, India had launched one of its most expansive global relief operations. The country's oxygen export increased by 734 per cent in January. It also exported around 193 million doses of vaccines. "We kept warning that the pandemic was not over but no one was listening," says Rakesh Mishra, senior principal scientist and director of the Hyderabad-based Center for Cellular and Molecular Biology. Mishra is currently investigating whether the variant B.1.617, found first in India, is behind the second wave in the country. He is also the scientist who went public with information that shows the government was informed of a deadly wave in early March.

REALITY HITS HOME

From mid-April, India's daily cases were above 0.2 million. This is the time when almost all states reported an increase in cases. An acute shortage of oxygen and hospital beds overwhelmed the country. On April 20, Modi addressed the nation: "The country is today fighting a very big battle against COVID-19. The situation had improved for a while, but the second COVID-19 wave has come like a storm." His acknowledgement of a crisis that had been brewing for over six months was of little use. It is a national emergency-like situation, said the Supreme Court two days later.

Soon after Modi's acknowledgement of the deadly second wave, heads of the government's top institutes hinted that the second wave in India might have been driven by its variants—the UK variant, South African variant, Brazilian variant and the "Indian" variant—which was speculated since September last. At a webinar on April 23, 2021, Sujeet Singh, director of the National Centre for Disease Control, said that the UK variant might be driving the surge in Delhi. "In the second week of March, it was found in 28 per cent of the samples. In the last week of March, it was found in 50 per cent samples," he said. The Indian variant's prevalence in Delhi is also on the rise, he added. "The surge in Delhi is clearly due to the variants," he said. Punjab's surge has been driven by the UK variant, while in the case of Maharashtra, the "Indian variant" is the key factor, he said.

T Jacob John, a virologist and professor at Christian Medical College, Vellore, says, around mid-March, when the number of

NOT QUITE THERE

In the first 118 days since January 16, when India began its COVID vaccination drive, **only 5 per cent of its adult population** had received both the jabs. Uttar Pradesh, Bihar, Madhya Pradesh and eight more states are below 5 per cent

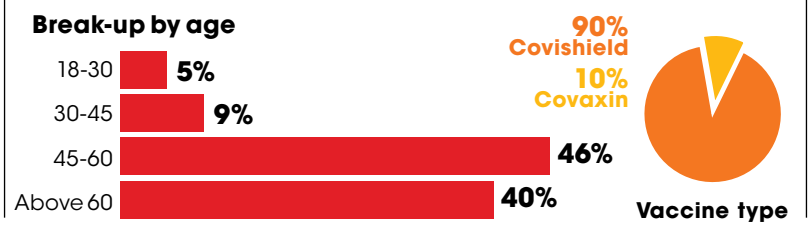
AS ON MAY 14

16% Indians received the first vaccine dose

5% Indians received the second vaccine dose

3% Indians have tested COVID-19 positive

INDIA HAS SO FAR ADMINISTERED 179 MILLION DOSES



% OF ADULT POPULATION THAT HAS BEEN

00 Partially vaccinated
00 Completely vaccinated
00 Infected with COVID-19

1. Ladakh
49% | 21% | 9%

2. Tripura
34% | 18% | 1%

3. Sikkim
36% | 13% | 2%

4. Uttarakhand
27% | 10% | 4%

5. Gujarat
26% | 9% | 2%

6. Arunachal Pradesh
24% | 9% | 2%

7. Delhi
27% | 8% | 11%

8. Himachal Pradesh
32% | 8% | 3%

9. Kerala
24% | 7% | 10%

10. Goa
26% | 7% | 10%

11. Mizoram
31% | 7% | 1%

12. Jammu & Kashmir
28% | 6% | 3%

Tender by Municipal Corporation of Greater Mumbai

13. Rajasthan
25% | 6% | 2%

14. Chhattisgarh
27% | 6% | 5%

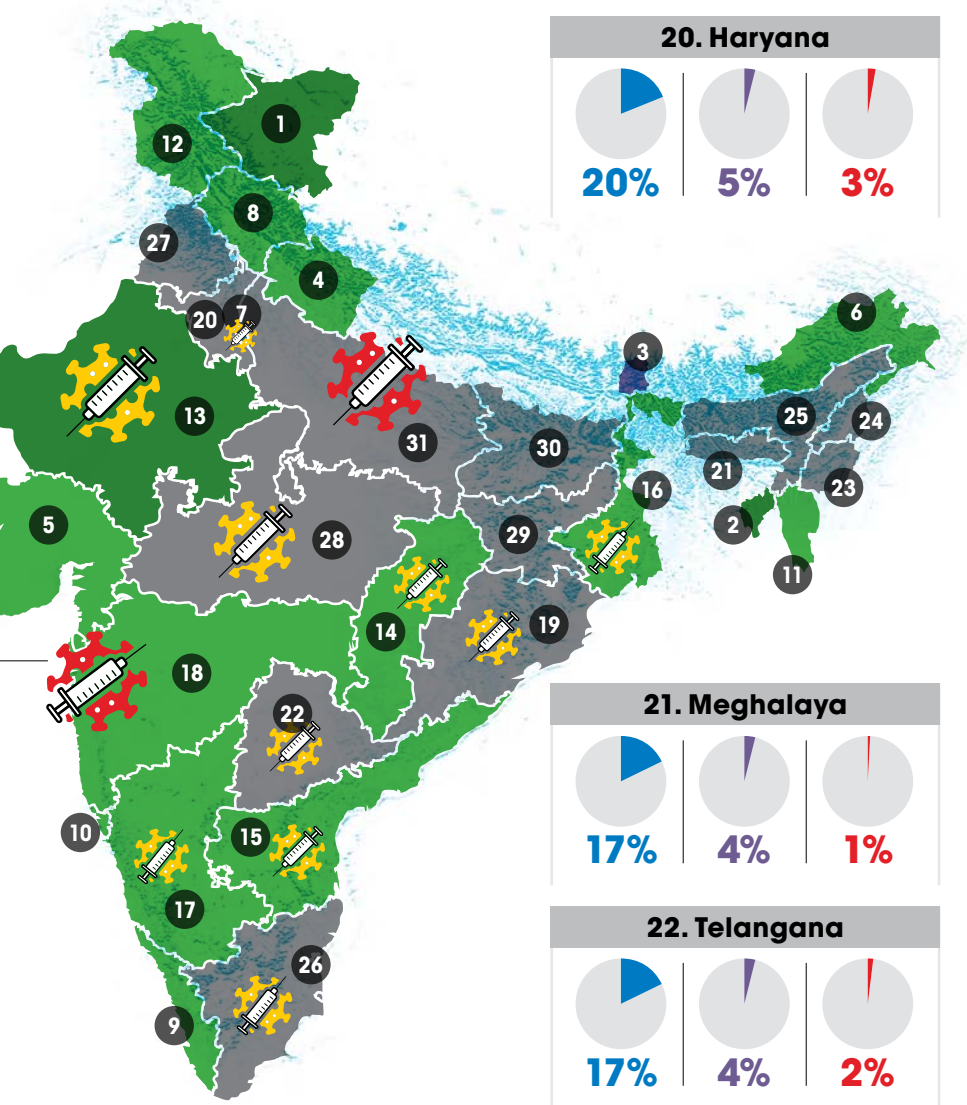
15. Andhra Pradesh
14% | 5% | 4%

% OF COMPLETELY VACCINATED ADULT POPULATION

Less than 5% | 5 - 10 % | Over 10%

GLOBAL TENDER FOR VACCINES

Floated | In the pipeline



16. West Bengal

13 % | 5% | 2%

18. Maharashtra

18% | 5% | 6%

24. Nagaland

12% | 3% | 1%

19. Odisha

17% | 5% | 2%

25. Assam

12% | 3% | 1%

20. Haryana

20% | 5% | 3%

26. Tamil Nadu

9% | 3% | 3%

27. Punjab

16% | 3% | 2%

28. Madhya Pradesh

14% | 3% | 1%

21. Meghalaya

17% | 4% | 1%

29. Jharkhand

12% | 3% | 1%

22. Telangana

17% | 4% | 2%

30. Bihar

10% | 2% | 1%

17. Karnataka

19% | 5% | 5%

23. Manipur

14% | 3% | 2%

31. Uttar Pradesh

8% | 2% | 1%

Source: CoWin dashboard, Union health ministry and Unique Identification Authority of India; Data as on May 14

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cases increased, no one had the idea that the second wave was caused by a new variant of coronavirus. The spreading strain was assumed to be the dominant variant (D164G). "We thought the Centre has been regularly monitoring the spread of the UK variant (originated in September 2020), the South African variant (October 2020), and the Brazilian variant (November 2020), which have a higher transmission potential. However, we were completely wrong. The fast-spreading B.1.617 (double mutant) was already present in India," says John. In December 2020, the government assigned the genomic analysis consortium Indian SARS-CoV-2 Consortium on Genomics, comprising 10 public health institutions and laboratories across India, to test 5 per cent of all the samples tested positive. The consortium has not given a report on it till the magazine went to press.

