DISASTER MANAGEMENT

MANUAL DRILLING ON TO REACH STUCK WORKERS

CONTEXT: Despite multiple setbacks, officials were hopeful of a breakthrough in their operation to rescue the 41 workers trapped in Silkyara tunnel in Uttarkashi, as manual horizontal drilling started on Monday.

Madras Sappers, an engineering group of the Corps of Engineers of the Indian Army, is overseeing the digging operation which employs "rat mining" technique to remove debris. Civilians experienced in rat-hole mining are assisting the Sappers in the process. Manual horizontal drilling must be undertaken for a further 10-12 metres and a length of 0.9 metres was covered on Monday.

Simultaneously, vertical drilling too is carried out. Rescuers need to drill through 86 metres of mountain vertically with the target set to reach the whole 86 metres in 100 hours. At present, vertical drilling to a depth of 36 metres has been completed.

The authorities heading the operations are also concerned for the safety of the rescue teams as reportedly, geological experts have warned of muck and debris falling on them. "False ribs" — support structures were erected on the top of the tunnel started on November 25 to protect rescuers working round the clock. In the last 48 hours, eight false ribs towards the tunnel's mouth on Silkyara side have been erected.

"If you invest more in your education, then you are likely to get more interest in it."
–Benjamin Franklin

POLITY AND GOVERNANCE

IT'S TIME TO REVAMP THE STRUCTURE OF THE SUPREME COURT

CONTEXT: The Supreme Court of India has three jurisdictions under the Constitution: original, appellate, and advisory. The Supreme Court serves as a Constitutional Court as well as a Court of Appeal. The Court sits in benches of varying sizes, as determined by the Registry on the directions of the Chief Justice of India (CJI), who is the Master of the Roster.

During the colonial period, there were three Supreme Courts – Madras, Bombay and Calcutta. The Indian High Courts Act of 1861 replaced the Supreme Courts of colonial periods with High Courts for separate regions. The Government of India Act, 1935, created the Federal Court of India as an appellate body for the Privy Council and High Courts. India approved the Constitution in 1949. The Supreme Court of India was founded on January 28, 1950, under Article 124 of the Constitution, two days after India became an independent, democratic republic.

The first Supreme Court included eight judges, including the CJI. As the workload rose year after year and arrears of cases began to accumulate, Parliament increased the number of judges from eight in 1950 to 11 in 1956, 14 in 1960, 18 in 1978, 26 in 1986, 31 in 2009 and 34 in 2019.

The Constitution Benches of the Supreme Court typically comprise five, seven, or nine judges who deliberate on a specific issue related to constitutional law. Article 145(3) of the Constitution provides for the setting up of a Constitution Bench with a minimum of five judges need to sit for deciding a case involving a "substantial question of law as to the interpretation of the Constitution", or for hearing any reference under Article 143, which deals with the power of the President to consult the Court. Today's Supreme Court issues around 8-10 decisions each year through Constitution Benches of five or more judges. It serves primarily as an appeals court. Only four of the 1,263 decisions issued in 2022 were issued by a Constitution Bench.

Typically, cases before the Supreme Court are heard by Division Benches (of two judges) or full Benches (three judges) to examine a wide range of topics. Under its very broad jurisdiction, the Supreme Court hears matters between the Centre and the States, as well as between two or more States; rules on civil and criminal appeals; and provides legal and factual advice to the President. Any person can immediately petition the Supreme Court if they consider their basic rights have been infringed. At present, there are 79,813

cases pending before the 34 judges of the Supreme Court.

Discourse on a separate Constitution Bench

The Tenth Law Commission of India in 1984 proposed that the Supreme Court be split into two divisions: the Constitutional Division and the Legal Division. The proposal stated that only issues pertaining to constitutional law would be brought to the proposed Constitutional Division.

The appeals in the Supreme Court mostly comprised matters from High Courts that are closer to the Supreme Court. Appeals from the Punjab and Haryana High Court, Allahabad High Court, and Delhi High Court formed the major chunk of matters, whereas courts far away from the Supreme Court had fewer appeals filed, due to both difficulties in accessibility and costs. The Eleventh Law Commission in 1988 recommended for setting up Regional Benches of the Supreme Court into parts to make justice more widely available at affordable costs.

The 229th Law Commission Report (2009) recommended setting up of 4 regional benches to be located in Delhi, Chennai or Hyderabad, Kolkata, and Mumbai to hear non-constitutional issues. It recommended six judges from each region at four regional benches take up appellate responsibility, with a Constitution Bench in New Delhi working on a regular basis.

