



CURRENT AFFAIRS FOR UPSC

7th January to 13th April 2024



DreamIAS

**INTERNATIONAL****FREE THE MESSENGER**

President Joseph Biden's comments, made off the cuff at the White House this week, that his administration is "considering" a request by Australian Prime Minister Anthony Albanese to drop charges against WikiLeaks founder Julian Assange, has sent a ripple of hope for his family and supporters. Mr. Assange, an Australian citizen, is in the U.K.'s Belmarsh Prison, and is awaiting a British court decision on whether he can appeal a 2022 extradition order that would send him to the U.S. to face serious charges for the publication of U.S. government and diplomatic cables in 2010. The court's order is due on May 20, and it has asked the U.S. for assurances that he will not face the death penalty. However, Mr. Albanese's appeal to Mr. Biden may make that decision redundant. Mr. Assange, 52, has been punished quite a lot already, while seeking asylum and under arrest, and, according to his family, is too ill and anxious about being extradited. Mr. Assange has faced a Swedish warrant for rape and assault, charges he denied, and the case was dropped. In the U.S. he faces 18 charges that could total 175 years in prison. The charges, 17 of which are under the U.S.'s century-old Espionage Act, pertain to the publication by WikiLeaks of thousands of classified U.S. documents related to the Iraq and Afghanistan wars, many of which showed the U.S. army's methods in a bad light, and revealed U.S. government strategy.

To be sure, Mr. Assange's decision to publish the trove of documents without check, and the revelation of names of specific U.S. officials, employees, soldiers and civilians, put many lives at risk. Governments are entitled to have their national security secrets, and confidentiality is respected for a reason. It is also true that, in several instances, WikiLeaks did partner with media organisations to do the scrutiny required when confronted with secret documents, to ensure that only those in public interest were revealed. But there was also some element of "data dumping" bypassing any careful journalistic effort that may have earned it more protections. However, it is hard for the U.S. to explain why it has thrown the book at Mr. Assange as the publisher, but not his source, U.S. Army intelligence analyst Chelsea Manning. The Biden administration has made the protection of democracy worldwide a policy priority, and to continue to prosecute a transparency activist, while castigating governments worldwide for hounding whistle-blowers, free speech activists and public accountability NGOs, seems contradictory. More than ever, the U.S. can show by example, in the Assange case, that it believes in democratic freedoms, and not in "shooting the messenger" for shining a spotlight on the way its government works.

ZAPORIZHZHIA ATTACKED AGAIN AMID UKRAINE-RUSSIA WAR: THE NUCLEAR RISKS FROM RECKLESS MILITARY ACTION

A drone strike at the Zaporizhzhia nuclear power plant on Sunday (April 7) triggered a new crisis at the facility that has been repeatedly brought to the brink of disaster by the war between Russia and Ukraine.

Russia, which has been in control of the facility, Europe's largest, for almost two years now, accused Ukraine of launching the attacks. The International Atomic Energy Agency (IAEA), the global nuclear watchdog, confirmed there had been "at least three direct hits", including on one of the six reactors at the plant, but did not say who was responsible.

While nuclear safety had not been compromised, "this is a serious incident with potential to undermine integrity of the reactor's containment system", the IAEA said. Director general Rafael



Mariano Grossi said “such reckless attacks significantly increase the risk of a major nuclear accident and must cease immediately”.

Zaporizhzhia is one of five nuclear power stations in Ukraine, which meets almost half of its electricity demand through nuclear energy. The six reactors at Zaporizhzhia have the capacity to produce 5,700 MW of electricity.

The drone attacks came three days after the power station suffered its most recent loss of external power supply. Nuclear power plants are connected to more than one external power source to run essential safety and security operations, including the crucial task of cooling the reactors.

Strong but vulnerable

Most nuclear reactors are made of several layers of steel and concrete, and are designed to absorb shocks from earthquakes of magnitude 8 or even higher. Ordinary shelling or gunfire can't impact them seriously, and it is not surprising that the drone attack did not cause much physical damage to the Zaporizhzhia station.

It is, however, not clear how a nuclear power plant would fare against a powerful bomb or missile attack. Such an incident has never happened, and no country is expected to be so reckless as to bomb a nuclear reactor. However, the war around Zaporizhzhia seems to be testing that assumption.

Risk from power outage

A power outage poses the biggest risk, and is the major concern. The insides of nuclear reactors get heated to thousands of degrees Celsius, and have to be constantly cooled. This is usually done by a circulation of water, which is maintained through an external power source. Multiple power lines are usually available at nuclear stations, which are also equipped with generators to maintain additional layers of redundancies.