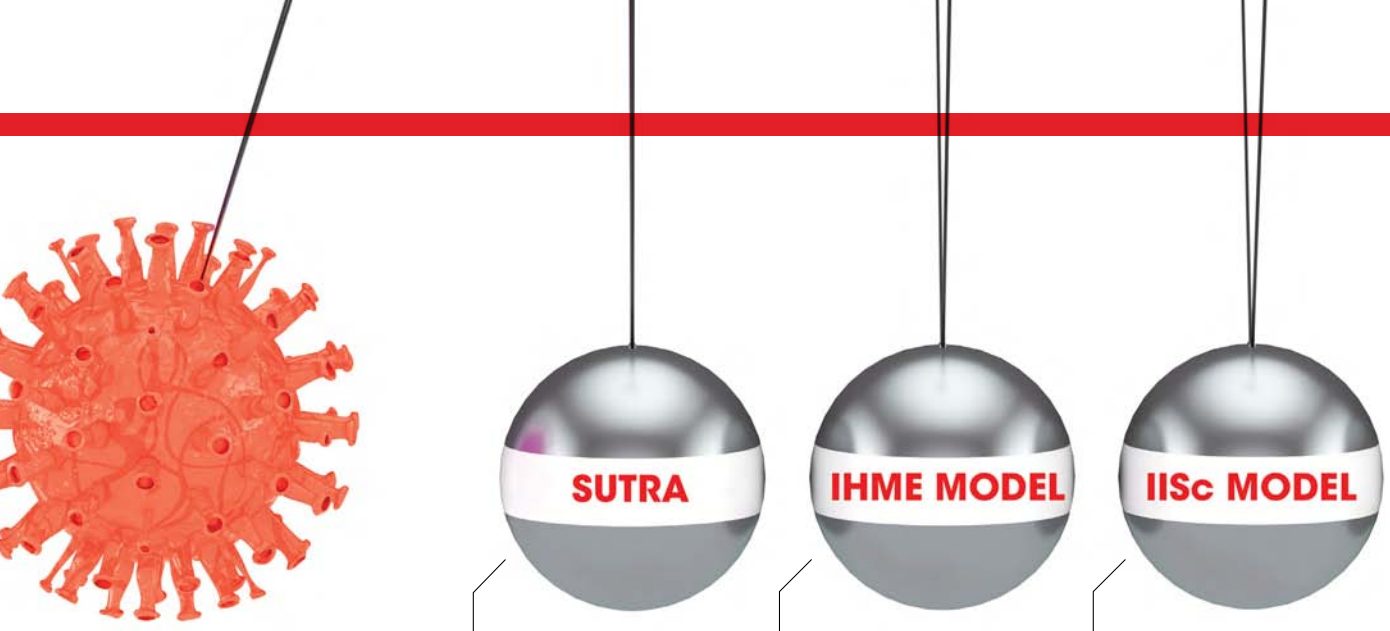
SUPERSPREADER EVENTS

India is a diverse and big geography that can have simultaneous outbreak of multiple COVID-19 variants, says experts. A new variant always leads to faster spread. It means, there could have been multiple outbreaks in the country, each requiring a customised strategy to curtail. That did not happen because we did not acknowledge the outbreak. State after state opened up while allowing super-spreader events like religious festivals and election rallies. The Election Commission on February 26, 2021 declared state elections spanning over two months. "We laid the red carpet for the variants through events like the Kumbh Mela, assuming there was no virus around us. Even when we knew of the problem, there was a delay in the government to contain the spread, leading to unimaginable circumstances," says John.

Take the case of Kerala, which remains an outstanding example of managing the pandemic and has deployed a well-thought-out strategy. Though India's first cases of the pandemic were reported from Kerala on January 30, 2020, the state successfully flattened the curve by May, even as cases were multiplying in other states. Its deft handling of the pandemic through "delay the peak" model was recognised worldwide. There were even days when Kerala reported no cases. It took the state four months to report its first 1,000 cases.

"After the initial phase of success in flattening the curve, priorities of the state changed drastically. COVID-19 took a back seat in the face of two successive elections and the celebration of different festivals. The state seemed a little apprehensive of the possible second wave, which had now turned into an alarming reality. The state even failed to anticipate evolving of the genetic variations of the virus," says V Raman Kutty, a public health expert and epidemiologist based in Thrissur. Even the state health department admits that two successive elections—the first one to the *panchayat*s, municipalities and city corporations in December 2020, and the second to the state assembly in April 2021—contributed immensely to the rise in cases.

> **In states that have not had elections, the spurt in cases is due to the congregations of different kinds. But in West Bengal, large congregations at the moment are mostly linked to the election**
>
> **GIRIDHAR R BABU**
> **Epidemiologist associated with Public Health Foundation of India, Bengaluru**



MODEL TALK

A look at the three popular models being used to predict COVID-19 trajectory in India and what they say about the future

Why did SUTRA go wrong

On **May 2**, the scientists working with SUTRA blamed the rapid changing nature of the virus for the model's incorrect predictions about the second wave. Experts also say the model relies on too many parameters

SUTRA

WHAT IS IT

SUTRA or the Susceptible, Undetected, Tested and Removed Approach has been **used by the Centre to fight the second wave of the pandemic**. The predictions have been modelled by two IIT professors and a scientist from the Union Ministry of Defence

PROJECTIONS

The model **on April 2, 2021 wrongly predicted that India's second wave** will peak in the third week of the same month at 100,000 cases a day

The model on **April 26, 2021, predicted that India's second wave will peak** in May 4-8, 2021 and at 340,000-440,000 cases a day

IHME MODEL

WHAT IS IT

The Institute of Health Metrics and Evaluation, a global health research centre, released its latest COVID-19 briefing on **India on May 5, 2021**. The model relies on its own estimations of mortality as it **maintains the official numbers are grossly underreported**

PROJECTIONS

India to record 1.5 million **deaths due to COVID-19 till September 1, 2021.** It predicts 101,000 fewer deaths if the country achieved universal mask coverage by second week of May

Daily deaths will peak **on May 17, 2021 at 15,430 deaths**

IISc MODEL

WHAT IS IT

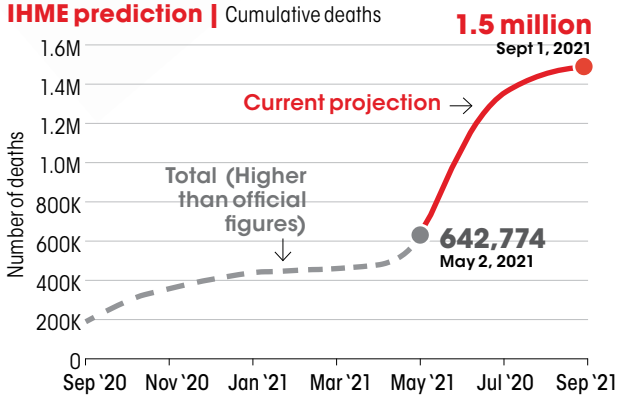
Two professors from the Indian Institute of Science in Bengaluru have developed a multi-dimensional Partial Differential Equations model to predict the pandemic. Their **latest prediction was released on April 27, 2021 and it looks at the trajectory till June 11, 2021**

PROJECTIONS

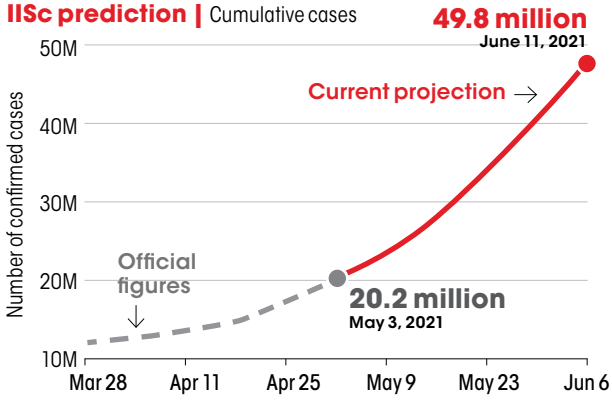
India's projected cumulative case count to reach **50 million on June 11, 2011.** The current count is 24 million cases (May 13).

The model looks at active cases, instead of new cases, and predicts over 11 million active COVID-19 patients on **June 11, 2021**, up from **3.71 million** active patients on **May 13, 2021**

IHME prediction | Cumulative deaths



IISc prediction | Cumulative cases



GRAPHIC: SANJIT / CSE

Source: Press Information Bureau, Sutra, IHME and IISc

As per the state health department, COVID-19 cases have risen by 255 per cent since April 14, a day when the state celebrated its harvest festival Vishu and people in large numbers engaged in shopping and festivities. "The elections and unprotected interactions in the society have created a situation in which the state failed to find a breathing period between the two waves," he adds. K K Shailaja, the outgoing health minister of Kerala, says, "Other than elections and celebration of festivals, people across the state found the post lockdown period as an occasion for what experts call revenge socialisation."

As a result, Kerala's situation in the second wave is similar to the rest of the country. ICU and ventilator beds earmarked for COVID-19 patients are fast filling up. The pandemic, which was earlier confined to the elderly and to those with comorbidities, is now prevalent among the young with little health problems. The state known for the country's most robust public healthcare system seems grossly unprepared for the second wave in which active cases crossed the 0.3 million mark on April 30. Kerala's positivity rate (percentage of positive cases to total tests) is about 25 per cent and the state has lost over 5,300 lives to the virus.