The Supreme Court in Bihar Legal Support Society v. Chief Justice of India (1986) stated that it was "desirable" to establish a National Court of Appeal to entertain special leave petitions, allowing the Supreme Court to only entertain constitutional and public law-related questions.

An overburdened court

The work of the Supreme Court could be split so that there is a Final Court of Appeal and a permanent Constitution Bench. This would ensure greater judicial stability and consistency by explicitly distinguishing cases filed under constitutional authority from those filed under appellate and review jurisdiction.

A Constitution Bench (V. Vasanthkumar v. H.C. Bhatia) is analysing these issues and contemplating measures to protect a citizen's basic right to access the Supreme Court. Under the guidance of the CJI, there is an opportunity to address this structural gap in the Supreme Court by designating several of the court's appeal benches as regional benches.

POLITY AND GOVERNANCE

NOT A PANACEA

CONTEXT: The Maratha Community has been demanding reservations for educational and employment opportunities.

In various parts of India, there have been demands for reservation by communities that are known to be politically dominant and are not traditionally classified as "backward". The Maratha community has had significant representation in positions of political power — over 35 % of MLAs since 1967 and 12 of 18 Chief Ministers in the State. It has also traditionally been economically influential in rural areas due to landowning — over 75% of the cultivable land in the State — besides controlling an overwhelming majority of sugar factories. Data from the India Human Development Survey (IHDS) in 2011-12 in the State have shown that Marathas had a per capita consumption expenditure only lower than that of Brahmins; poverty incidence among Marathas was comparable to that of other forward communities and significantly lower than that of Scheduled Castes and Scheduled Tribes and marginally lower than that of Other Backward Classes. The Supreme Court in 2021 struck down the 16 % quota provided under the Socially and Economically Backward Classes for Marathas in jobs and education.

Despite the relative dominance, there are significant intra-community variations in terms of income and educational outcomes. The IHDS survey showed that the highest quintile of the community had an average per capita income of ₹86,750, while the per capita income of the lowest quintile was one-tenth of this. This disparity, besides the predominant rural nature of livelihoods among the poorer Marathas amid the prolonged nature of the recurring agrarian crisis in the State, has given rise to resentment and the demand for reservations. The Eknath Shinde government set up a committee led by Justice Sandeep Shinde to help expedite the issue of Kunbi certificates to all Marathas so that they could benefit from reservations as part of the OBCs. But this has led to tensions with OBC leaders, including from the ruling coalition, demanding that the government scrap the committee. The need for a comprehensive socio-economic survey across States, instead of knee-jerk responses to agitations, is a must to evaluate the implementation of reservation, its outcomes, and to find out which group deserves it based on constitutional provisions.

SCIENCE AND TECHNOLOGY

FIBRE OPTIC CABLES: ITS ORIGINS, WORKING AND DIFFERENT FUNCTIONS

What is an optical fibre?

Optical fibres are made of thin cylindrical strands of glass. The diameter of a typical fibre is close to the diameter of a human hair. These fibres can carry information, such as text, images, videos, telephone calls, and anything that can be encoded as digital information, across large distances almost at the speed of light.

Ultra-thin fibres seem very fragile. But when manufactured correctly as a long thread surrounded by protectives, they serve the purpose in a durable way. They are strong, light, and flexible, and ideal to be buried underground, drawn underwater, or bent around a spool.

How do optical fibres work?

Light is an electromagnetic wave with a spectrum of frequencies. Visible light, X-rays, radio waves, and thermal radiation (heat) all lie on this spectrum. Humans see the world around us via sunlight. When a beam of light falls on a glass surface, it passes through partially while the rest is reflected away. When it passes through, its path bends because the refractive index of glass is different from that of air. The refractive index is the property of a medium that determines how fast light can travel in it. When a beam travels in the reverse direction, that is from glass to air, it's possible that it won't enter the air. Instead, it will be completely reflected back within the glass. This phenomenon, known as total internal reflection, is the basis of guiding light across long distances without a significant loss of optical power. With proper adjustments, the light can be kept bouncing within the glass with very little escaping outside. This is how signals encoded as electromagnetic waves can be fed into one end of an optical fibre, and they will reflect and bounce many times between the glass walls as they traverse several kilometres bearing the information in the signals.

A fibre optic communication system consists of three parts — a transmitter which encodes information into optical signals (in the form of rapidly blinking light pulses of zeros and ones); an optical fibre that carries the signal to its destination; and a receiver which reproduces the information from the encoded signal. Optical waves allow a high data-transmission rate, up to several terabits per second in a single fibre. Unlike radio or copper-cable-based communication, fibre cables are also insensitive to external perturbations such as lightning and bad weather.

How were fibre optic cables developed?