The failure to adequately cool the reactors can result in meltdowns or explosions. In the Fukushima disaster of 2011, the nuclear plant itself survived the magnitude 9 earthquake, and shut down its operations in response. But the resultant tsunami flooded the entire area, including the power station, which disabled all power lines and backup systems. As a result, three reactors at the facility suffered partial meltdowns and allowed the leakage of nuclear radiation.

As part of the lessons from the Fukushima disaster, several nuclear reactors installed 'passive' cooling systems as an additional layer of safety. 'Passive' systems do not require electricity and can, therefore, continue to operate even after a power outage. One example would be of a system that relies on gravity— water circulation is maintained by ensuring that the supply comes from a higher-altitude location.

Courting avoidable disaster

All these measures, however, are meant to deal with eventualities that are beyond the control of humans. The magnitude 9 earthquake in Fukushima in 2011 was an unexpected, once-in-a-century event, against which the best of preparations might not have been adequate.

The situation in Zaporizhzhia, on the other hand, is entirely avoidable. Russia and Ukraine have been courting disaster, and the rest of the world has been unable to do anything apart from warning them of the dangers, of which they are already fully cognizant.



The IAEA has a team stationed at the Zaporizhzhia station, but its main job has been to offer technical advice to keep the facility safe, and to intervene in regular maintenance activities. It cannot stop the war, or convince the two sides to keep a safe distance from the nuclear reactors.

WHAT WOULD BE THE IMPACT OF THE BALTIMORE BRIDGE COLLAPSE?

The collapse of the Francis Scott Key Bridge on March 26 has put a spotlight on the Port of Baltimore, one of the busiest harbours in the U.S., which paused shipping and immediately halted all vessel traffic in and out.

The port remained open to trucks following the incident, but the loss of maritime traffic is expected to cost \$9 million a day. The overall economic toll is likely to be higher as billions of dollars of goods are rerouted amid the prospect of supply chains being snarled for months. It will also mean a loss of tax revenue for the city and state.

Here, a supply chain and logistics expert from the University of Montana explains the short- and long-term impacts of the crash on supply chains.

How important is the Port of Baltimore?

The Port of Baltimore is the ninth largest U.S. port by overall trade volume. In 2023 alone, it moved around 50 million tonnes of goods between the U.S. and other countries, much of it in large shipping containers, like those stacked on the ship that rammmed into the bridge. Although it's smaller than other ports on the East Coast and in the Gulf of Mexico, it still plays a critical role in processing U.S. international trade traffic. That's especially true for some products, such as automobiles, heavy machinery and coal. It also handles a large share of U.S. sugar imports.

What's the short-term impact of its closure on supply chains?

The immediate impact will be felt by the 15,000 or so workers in the port and about 1,40,000 others who depend on it. It doesn't mean they'll be laid off, but drastically less traffic would mean less work to go around. Companies and consumers should expect some delays for packages that would have otherwise been processed by the port. How long depends on how much time it takes for ships to be rerouted to other terminals, but it should only add a matter of days or up to a week or two. Baltimore accounts for only 4% of overall East Coast trade, so it shouldn't have a major impact. Dealers will probably experience some delays receiving imported cars and light trucks, but things should be resolved within days or weeks.

What's the long-term impact?

The problem is that supply chains have been under stress from multiple directions lately.

Houthi attacks on ships in the Red Sea and Panama Canal bottlenecks have lengthened delivery times and increased costs for companies that rely on East Coast ports. The pause in maritime traffic at the Port of Baltimore adds one more point of pressure for trade in the region. This may lead more shippers that have a choice to send more freight through West Coast ports, which have not suffered much from the Red Sea attacks and Panama problems. This could also mean more business for trucking and rail companies if it means they have to transport more goods from the West to East Coast.



How does this supply chain shock compare with other recent ones?

From a supply chain perspective, this was a freak accident. It's dramatic, it's graphic, and it forces people to pay attention to the issue. But unlike the Red Sea attacks or the impact from the COVID-19 pandemic, which have led to lingering supply chain problems, fallout from the bridge collapse will be temporary. That said, we'll likely see public pressure on companies to try to prevent such a thing from happening again — even though the risk of ships striking bridges is very low.

FROM PRISON TO PRESIDENCY

Democracy is not really one of the ethos of West Africa's troubled Sahel region, but Senegal's 2024 presidential election offers a glimmer of hope in a land marred by conflict and unrest.

At 44, Bassirou Diomaye Faye was elected Senegal's new President — the youngest ever to hold the post — on March 25, barely two weeks after he was released from prison. He beat former Prime Minister and frontrunner Amadou Ba. Mr. Ba was supported by outgoing President Macky Sall, who attempted to postpone the election a few times, leading to mass protests.

Mr. Faye was born in Ndiaganiao, and completed his college education in M'bour, a coastal city in Senegal. A lawyer by degree from Dakar's Cheikh Anta Diop University, he excelled at his public administration exams and trained at the National School of Administration to be an inspector of taxes and estates.