In West Bengal, which had an eight-phase elections and saw over 100 mega rallies, a state health ministry official concedes that the government saw signs of the second wave in the first half of March, as the cases started to rise. There was little anyone could do since the state was in election mode and the Model Code of Conduct was in place, says the official requesting anonymity. "Along with the obvious role of election, the new variants must have also played a role," says Manas Gumta, a physician in North 24 Parganas and general secretary of the Association of Health Service Doctors, West Bengal. Subhrojyoti Bhowmick, clinical director of Peerless Hospital, Kolkata, says the spread of the contagion beyond Kolkata also hints towards the role of elections. "Most of the areas that went to election in later phases, and hence had more meetings and rallies, are recording more cases," says Bhowmick.

As per the West Bengal government data, 19 districts apart from Kolkata urban agglomeration contributed 56 of the state's 216 cases (26 per cent) on February 26—the day election schedule was announced. On May 3, total number of cases had spiralled almost 81 times to reach 17,501. Districts like Birbhum and Malda that went to poll in the last phase on April 29 had two and one cases respectively on February 26, but 833 and 522 cases on May 3.

"In states that have not had elections, the spurt in cases is due to the congregations of different kinds. But in West Bengal, large congregations at the moment are mostly linked to the election," says Giridhar R Babu, an epidemiologist associated with the non-profit initiative, Public Health Foundation of India based in Bengaluru. "We may not have the data from West Bengal or India but the analysis of the US presidential election clearly establishes the correlation between large electoral meetings or rallies, often without maintaining COVID-19 norms, and a spurt in COVID-19 cases," says Bhowmick. "A long election is definitely contributing to the COVID-19 rise because it is maximising exposure," says Arunava Majumdar, a former director of All India Institute of Hygiene and Public Health, Kolkata.

Sukumar Mukherjee, member of the State Advisory Committee on COVID-19, and a physician based in Kolkata, says COVID-19 cases in West Bengal may reach around 25,000 per day by mid-May, triggering "a Delhi like situation", with Kolkata and adjoining districts likely to be most affected. Doctors say the positivity rate is already 40-90 per cent in Kolkata and adjoining areas, with hospitals generally recording the higher range. The overall positivity rate in the state has reached 29 per cent. "The second wave is proving to be much bigger than the initial wave. During April, we had a vertical rise in the number of cases. The situation is already difficult with virtually no bed left in most hospitals," he says.

During the first wave, COVID-19 infection was more prevalent in people above 60 years and in those with comorbidities. This time it is the 20-50 age group, which has been hit hard. There is a good chance of a third wave, which is likely to affect those under 20—the ones not vaccinated

PHOTOGRAPH: REUTERS

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COVID GONE NATIVE?

Vaccination and herd immunity are our only shield against the novel coronavirus which is likely to become endemic

Close to 70 per cent of India's 700-odd districts have a test positivity rate of over 10 per cent, shows the Indian Council of Medical Research (ICMR) data released on May 10, 2021. The national positivity rate is 20-21 per cent, but 42 per cent of the country's districts have reported a rate higher than this. This clearly establishes that the second wave of the pandemic has not just reached rural areas, but has become quite widespread. Given the lack of test infrastructure, the government has had to amend its testing guidelines by allowing more Rapid Antigen Tests. Earlier, the government had capped Rapid Antigen Tests at 30 per cent of total tests, while recommending RT-PCR tests because they are more accurate. As testing and isolation is key to break the transmission, and RT-PCR tests results take time, the government changed its guideline.

While India is still in the middle of the second wave, K Vijay Raghavan, principal scientific advisor to the Centre, has warned of another wave. "Phase 3 is inevitable, given the high levels at which this virus is circulating. But it is not clear at what time scale this Phase 3 will occur," he said at a press conference on May 5. However, at another press conference two days later, he mellowed down the warning by making it conditional on the absence of "strong measures". There is a growing consensus among epidemiologists and public health experts that India has to endure the pandemic for months to come. "COVID-19 is far from over. Allowing a third wave has grave consequences," warned Shekhar C Mande, director general of the Council of Scientific and Industrial Research during the virtual "National Science Day Lectures" organised on February 28 by Rajiv Gandhi Centre for Biotechnology in Thiruvananthapuram, Kerala.

While waves are temporary crises in a pandemic, the bigger and scarier scenario that experts are reconciling to is the circulation of the novel coronavirus for years to come. According to epidemiologists, and going by historical trends, COVID-19 would soon become endemic to India, meaning the health infrastructure will have to fight outbreaks regularly, just like it prepares for outbreaks like dengue.

The journal *Nature* in January this year undertook a survey among 100 immunologists, infectious-disease researchers and virologists on whether the novel coronavirus can be eradicated. Nearly 90 per cent of the respondents said it would become endemic. "Eradicating this virus right now from the world is a lot like trying to plan the construction of a stepping-stone pathway to the moon. It is unrealistic," Michael Osterholm, an epidemiologist at the University of Minnesota in Minneapolis, US, told *Nature* in his response to the survey. However, a third of the respondents thought that in some regions the virus could be eradicated while in some it would become endemic.

One scenario visualised by scientists and epidemiologists goes like this: in a not-so-distant future, children will catch the virus, get mild symptoms and develop immunity. Vaccines will be part of childhood inoculation regime.

This scenario is based on our experiences with four endemic coronaviruses (OC43, 229E, NL63 and HKU1) that affect humans

SCHOOL OF WATER AND WASTE

AAETI

2ND IMPACT WORKSHOP CUM MASTER CLASS ON

CAPACITY BUILDING INITIATIVE FOR CITYWIDE WATER AND SANITATION MANAGEMENT

Date: June 16 - 18, 2021 **I Venue:** Anil Agarwal Environment Training Institute (AAETI), Nimli, Rajasthan

School of Water and Waste (SWW) is organizing its second 'Impact Workshop cum Master Class' of the two-part series events to re-connect with alumni and resource persons for evaluation and assessment as core strategy to achieve higher outcomes of capacity building interventions. The 3-day workshop aims to bring together the SWW alumni, institutional programme partners, key resource persons – participants of various short-term trainings (including residential, online trainings/ webinar), workshops, knowledge conclaves, field exposure visits to identify the 'change agents' ***– water manager and leaders.***

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PROGRAMME DESIGN

Date: 16th June 2021

Theme: Sustainable Water Management

Water Sensitive Urban Design and Planning, Rainwater harvesting, Green Infrastructure and Nature Based Solutions, Urban Lake Management, Water and Communication, Tools and Approaches for Citywide Water management, Mainstreaming Water-Energy Nexus in Wake of Climate Change, Green Infrastructure Knowledge Conclave 2020

Date: 17th June 2021

Theme: Sanitation, Wastewater and Faecal Sludge / Septage Management

Tools and Approaches for Citywide Sanitation, Citywide Inclusive Sanitation, City Sanitation Plans & Faecal Sludge Management, Excreta Flow Mapping – Shit Flow Diagrams, Decentralised Wastewater Treatment including Local Reuse, SaniPath, Water and Sanitation Safety Plan, SFD Week Knowledge Conclave-2019

Date: 18th June 2021: Aspirational Talks by Invited Global and National Experts

Theme: Sustainable Water Management and Technical Session

Dr John Cherry - Distinguished Professor Emeritus, University of Waterloo, Canada

Dr Veena Srinivasan - Senior Fellow- ATREE, Bangalore, India

Anusha Shah - Director Resilient Cities, Arcadis, UK

Tony Wong, Professor - Monash University, Australia

K. Madhavan - Chief Executive Officer, WaterAid, India

Aloka Majumdar - Head CSR HSBC, India

Dr Kala Vairvamoorthy - Executive Director, IWA, India

Theme: Sanitation, Wastewater and Faecal Sludge/ Septage Management

Dr Kate Medicott- Team Leader – Sanitation, WHO, Switzerland

Juliet Willetts, Professor - University of Technology, Sydney, Australia

Christoph Luthi, Professor – EAWAG SANDEC, Switzerland

Dorai Narayana- International Consultant FSM, Malaysia

Arne Panesar- Head Sanitation Programme – GIZ & Sustainable Sanitation Alliance (SuSanA), Germany

If you are an Alumni of CSE –SWW or CSE institutional partner and interested to be a speaker at the Impact workshop to share your experience on above mentioned objectives, kindly submit a short abstract (max 500 words) of your presentation before 20th of May, 2021 to the undersigned coordinators.

- Top 10 impactful alumni will be awarded a Certificate as "Water Champion"
- Top 10 impactful alumni stories will get a full fellowship to attend a 3-day residential training cum knowledge conclave at AAETI.

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currently. Three of these four are believed to have been circulating in human populations for hundreds of years. People have developed immunity against them through infections, but that might wane when viruses mutate into new variants. The same could happen with COVID-19. We might develop immunity against it, aided by vaccines, but the virus might just evolve to escape this shield. More than half of the scientists who responded to *Nature*'s survey think that waning immunity will be one of the main drivers of the virus becoming endemic.