We can guide light using total internal reflection with materials that have a higher refractive index than air. As Babinet found, a better choice than water is thin glass rods thanks to their availability, durability, and convenience. Such glass objects found early application in medicine and defence. In the 1920s, for example, Clarence Hansell and John Logie Baird showed a way to transmit images through glass fibres. Around the 1930s, doctors started using a bundle of thin fibres to inspect patients' internal organs and to illuminate teeth during surgical procedures. Early optical fibres were prone to damage, and weren't suitable for long-distance transmission of light.

In 1954, fibre development made a significant leap forward. Harold Hopkins and Narinder Singh Kapany at Imperial College London transmitted images using a 75-cm-long bundle of more than 10,000 optical fibres. Kapany was an Indian American physicist and a pioneer in the field. Two years later, Lawrence E. Curtiss at the University of Michigan developed the first glass-clad fibres. His idea to coat the bare glass fibres with a cladding material with a low refractive index paved the way for long-distance data transmission. In the same year, Kapany coined the term 'fibre optics'.

In 1960, Theodore Maiman built the first laser — an excellent optical source — which further boosted research in optical communication. The development of lasers working at room temperature made it possible to code any information digitally into optical signals. However, sending such light signals across long distances was still a big challenge. Even the best optical fibres available at the time lost 99% of their power after a few metres. In 1966, Kao and his colleagues found that the signals were attenuated due to impurities in the glass rather than the light being scattered. He suggested melting high-purity fused silica at high temperatures and producing thin fibre threads from that. This way, the decay of light signals inside glass fibres could be reduced below 20 decibels per kilometre (dB/km) — meaning 1% of the signal could still be detected after a kilometre. In 1971, the American glass-making company Corning Glass Works achieved this value in a finished cable.

Nowadays, glass fibres are manufactured using the fibre-drawing technique. First, a thick glass rod, called preform, of high purity and an engineered refractive index profile is prepared using chemical vapour decomposition. The preform is heated to about 1,600 degrees Celsius until it melts and is then drawn into a thin, long fibre. The drawing process reduces the fibre's diameter while maintaining its length. The drawn fibre is coated with a protective layer to enhance strength and durability.

In India, the Fibre Optics Laboratory at the Central Glass and Ceramic Research Institute, Kolkata, has a facility to

manufacture high-quality silica-based optical fibres. Today's optical fibres have a typical loss of less than 0.2 dB/km.

What is the future of fibre cables?

Fibre optics technology has since been used in telecommunication, medical science, laser technology, and sensing. With a goal to securing communication and promoting quantum science, the Government of India announced a national mission in the Union Budget of 2020. The proposed budget for this 'National Mission on Quantum Technologies and Applications' is ₹8,000 crore over a period of five years. The possibilities of fibre optic networks are growing at an accelerated rate, reaching all the way into our homes. Along with quantum optics, fibre optic communication stands on the cusp of a new era.

INTERNATIONAL RELATIONS

SURVEY TO KNOW STATUS OF PLOTS EXCHANGED WITH THOSE FROM EAST PAKISTAN

CONTEXT: The Tripura government has started an in-depth survey to know the status of plots exchanged between the people of the State and erstwhile East Pakistan before and after the Partition in 1947.

A large number of people on both sides of the international border had mutually exchanged properties during that period. The exchange had taken place mainly between Hindus seeking to come to India and Muslims who sought to settle in Pakistan.

Many of these people who came to Tripura did not register those properties due to lack of awareness and administrative set-up. Several such plots have also been sold. The State government will send the compiled list of unregistered plots to the Centre. Those who have an exchange deed or register deed will continue to hold the land. The Government has informed that no one will be evicted from the exchanged land properties which were not registered.

SCIENCE AND TECHNOLOGY

INDIA HAS CHARTED A SPACE ROAD MAP FOR UP TO 2047, SAYS CHANDRAYAAN-3 PROJECT CHIEF

CONTEXT: Chandrayaan-3 Project Director P. Veeramuthuvel delivered the sixth Manikam Ramaswami memorial lecture at the Thiagarajar School of Management.