ELIMINATION UNLIKELY

Angela Rasmussen, a virologist affiliated to the US' Georgetown University Center for Global Health Science and Security, and a research scientist at the Vaccine and Infectious Disease Organization in Canada, told *Down To Earth* that in countries like India, Canada and US, which have runaway community transmission, the virus cannot really be eliminated. "COVID-19 is something that countries will have to learn how to live with and again this is going to vary a lot," she says. India, Canada, Brazil are in a crisis situation, while in countries like the US and in parts of Europe the virus is on the decline, she adds. "But a lot will depend on the prevalence of the virus and immunisation... it is a complicated question… I don't honestly know," Rasmussen says.

"Some argue it is already endemic… India is a good example. Beginning 2021 infection was so less that people were writing pieces that India had reached herd immunity. There was ongoing community transmission at low level. To some, it is a general definition of endedicity. It was not causing an acute epidemic," she says. "It may also go back to new animal reservoirs and that new zoonotic transmission, back to human. We have seen in Denmark and in the Netherlands. I am worried about infection getting into cats…as they are everywhere and people interact with them a lot.. That is why it is so important to vaccinate so that future outbreaks in COVID-19 endemic world are small and easy to contain," says Rasmussen.

Gautam Menon, professor of physics and biology at Ashoka University in Sonipat, Haryana, believes that the novel coronavirus will soon be part of our usual disease system. "We know that there are other coronaviruses causing something like the common cold, and they are seasonal. They are part of the bigger viruses that circulate. They are endemic. In principle, there is no reason COVID-19 will also not become an endemic," he says. But do we now when will it become endemic? Menon says it all depends on how the past infections build immunity response and how good are the vaccines in averting fresh infections. "If it turns out that reinfection is rare and the vaccination highly protective, you may find it just fizzling out, not even becoming endemic here," he says.

T Jacob John, a virologist and professor at the Christian Medical College, Vellore,

Some argue it is already endemic… India is a good example. Beginning 2021, infection was so less that people were writing pieces that India had reached herd immunity

ANGELA RASMUSSEN
Virologist affiliated to Center for Global Health Science and Security, Georgetown University, US

says COVID-19 will end as a "pan-endemic", covering the world, and the newborns will be the new addition to the existing vulnerable population of senior citizens and patients with comorbidities. "We can expect at least 5 per cent of the people in the country to develop symptomatic COVID-19 per day. Though we have faced many endemic diseases from time to time, the government has never had a plan to control them. Influenza H1N1 was once a pandemic. It still kills people. In fact, tuberculosis in India is hyper-endemic. We do not have any national policy to control it but to treat it free of cost. Treating the virus does not control the disease per se. We were living with endemics and we will learn to live with COVID-19, too," he says.

Vijay Kohli, who has worked with the Ahmedabad Municipal Corporation (AMC) health department for 15 years and with the Indian Council of Medical Research (ICMR) for a similar period, says that except malaria, there is no "system" to handle a new virus or bacteria. "Everything happens in a firefighting mode. Health infrastructure delivery systems need vertical programmes– meaning a set of people specialising in dealing with every aspect of a specific disease in a region. Malaria workers are experts in their regions. Now we are only developing horizontal systems. Meaning everyone knows a little about everything, but no region-wise disease experts," says Kohli.

Regional factors like the weather, a community's demographic and genetic makeup and its impact on the behaviour of the virus, are not sufficiently understood. Kohli, now retired, says he was with AMC when the city battled Crimean Congo haemorrhagic fever, chikungunya, dengue, swine flu, Zika virus and bird flu. "We could achieve success due to surveillance and accurate data processing. Without data, we cannot learn," Kohli says, and adds that though these diseases are under control, standard operating procedures are missing. "Doctors are learning on the job. This casual approach needs to stop," he asserts.

VACCINATE ALL

Experts are near unanimous in saying that vaccination and herd immunity are the only ways to fight the virus (see 'Not quite there' on *p*40). "Lots of people are getting infected, so we should develop herd immunity. Once 70-80 per cent of the population is vaccinated, vaccination and natural immunity together will bring the virus down," says Asima Banu, professor of microbiology at Bengaluru Medical College and Research Institute, and nodal officer of Trauma and Emergency Care Covid Centre at the Victoria Hospital. "Last time, the severity of disease was a bit different. It was more prevalent in people above 60 years of age, and in those with comorbidities. This time it is the 20-50 age group which is really badly hit. People with no comorbidities, absolutely healthy people, have been hit. Last year, symptoms were cough, soar throat, fever and the patient would go on to develop pneumonia. Now, it is mild fever one day, cough the next day and then they are absolutely okay. Or mild symptoms for three-four days and suddenly on the fifth or sixth day, they will develop breathlessness. Even children are getting increasingly affected; last year they were asymptomatic," Banu says.

She suggests that vaccination might not be the only reason a different age group is getting impacted this time. "How many have we vaccinated? Maybe just 1 per cent. So, that would not make such a huge difference," she says. "I can't comment on the dominant variant now, as we have to do lots of sequencing. Right now, we are in the process of handling the pandemic, so that data has to be released by ICMR. The virus has mutated, there are double mutants and triple mutants also. If we do genetic sequencing of all the people, we will know which mutant is dominant. But there definitely is a new mutant," she says.

Banu adds there is a good chance of a third wave. "We may not see the third wave in this population. Maybe it will affect those under 20. They are the ones not vaccinated. But again, we cannot say." DTE

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TRIPS waiver just got tougher after US support

The country wants text-based negotiations on a waiver limited to vaccines, but no one is complaining

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THERE IS an irony here. The struggle of developing nations to get an intellectual property rights (IPR) waiver on COVID-19 related therapies, vaccines and equipment just got harder after the US announced support for it—partially, that is. An unexpected statement by US Trade Representative Katherine Tai on May 5 that the Joe Biden administration would support the IPR waiver was seized with delight by just about everyone from governments to humanitarian organisations and public health campaigners.

It was hailed because the US is the foundational support for IPR, promoting it with messianic zeal and punishing countries that it accuses of, rightly or wrongly, transgressing the global rules on IPR protection known as TRIPS in the World Trade Organization (WTO). The US has been viewed as the biggest hurdle to any easing of IPR to fight the devastating effects of the pandemic and it was not surprising that even organisations in the forefront of the campaign for the waiver appeared overwhelmed by Washington's apparent change of stance.

But was it, indeed, a turnaround? Tai's statement is terse. It makes two points: the US will support the waiver only for COVID-19 vaccines and that it will participate in text-based negotiations at WTO to make that happen. It makes no mention of the India-South Africa proposal made in October 2020 at WTO around which an unremitting global campaign for waivers has coalesced. That proposal, which now has 60 co-sponsors and well over a 100 WTO members supporting it, has made no headway over the past seven months. There is not even a written text of the proposal which the original sponsors were in the process of redrafting when the surprising US decision was announced. The opposing camp has consisted of the US, the EU, other nations like Switzerland and Japan, which strongly echo the powerful voice of the pharma giants or the innovator companies. The latter insists that even a limited time IPR waiver to fight the pandemic will sound the death knell of innovation in the industry.

Tai is clear that the US belief in IPR is unshaken. However, the extraordinary circumstances call for extraordinary measures, she says, and the US' aim is to get as many vaccines to as many people as fast as possible. To this end, it "will continue to ramp up its efforts—working with the private sector

and all possible partners—to expand vaccine manufacturing and distribution". It promises to work towards increasing the raw materials for making the vaccines.

To some extent, Biden has proved his credentials. He has worked around the Defence Production Act (DPA) to provide raw materials to the Serum Institute of India for producing the AstraZeneca Covishield vaccine. The DPA requires US firms to prioritise government contracts ahead of other American contracts. According to a National Security Council briefing, the US government is diverting its own order for raw materials to India, making it an act of mercy to tackle the spread of SARS-CoV-2 virus in the country.

This leaves the question of IPR waiver at WTO hanging. Text-based negotiations have invariably been protracted and Tai has warned this will take time given the consensus-based nature of the institution and the complexity of the issues involved. The wording of the text could be a fraught exercise since the sharing of technology needs to be incorporated in it. That is, if developing countries accept the curtailed version of their proposal to start with.

Champions of IPR waiver have invariably sidestepped the critical question of how they plan to get companies to part with their technology even if WTO members agree to it

The immediate reaction to the Biden announcement is an indication of what lies ahead. Although the EU is ready to discuss the US proposal, it wants a more extensive discussion about production capacity, licensing and vaccine exports apart from the IP waiver. It has thrown cold water on the hope that a waiver will bring in more vaccines. Not even next year, says a dismissive statement. Industry has also stepped up its shrill campaign, making dire predictions about the end of innovation.

The pandemic has sharpened the familiar North-South divide on many fronts, most notably on access to vaccines. Rich nations have managed to immunise a sizeable part of their population and are moving towards herd immunity while many nations, specially in Africa, have been denied vaccines. The proposed waiver has polarised the WTO further, not least because of the successful lobbying by industry which is set to make enormous profits from the COVID vaccines. The top five makers of COVID vaccines are expected to rake in profits of $38 billion in 2021.

But as the death toll crosses 3.2 million (May 10), there is a growing disquiet in the pro-waiver camp that developing countries might be barking up the wrong tree. There is a perception that IP is not the only hurdle to vaccine equity. There are a stack of other problems, including limited manufacturing capacity and shortage of raw materials. Given this, WTO director-general Ngozi Okonjo-Iweala has proposed a "third way" based on more licensing to promote access to vaccines.

Since the waiver proposal was mooted last year, another 2 million people have died worldwide and the licensing lobby appears to be winning the argument simply because there is no clarity on how the IPR waiver will result in more jabs—if at all. Champions of the waiver have invariably sidestepped the critical question of how they plan to get innovator companies to part with the technology even if they succeed at WTO. Without cooperation on technology transfer the new mRNA vaccines may be difficult to manufacture, assuming that all else is secured: production facilities, the right kind of scientists to run them and adequate supplies of raw materials. In the case of vaccines it is not patents that act as a barrier but trade secrets which are a more difficult form of IPR to contend with. The alternative to licensing and cooperation would be forced technology transfer, a far from appealing prospect.

Biden has promised Congress that he will turn America into "the arsenal of vaccines" to fight the pandemic. It combines business logic with humanitarian principles and makes his support for the waiver a good strategy. Quite often, it's not about winning or losing—it doesn't matter anyway to the US—but about which side of the battle one fought on. DTE

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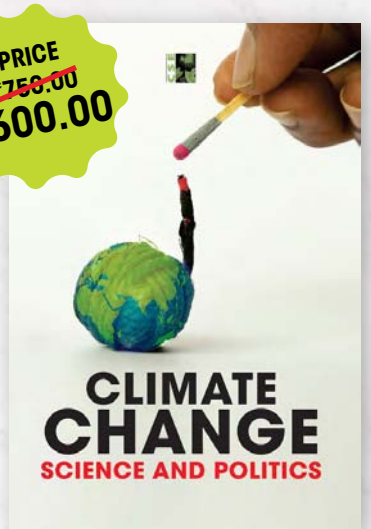

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Palette

WHAT'S INSIDE

Degradation of Loktak lake in Manipur hurts lives, livelihoods **P54** / Coal India's annuity scheme for landowners shows promise **P60** / Tea made from *giloy* can aid in recovery from viral fevers **P64**

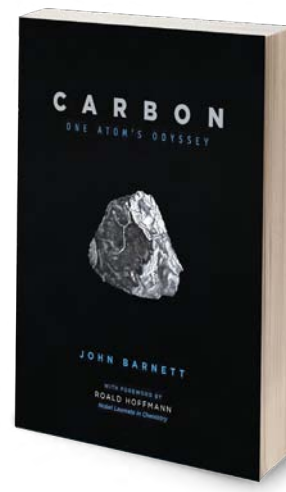
RECOMMENDATIONS

EXHIBITION

Nature has been one of the most consistent subjects of focus for artists across generations and media. This fact has inspired the Dulwich Picture Gallery in London, UK, to open its first major photography exhibition on May 19. Named *Unearthed: Photography's Roots*, the exhibition traces the evolution of the art through still-life photographs of plants and other botanical images. *Unearthed* will feature more than 100 works of celebrated photographers such as William Henry Fox Talbot and Anna Atkins as well as of several undiscovered artists in the domain. The exhibition will be open until August 30, 2021.

BOOKS

Can our food choices save the world? According to Jessica Fanzo, Bloomberg Distinguished Professor of Global Food & Agricultural Policy and Ethics at Johns Hopkins University, making an effort to eat correctly can not just preserve the world's biodiversity, but also save us from a host of potential public health crises. In *Can Fixing Dinner Fix the Planet?* she educates both policymakers and the public on how to move towards sustainability through the food we purchase, distribute and cook.



Since its birth 14 billion years ago, the humble carbon atom has gone through a tremendous evolution, becoming a building block of nearly 10 million essential compounds in living species. From helping trees grow tall and moths see light to turning grapes into wine, several processes use carbon. In *Carbon: One Atom's Odyssey,* an illustrated adaptation of a short story on the element by Italian chemist Primo Levi, US-based graphic designer and illustrator John Barnett traces the fascinating journey of this component.

The floating meeting hall of Champu Khangpok village in Manipur's Loktak lake. Only 20-odd people can enter the meeting hall at a time so that it does not sink. The rest participate in the meeting from their canoes

PHOTOGRAPH: DEEPAK SHIJAGURUMAYUM

HOLDING GROUND

A floating village has so far managed to cope with Loktak lake's fast degrading ecosystem. It may not survive the financial crisis induced by the pandemic

BY DONALD TAKHELL IMPHAL, MANIPUR

OINAM RAJEN appears to have suddenly grown old in the past one year. Sitting in his wooden canoe, his eyes wander over the vast expanse of Loktak lake that surrounds his village, in search of the end. But the lake appears to be as endless as the struggle of his community to stay afloat—both literally and metaphorically.

Rajen's village, Champu Khangpok, is located in the largest freshwater lake of the Northeast, in the Imphal valley of Manipur, surrounded by a chain of hills. Houses here are nothing but single-room thatched huts perched on *phumdi*s—thick mats of aquatic and terrestrial vegetation in different stages of life and decay that keep floating with the wind. Over the centuries, his community has mastered the art of maintaining the buoyancy of these floating

islets through regular pruning and clearing of dead clumps. The *phumdi*s are then tied together in the desired order to serve different purposes. On some, bamboo poles are placed neatly to build dwellings called *khangpok shangs* (shelter huts). Women use the others to wade through the soggy biomass to collect wild edibles and herbs for household consumption and to sell. An impressive use of the biomass is to harvest fish using a traditional practice, *athaphum-namba*.

Every now and then some eight to 12 people come together to arrange patches of the biomass in a circle to form an open "water pond". It is lined with a fish net and feed is provided at the centre. When the feed draws adequate fish into the circle, the net is slowly hauled from one end to the other. The fish are then collected in traditional traps called *taijep,* which are kept half immersed in the water so that the fish stay alive until they are taken to be sold. The women of Champu Khangpok, however, prefer to smoke-dry some of the catch on a hearth. Smoked fish is not just a delicacy in Manipur, but it can also be stored for a long time until the women have enough to head to the lakeshore villages like Thanga, Ningthoukhong and Mayang Imphal. There they hand over the smoked fish and the fresh catch to the *unja*—the middle-woman who then sells the produce in markets.

Paddling the canoe for more than an hour to reach the lakeshore, navigating through the maze of floating biomass—often hampered by strong winds—is not easy. But this is the only way of sustenance for the 165 households of Champu Khangpok. The village has no shops or basic facilities other than a floating elementary school and a floating meeting hall. Fish is the only available resource for everything, from buying clothes, fishing gear, firewood and essential food items like salt and rice to paying education fees of children, most of whom study in boarding schools. An assessment by Imphal-based non-profit Indigenous Perspectives shows that a fisherman of Champu Khangpok spends over ₹1 lakh a year on fishing nets and gear and up to ₹18,000 on firewood. For this, he invariably borrows money from the *unja* at high rates of interest with an agreement to continue selling the catch to her until the debt is settled.

"Our condition was never so pitiable. There was a time when we used to grow paddy in this lake," recalls Rajen, who is in his late 60s.

Other residents join the conver-

(Top) Ithai barrage built in 1983 has permanently altered the ecosystem of Loktak lake; (right) phumdis *arranged in circles for catching fish dot the lake. Residents of Champu Khangpok village say fishes that used to migrate from the Chindwin-Irrawaddy river system into the lake are now blocked by the barrage*

PHOTOGRAPHS: NGAMEE LUP, ALL LOKTAK LAKE AREA FISHERMEN'S UNION, GOOGLE EARTH

sation. They say some four decades ago, Loktak lake was not a single waterbody. It was a wetland system fed by at least nine rivers and 20 rivulets which then drained into the Manipur river—part of the Chindwin-Irrawaddy river system that straddles India's border with Myanmar. Each wetland had distinctive waterbodies, a defined boundary, a distinct identity and a name. During the dry season from October to April, communities from Champu Khangpok and other villages on the shore used to grow different varieties of rice on the exposed lake bed and dried up

During the COVID-19 lockdown in 2020, residents of the floating village Champu Khangpok had to depend on occasional supplies of rice and other essential food items from their well-wishers. Before the Ithai barrage was built, they used to grow rice on the lake bed and wetlands in summers, catch fish in the monsoon and collect ample wild edibles from the phumdis

wetlands. Crops were harvested before the onset of pre-monsoon showers. With the arrival of the rainy season, the level of water would rise with the *khangpok shangs* floating up. The fields would be submerged, the waterbodies would merge and the farmers would become fisherfolk. With water spreading over 240 sq km, the lake used to support over 100,000 people living both inside as well as outside its waters.

All this changed in 1983, when the National Hydro Power Corporation (NHPC) Ltd set up a barrage at the confluence of the Manipur river with the Tuitha (Khuga) river near Ithai Khunou village. The Ithai barrage, constructed to feed a 105 MW hydropower plant, obstructed the only outlet for the wetland system and created an artificial reservoir; all the wetlands have since become one waterbody known as Loktak lake, which no longer exhibits any seasonal variation. "This has altered the lake ecosystem," says Ningthoujam Thasana, a resident of Champu Khangpok. *Phumdi*s that used to sink to the lakebed during the dry season, allowing its terrestrial vegetation to absorb nutrition from the soil before floating up with added biomass in the rainy season, now solely depend on aquatic vegetation and are thinning down. Wild edibles on them, too, have become sparse.