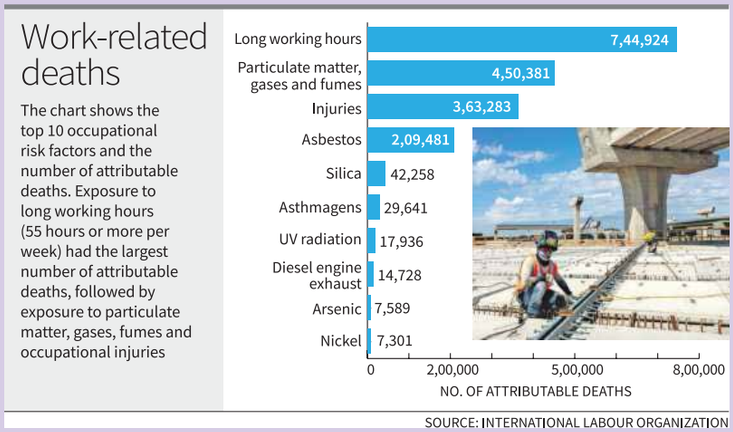
The Indian Space Research Organisation (ISRO) chose to land Chandrayaan in the south pole of the moon because of the availability of more resources for fuel. During an interaction with students, Mr. Veeramuthuvel said India had a road map for its space programmes till 2047. The ISRO wanted to set up its space station by 2035. Water molecules could be used as a resource for fuel and the organisation could make the best use of the moon's escape velocity of 2.38 km per second to reach other planets, making the moon a gateway.

All planet explorations are aimed at identifying new resources, he said Helium-3, if tapped, could help future generations in producing power. Luna 25, a failed Russian moon mission, was aiming to land close to the point targeted by the ISRO, and all future missions planned to land at the pole.

INTERNATIONAL RELATIONS

AS DEATHS DUE TO WORK-RELATED FACTORS GO UP, ILO REPORT URGES COUNTRIES TO STRENGTHEN SAFETY NET

CONTEXT: A new report "A Call for safer and healthier working environments" prepared by the International Labour Organization (ILO) cited that nearly 30 lakh workers die every year globally owing to work-related accidents and diseases. More than 63% of these deaths are reported from the Asia-Pacific region.



The report, "A Call for safer and healthier working environments", will be discussed at the 23rd World Congress on Safety and Health at Work, one of the largest international conferences on this subject, which began in Sydney on Monday. The report said mining and quarrying, construction, and utilities sectors were the three most hazardous sectors globally.

The Director-General of the Employees' State Insurance Corporation, Rajendra Kumar, is representing India at the conference.

ILO conventions

The report said that so far 79 out of the 187 member countries have ratified the ILO Occupational Safety and Health Convention (No. 155), while 62 countries have ratified the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187). India has not ratified both the conventions.

It added that a majority of these work-related deaths, 26 lakh, was attributed to work-related diseases, while work accidents resulted in 3.3 lakh deaths. The diseases that caused most work-related deaths were circulatory diseases, malignant neoplasms and respiratory diseases. The report said that the rate of trachea, bronchus, and lung cancers attributable to occupational exposure to chromium doubled between 2000 and 2016. Mesothelioma, attributable to asbestos exposure, has risen by 40%. The rate of non-melanoma skin cancer increased by over 37% between 2000 and 2020.

On the other hand, deaths due to exposure to asthmagens and particulate matter, gases, and fumes decreased by over 20 %. The report also recommended five categories of "Fundamental Principles and Rights at Work" for ensuring safety and health at work. These are freedom of association and the effective recognition of the right to collective bargaining, elimination of all forms of forced or compulsory labour, abolition of child labour, elimination of discrimination in respect of employment and occupation, and a safe and healthy working environment.

ECONOMICS AND DEVELOPMENT

ONE YEAR ON, INSIDER NORMS FOR MFS HANG FIRE

CONTEXT: The insider trading regulations are yet to get enforced, A year after the market regulator brought mutual funds under the ambit of insider trading regulations.

In November, a notification brought within its fold all types of MFs, whether listed or unlisted, with exemptions for exchange-traded funds and systematic investment plans. There are operational hurdles in setting up common industry standards, even as the Association of Mutual Funds in India (AMFI) has held several rounds of talks with SEBI on the issue.

SEBI issued a consultation paper on applicability of its Prohibition of Insider Trading Regulations 2015 to MFs in July last year. The rules have not been enforced. Rules have been laid down in a hurry without thinking through operational hurdles. For instance, each MF scheme could hold multiple ISINs (International Securities Identification Number), which could pose a challenge. Under the new norms, asset management companies (AMCs) and fiduciaries doing business with them need to maintain a structured digital database, which is a master-roster that tracks each instance of UPSI (unpublished price sensitive information) shared within and outside the AMC.

Digital database

This is uncharted territory for AMCs as new processes would be required to capture the data and include outside persons who may be aware of such information such as auditors and valuers. With pre-clearance of transactions in MF units required for employees, new issues could crop up as there are no precedents for what constitutes UPSI, which may affect the net asset value of MF schemes.

The norms may be made effective from January or April, with another three-six months for implementation. An email sent to SEBI and the exchanges did not get a response till press time. Some experts maintain that separate regulations for MFs are an overkill.

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