Before 1983, a variety of fish used to migrate upstream from the Chindwin-Irrawaddy river system. The barrage has blocked their route. All that is available in the lake are Indian major carps introduced by the fisheries department. Migratory birds visiting the lake have also declined by one-third. The residents' struggle has compounded as the lake has become a receptacle of untreated sewage and silt flowing down from surrounding areas. In 1993, just three years after being recognised as a wetland of international importance under the Ramsar Convention, the lake was listed under the Montreux Record because of its degraded ecology. Now, COVID-19 appears to have dealt a death blow to the village community. None of the residents were infected by the virus till early May this year. Yet they are among the worst-hit by the pandemic. Soon after the first nationwide lockdown was declared to curb the spread of infection in late March 2020, children studying in Imphal

Women at Champu Khangpok often smoke-dry the fish so that it can be stored until they have enough to head to the lakeshore villages

PHOTOGRAPH: DONALD TAKHELL

and other urban areas returned home. The *khangpok shang*s, usually sized 0.5 sq m, had little space to accommodate them as well as the smoked fish that remained stacked up as markets remained shut. People ran out of basic food items, firewood and other essential commodities. Groups such as the All Manipur Students Union did try to provide emergency food supplies, but these did not last long. The residents had to request their relatives and *unja*s to supply food as additional loan, but completing the exchange was not easy as the lakeshore villages had restricted entry of outsiders.

But living an integrated life with nature for generations has made the people of Champu Khangpok resilient. During the initial lockdown weeks, some ace canoe rowers braved the dark to the reach the lakeshore before daybreak or after dusk to collect the supplies. Fishing continued as usual. To ensure that the catch remains preserved till the markets reopened, the people altered the curing method. Instead of smoke-drying, they sun-dried the fish and then pressed them with weights. This preparation also reduced their dependency on firewood, a precious commodity on the islet. Life limped back to normal as the government eased lockdown restrictions after a few months, but by then every household was neck-deep in debt.

Amid the hardship, on November 11, 2020, the Election Commission of India re-recognised the existence of the village (it was removed from electoral records in 1980s) and set up a polling booth there. This came as a huge relief to the residents who had been living under constant fear since 2011, when the Loktak Development Authority (LDA) set fire to 777 *khangpok shang*s across the lake, declaring the fisherfolk as illegal occupiers. "The recognition will now help the residents benefit from the government's welfare programmes and relief assistance like insurance schemes and fishing loans," says Thasana.

The pandemic, repeated lockdowns and exodus of workers from urban to rural areas has once again underscored the importance of Loktak lake in ensuring livelihoods. More and more people from lakeshore villages are now engaged in fishing in the lake. Boat makers say they have delivered more than double the canoes they usually build in a year. "There is an urgent need for the government to provide us financial assistance and other welfare benefits, particularly during the lean season when catch dwindles. Provision should be made for basic amenities like solar lighting, safe drinking water, potable toilets, primary healthcare and education, and Champu Khangpok should be developed as a model fishing village in line with concepts of a green village," says Rajen, who leads All Loktak Lake Area Fishermen's Union, set up in 2011 after the LDA incident. "Else, the government must decommission the Ithai barrage and restore the lake. That's the only way to end our miseries." DTE @down2earthindia

IN NOVEMBER 2020, THE ELECTION COMMISSION OF INDIA RECOGNISED THE EXISTENCE OF CHAMPU KHANGPOK AND SET UP A POLLING BOOTH IN THE VILLAGE

(Donald Takhell is research associate with Indigenous Perspectives, a non-profit in Imphal. This article has been published as part of the 2021 Smitu Kothari Fellowship of the Centre for Financial Accountability, New Delhi)

SCHOOL OF WATER AND WASTE AAETI | UWE Bristol University of the West of England

Training Programme on GIS and Remote Sensing for Designing & Implementing Green Infrastructure

Part A (Online): 23 June to 9 July 2021 | **Part B (Residential):** 28 - 30 July, 2021 | **Language:** English
Venue: Anil Agarwal Environment Training Institute (AAETI), Nimli, Rajasthan

BACKGROUND

This tailor-made training on Geographic Information System (GIS) and Remote Sensing (RS) will go long way supporting practitioners as well as allow managers and regulators move efficiently from traditional planning and design techniques to smart, cost effective and sustainable water and sanitation solutions.

GIS Package: The course will be run on open-source GIS package, Quantum-GIS (Q-GIS).

AIM

To equip practitioners, managers and regulators with state of art tools and techniques required for water sensitive urban design and planning.

LEARNING OBJECTIVES

- Build skills to use GIS and RS in sustainable water management in city/region.
- Enhance understanding on various data portals: USGS Earth Explorer, Bhuvan, OpenStreetMap, Toposheets, etc.
- Prepare maps and perform analysis using open-source GIS packages for designing and implementing green infrastructure for improved water security in city/region.

CLICK HERE TO REGISTER

PROGRAMME DESIGN

Part A: Context setting and Introduction (Online Platform) 23 June to 9 July, 2021

Part B: Action Learning (Residential Training) 28 - 30 July, 2021

GIS proficiency is not a requirement. However, participants must have basic proficiency in using of computers, and access to a computer system with minimum requirements for downloading, installing and running Q-GIS package.

TRAINING FEE

Part A (online): ₹3,500 (Indian participants), $100 (Participants from outside India)

Part B (Residential): ₹26,400 (Only for Indian participants)

Includes Tuition fee, Training material, External expert lectures and sessions, Boarding and lodging, Transport from New Delhi to AAETI and back.

Part and Full fellowships available: Part and Full fellowships are available for Part B (Residential Training) for deserving candidates and alumni.

Note: Only shortlisted candidates will be informed.

EXTERNAL TRAINERS

Dr Pramod Kumar
IIRS Dehradun, India

Dr Nevil Quinn
UWE Bristol, UK

Mr Ujaval Gandhi
Spatial Thoughts, India

Prof. A. K. Gosain
IIT Delhi, India

Dr Sandhya Rao
INRM Consultants, India

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A BIG DEAL, NOT YET

Coal India's new scheme that offers monetary compensation for land in lieu of employment offers a win-win prospect for its business as well as project-affected people. But operational challenges remain

BY RISHI KISHORE

A MAJOR HURDLE that India's robust coal mining sector faces is acquiring land for implementing or expanding its projects. This is especially a challenge for companies that operate opencast or open-pit mines and need to occupy huge tracts of land for excavation of ore from seams near the surface as well as for disposal of overburden. Negotiations with landowners and other project affected families (PAFs) for such large-scale land acquisitions often result in clashes and delays in project implementation.

Even the government-owned Coal India Limited (CIL) is not exempt from this problem. CIL's annual report for 2019-20 says that 54 of its 123 projects valued at ₹20 crore or above across the

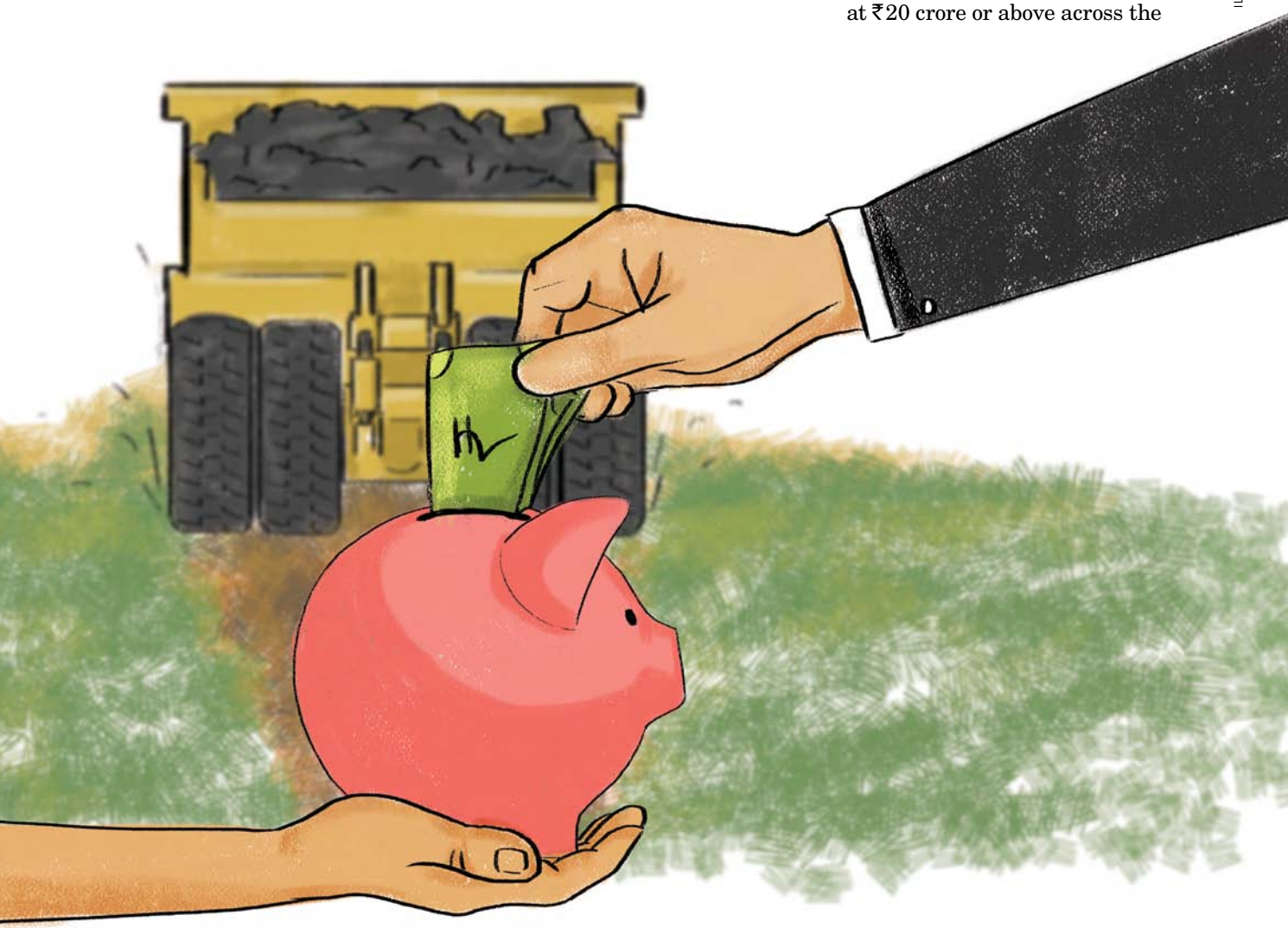


ILLUSTRATION: RITIKA BOHRA / CSE

country are running behind schedule because of delays in land acquisition and forest clearance.

One major sticking point in land acquisition agreements is that the mining company, apart from paying for the land, must also provide employment to one eligible member of the PAF in accordance with the Second Schedule of the Right To Fair Compensation And Transparency In Land Acquisition, Rehabilitation And Resettlement (RFCTLARR) Act, 2013. This leads to internal disputes among landholding families, often resulting in delays in agreements. As a solution, CIL on September 2, 2020 approved an annuity scheme, already permissible under the RFCTLARR Act, for PAFs in lieu of employment.

CIL's Annuity Scheme 2020 states the landowner can opt for a fixed monthly income of ₹150 per decimal (0.004 hectare) of land, which can amount to a minimum of ₹2,000 and a maximum of ₹30,000 per month for 30 years or through the project's lifetime, whichever is longer. Non-title landowners will receive ₹2,000 per month for 20 years or till the end of the project, whichever comes later. In addition, the landowner will receive other benefits such as group health and life insurance coverage and skill development training. PAFs that bequeath the land within one month of announcement of the project will receive a special bonus.

A close reading of the scheme shows that though it is beneficial for both the company and PAFs, it is not without complications.

LONG-TERM OUTLOOK

For CIL, the scheme will prove highly beneficial if implemented successfully. Monetary compensation to the PAF in lieu of guaranteed employment to just one member will help resolve internal disputes and thereby speed up land acquisition process.

Furthermore, CIL mines are highly mechanised. In most of them, production is outsourced to private contractors and do not have much requirement for unskilled labour. In this context, employing all eligible project affected persons is unviable. Since coal demand is expected to plateau in the next few decades—globally, there are commitments to replace coal-based power with renewable energy sources within the next 30 years—any person joining the company now may not be able to complete their full tenure. The annuity scheme thus works in favour of PAFs who may continue to earn a steady income irrespective of the closure of the mine.

UNDER THE ANNUITY SCHEME, COAL INDIA PROMISES MONTHLY COMPENSATION FOR AT LEAST 30 YEARS. THERE IS NO CLARITY ON HOW IT WILL ENSURE THE FUNDS

However, financing the scheme is a challenge. CIL promises compensation for at least 30 years; but it is not clear how the company is going to ensure availability of the required funds. Will CIL create a corpus during the project initiation period, or will the money be doled out from the project's annual operational budget?

In the case of loss-making subsidiaries, there are instances when even the salary of permanent staff is delayed. So how will CIL guarantee monthly disbursal of the annuity? Like other public sector units, CIL also has a history of corruption and inefficiency. So without a proper mechanism for funds disbursal, PAFs may not get their promised sum. This will lead to distrust among PAF members and future beneficiaries will not opt for the scheme. As a solution, the fund can be set up at the time of project initiation and a third-party corpus management company such as Life Insurance Corporation or Housing Development Finance Corporation can be appointed for the monthly disbursals.

LIKELY OBJECTIONS

Under CIL's current land acquisition policy, one PAF member will be employed in exchange for 0.8 ha. However, the 2015-16 Agricultural Census states that 85 per cent of landholdings in the country fall in the marginal and small farm category of less than 2 ha. Therefore, marginal and non-title landholders do not always get the benefit of CIL employment and resist land acquisition. The new scheme will be beneficial for such landholders, provided they are not misguided to opt out due to information asymmetry. Trade unions and local politicians, whose dominance and popularity rely on their ability to provide jobs to PAF members, might also oppose the scheme and spread misinformation against it.

There were already multiple protests at all seven of CIL's subsidiaries after the scheme was announced in September 2020.

The annuity scheme is well planned. However, CIL must resolve its operational challenges, in consultation with PAFs and their leaders, so it realises maximum potential. DTE @down2earthindia

(Rishi Kishore is research manager at the Madras Institute of Development Studies in Chennai. The views are his own)

"Cities collapse if the labour market falls"

With rapid urbanisation comes an uptick in demand for adequate housing in cities that are seeing an influx of workers. But city planners fail to provide these groups adequate housing; this was evident during the COVID-19 lockdown last year. **ALAIN BERTAUD**, senior research fellow at the Marron Institute of Urban Management, New York University and author of *Order without Design: How Markets Shape Cities*, tells **AVIKAL SOMVANSHI** how planners must shift focus from unsustainable housing to essential infrastructure. Edited excerpts:

Your book says that the market is an important force in deciding how cities grow and develop. In India, we often hear plans to, say, convert Mumbai to Shanghai but these do not materialise. Cities grow of their own accord. Why does this happen?

If you had told urban planners 30 years ago that Delhi would be a conurbation of 30 million people, they would say "no, it's impossible, we would not do that". The policy of India was to have smaller cities or even cities in areas which were undeveloped. But the way cities have developed, not only in India but also everywhere else, is not according to planning. It has been driven by firms. Firms go to Delhi or Mumbai because they find competent people there as employees and consumers. Basically cities are driven by people, who express their desires through the market. If a lot of people are going to select cities, then of course it will put pressure on land and housing and on the infrastructure. That's why, to me, the two main aspects of urban planning are mobility within the city and affordability—to be sure there is supply of land to meet the demand of people moving to the city. But

if urban planners say they will limit the city, as was the case in India for a long time, they will not develop infrastructure that is needed.

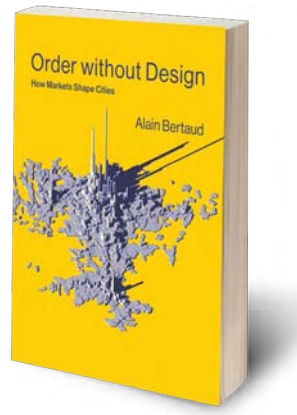
In India, the floor space index (FSI, the maximum area that can be built on a plot of land) in major cities is restricted. But even in smaller cities where FSI is freer, developers build luxury apartments, not low-cost housing. Why?

The demand for luxury apartments is not infinite, so in time, developers will have to cater to the middle class or to the lower middle class. But let's take the case of Mumbai. There should be at least two or three bridges across the bay (on the Thane Creek, connecting South Mumbai with Navi Mumbai and the mainland). These bridges would be a way of increasing the supply of land, but instead the city built a bridge connecting Worli to Bandra—already land-constraint neighbourhoods. So in a way, Mumbai restricted the supply of land. If the supply is restricted, developers cater to the upper class, especially if they have to build high-rises. You cannot have a 20-storey building and call it low-cost housing, just the maintenance will be higher than what people pay in rents. If there is a large category of people that cannot afford to spend US $12,000 annually on a house, no high-rise building will solve the problem; you need a minimum income.

A city's infrastructure network and the way it is designed is important, it controls the price of land. At the same time, regulation that requires a minimum standard or consumption of space is bad; it allows people to make their own trade-offs.

You say that a free market can solve several problems. Delhi sees a lot of air pollution but there is neither public support for nor technical know-how of structural adjustments to address that. Can a free market help such an issue?

Pollution is something that the market does not price. So the government has to price it, because if you pollute, you do pay a price for it in your health but not in money. More than 20 years ago in Delhi, there was a civil suit against pollution by buses and rickshaws and the Supreme Court decided they should switch to compressed natural gas (CNG). For some time this improved things. So, (in such a case) the market itself will not change but the government has to use the market through incentives, for instance, taxes (to push reforms). Now in USA, the government has set pollution limits on cars, which creates an incentive for industry to adapt. As a result, car prices are a little higher and owners pay for pollution they produce.



Order without Design: How Markets Shape Cities

By Alain Bertaud

Publisher: The MIT Press

Pages: 432; **Price:** US$40

One pattern that emerged during the COVID-19 induced lockdown in India last year was the reverse migration of informal workers from major cities. These people paid exorbitant rents to live in slums or informal settlements within the city. What do you think about this?

The exodus of the people was typical of what happens when the labour market collapses. Slum or the informal sector is part of the market. People living in slums are paying rents which are quite high per square metre, especially since they have no running water, among other things. This limit between the formal and the informal sector is a mistake of the planners. You have, because of COVID-19, a collapse of the labour market—people see their employment disappear overnight—and then the city collapses. It happened in the US, with Detroit. Services deteriorated and firms left. There was robotisation in the industrial sector. So the Detroit labour market collapsed.

What would you like to tell planning professionals and schools about how they should reorient or realign their education so that future planners and architects focus on making the city work, instead of merely making master plans to decide where people should build and how? Delhi, for instance, is already working on the Master Plan 2041...

I think the problem we have as planners, all over the world and not only in India, is this idea that the city is a bit like a high-tech telephone. This is not true. A city is made of, we have to understand, its problems. Then the idea of the market comes naturally. If students talk with slumdwellers, they would understand their real constraints, instead of inventing constraints that do not exist. Form a solution to increase supply through infrastructure, and in a certain way, taxation, to plan the city rather than using just designs. DTE

@AvikalSomvanshi

SLAY THOSE SYMPTOMS

KEEP A STEM OF *GILOY* HANDY WHILE RECOVERING FROM COVID-19 OR ANY OTHER VIRAL FEVER

VIBHA VARSHNEY

LARGE, HEART-shaped leaves of *giloy* (*Tinospora cordifolia*) peeped out from behind a pillar in front of my house as I recuperated from COVID-19. It was just one of the many *giloy* creepers the residents had planted after chikungunya ravaged the south Delhi neighbourhood in 2010. Since then, people in the locality have used stems of these creepers to prepare herbal tea or *kadha* during all kinds of viral fevers. It is slightly

Giloy tea or *kadha* is slightly bitter but the herb is traditionally considered to be a prophylactic against fevers

bitter but easy to make (see recipe). This time as COVID-19 swept across the national capital, I could see many in my neighbourhood relying on *giloy's* woody vines to alleviate their symptoms.

Soon after the outbreak of the SARS-CoV-2 virus in the country, the Union Ministry of Ayush had released an advisory, *National Clinical Management Protocol based on Ayurveda and Yoga for management of COVID-19,* which prescribes *giloy* as one of the prophylactic care measures against COVID-19. People who are at high risk of the infection or are regularly exposed to the virus should take 500 mg extract or 1-3 g powder twice every day with warm water for 15 days or one month, it says. While undergoing conventional treatment for the disease or recovering from it, the ministry advises taking *giloy* in combination with *amla* (*Emblica officinalis*) and *gokshura* (*Tribulus terrestris*) in prescribed doses to manage symptoms like fever, sore throat, headache and tiredness.

The plant has a long tradition of use for its therapeutic properties. Ayurveda refers to it as *guduchi,* which means "protector from diseases", or as *amrita* or nectar which has the property to make the user immortal. Other than its vines, several Ayurveda texts mention *giloy* as a *patra shaka* (leafy vegetable), suggesting that the plant was used as a vegetable by ancient Indians. Studies have established that *giloy* leaves are rich in vitamin C and minerals, while the starch from the stem (called *guduchi satva*) is full of calcium and iron. The stem extract helps control diabetes and arthritis, strengthens immune response and aids in digestion.

In recent years, studies are trying to explore its antiviral properties. The herb is effective in controlling hepatitis A virus, according to a study published in the *International Journal of Scientific Research in Biological Sciences* in June 2018. Ethanolic extract of the whole plant was found effective against the virus in a dose-dependent manner in laboratory studies, with efficacy being maximum at 50 µg/ml concentration, says the study. Another paper, published in the *Indian Journal of Pharmacology* in 2008, says 60 per cent of HIV patients who received treatment with extract of *giloy* reported a decrease in the incidence of symptoms associated with this autoimmune disease. Compared to this, 20 per cent people on placebo reported improvement in symptoms of HIV. Based on the findings, the researchers from the Government Medical College and the Government Ayurvedic College and Hospital, both in Nagpur, Maharashtra, suggest *T cordifolia* could be used as an adjunct (additional treatment to increase the efficacy of primary treatment) in HIV/AIDS management.

As more and more people attempt to adopt a healthier lifestyle following the pandemic, there is an increased demand for the beneficial stem of *giloy* from across the country. Since most *giloy* available in the market is collected from the wild, state governments have also increased the minimum support price (MSP) for it to promote collection. Chhattisgarh, for example, increased the MSP to ₹40 per kg in May 2020, up from ₹21. In Maharashtra's Thane district, 300 people of the Katkari community—one of India's 75 Particularly Vulnerable Tribal Groups—have come together to form the Adivasi Eakatmik Samajik Sanstha to collect and sell *giloy* from forests. Since its formation, the self-help group has earned ₹18.5 lakh from selling *giloy* powder and dry *giloy* stems, as per a government press release dated April 8, 2021. The Union Ministry of Tribal Affairs has also set up a central processing facility in the district where the dried stems brought in by the group are powdered, packaged and sold to Ayurvedic companies like Dabur, Baidyanath and Himalaya.

Giloy is said to have originated in the Indian subcontinent and is found across India, Myanmar, Sri Lanka and China. Though India is home to three of its 40 species—*T cordifolia*, *T sinensis* and *T crispa*—they can be easily grown as a rain-fed crop. The National Medicinal Plants Board, Delhi, has recently brought out guidelines for its cultivation, which say the vine grows best as an inter-crop with native trees like *neem (Azadirachta indica)*. It is said that when grown with *neem*, *giloy* takes up its medicinal properties. Fresh twigs are also said to be more efficient than dried stems. Since it can grow profusely in pots, all one needs to do is plant a small piece of the stem. DTE @vibhavarshney

RECIPES GILOY TEA OR KADHA

INGREDIENTS

Giloy stem: 5 cm
Ginger: 2 cm
Turmeric (fresh): 1 cm
Cinnamon bark: 2 cm
Peppercorn: 1/2 tsp
Honey: 1 tsp

METHOD

Crush the ingredients and boil in 300 ml water using a pan with a thick base. Boil till the water reduces to 200 ml. Strain the concoction in a cup and add honey. The *kadha* is said to be more effective when consumed on an empty stomach.

PHOTOGRAPH: VIKAS CHOUDHARY / CSE

ONLINE TRAINING PROGRAMME ON

"CEMS and CEQMS- Technology selection, its installation, Data Handling and its Audit Methodology"

Course Date: July 14-27, 2021
Last Date to Apply: July 9, 2021
Course Duration: Two weeks 20 Hours (10 hours per week)
Course Platform: Zoom and Moodle

BACKGROUND

Installation of Continuous Emission Monitoring System (CEMS) and Continuous Effluent Quality Monitoring System (CEQMS) were mandated by Central Pollution Control Board (CPCB) in 17 categories of highly polluting industries (classified under highly polluting industries) and for common pollution treatment facilities. The purpose of mandating real-time monitoring is to strengthen the monitoring and compliance mechanism in the industries and also to promote the measurement of real-time data, which is to become the basis for regulators to check compliance by the industries in near future. In addition to this, these systems can also help industrial sectors/regulators in process optimization and taking timely corrective measures. Since CEMS and CEQMS are complex and expensive technologies, there are significant challenges and risks associated with their implementation. Therefore, appropriate knowledge and skill development for CEMS and CEQMS becomes most crucial factor for industries, regulators and other stakeholders.

Furthermore, in order to ensure proper implementation, auditing of these real-time technologies is an essential factor in improving the systems already installed in the industries. So this programme will also lay focus on audit methodology, which ensures correct implementation of the real time monitoring of emissions and effluent in an industry, to check whether stated standards and other regulatory requirements are being followed, status of facility's compliance, certification, verification, accreditation of the system, technical acceptance through calibration, quality assurance, generating accurate, reliable and traceable data and other related aspects.

Centre for Science and Environment (CSE) recognizes this need and announces an online course on **"Continuous Emission and Effluent Quality monitoring System and its Audit Methodology"** for environment professionals.

This course will be conducted online through technological learning tools such as technical discussion with experts, recorded sessions from experts, presentations, videos and reading material.

THE KEY TAKEAWAYS

- Pollution monitoring regulations in India and developed countries like US, Europe.
- PM CEMS Technologies and its suitability and limitations
- Gaseous CEMS Technologies and its suitability and limitations.
- CEQMS Technologies and its suitability and limitations.
- Correct installation, operation & maintenance of CEMS and CEQMS.
- Requirement and procedures of calibration for CEMS and CEQMS.
- Data acquisition, handling and reporting.
- Data interpretation, compliance check and improvement.
- CEMS and CEQMS- Audit Methodology.
- Assessment of monitoring technologies, installation, calibration and maintenance practices while conducting audit.
- Development of CEMS and CEQMS audit questionnaire.

WHO CAN APPLY?

Industry Professionals, Environmental laboratories professionals, Regulatory bodies, Academic institutions, Consultancies, Researchers Instrument Manufacturers and other interested participants.

COURSE FEE

Indian participants: **Rs 3500 I** Overseas participants: **USD 100** (per Participant)

COURSE COORDINATOR

SHREYA VERMA
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