CAN THE JUDICIARY BE TRULY INDEPENDENT IN PAKISTAN?

The story so far:

In March, six judges of the Islamabad High Court (IHC) wrote to Pakistan's Supreme Judicial Council (SJC), complaining about intelligence agencies' intervention to influence the outcomes of certain specific cases. To address the contents of the six judges' letter, the government announced the formation of an inquiry commission to be led by a former Chief Justice of Pakistan. However, following the refusal of Justice Tassaduq Hussain Jilani, who was nominated by the government to lead the inquiry commission, the Supreme Court of Pakistan has announced a suo motu notice of the case.

What is the complaint?

The letter by the six judges of the (IHC) is important, as it came immediately after the Supreme Court verdict setting aside Judge Shaukat Aziz Siddiqui's dismissal by the IHC in 2018 on a similar issue relating to intelligence agencies' intervention and coercion. The content of their letter includes the following — first, it seeks the SJC's guidance "to the duty of a judge to report and respond to actions on part of members of the executive, including operatives of intelligence agencies, that seek to interfere with the discharge of his/ her official functions and qualify as intimidation." Second, the letter demands an inquiry to determine whether there is a "continuing policy" of the "executive branch of the state, implemented by intelligence operatives" to "intimidate judges, under threat of coercion or blackmail, to engineer judicial outcomes in politically consequential matters." Third, the letter sees a larger institutional debate on the issue, leading towards an SJC code of conduct if there are issues "that are tantamount to intimidation and interfere with judicial independence."



What has been the response?

The response from the senior judiciary has been swift. On March 28, the Chief Justice of Pakistan (CJP) met the Prime Minister and according to a press release from the Supreme Court, “the CJP clearly stated that interference by the executive in the affairs and judicial workings of Judges will not be tolerated and under no circumstances can the independence of the judiciary be allowed to be compromised.” Following the discussion with the CJP, the Prime Minister decided to constitute an inquiry commission and nominated Justice Jilani, a former Chief Justice of Pakistan. Following the latter’s refusal, the Court decided to take suo motu notice on the case. Both civil society and the legal community seem to be backing the case of the six judges.

Will the judiciary succeed?

This is not the first time there has been a debate over the intervention of intelligence agencies in the judiciary. In July 2018, Justice Siddiqui, then a senior judge of the IHC, accused the Inter-Services Intelligence of manipulating judicial proceedings. The SJC that looked into the case was of the unanimous opinion that Justice Siddiqui “had displayed conduct unbecoming of a judge” and was therefore, “liable to be removed from his office.” However, just one week before the letter from the IHC judges, his petition was taken up and his dismissal was set aside.

While the Establishment’s (the military) reach has expanded to all the organs of the state and civil society, during recent years, there has been a pushback. The failed Imran Khan experiment was the first big blow to the Establishment’s hold over politics. Despite engineering a new coalition with the Pakistan Muslim League (N) and the Pakistan Peoples Party, the 2024 election results have been the second big blow for the Establishment. The highly contested verdict shows that a substantial section, including those in Punjab, are with Imran Khan’s Pakistan Tehreek-e-Insaf and do not agree with the Establishment.

The judiciary has also made efforts to curb the Establishment’s activities. However, these efforts have not been fruitful so far. The primary reason is simple — the separation of powers and the balance of power in Pakistan remain skewed. For the judiciary to succeed, the legislature and executive also need to be independent, and the balance of power vis-à-vis the Establishment must be restored. The judiciary also needs to pursue internal reforms and ensure it protects itself from external intervention.

DreamIAS



NATION

WHY ARE KATCHATHEEVU PACTS BEING QUESTIONED?

The story so far:

On March 31, Prime Minister Narendra Modi posted on social media platform 'X' that he blamed the Congress for "callously" giving away Katchatheevu island to Sri Lanka. He cited a media report on documents received in response to a Right to Information Act application from K. Annamalai, the Bharatiya Janata Party's (BJP) Tamil Nadu president. Soon after, External Affairs Minister S. Jaishankar held a media conference, in which he sought to elaborate on Mr. Modi's allegation. Calling for a "solution", he said the bilateral agreements signed by India and Sri Lanka in 1974 and 1976, when the Congress and the Dravida Munnetra Kazhagam (DMK) were in power respectively at the Centre and in Tamil Nadu, displayed indifference about Katchatheevu island, and compromised Indian fishermen's rights in the Palk Strait separating India and Sri Lanka.

Where is Katchatheevu?

Katchatheevu is an uninhabited island spanning some 285 acres in the Palk Strait that separates Tamil Nadu and northern Sri Lanka. More precisely, it is located 14.5 km south of Delft Island and about 16 km to the northeast of Rameswaram. It is barren, has no drinking water or infrastructure, except a sole Catholic structure dedicated to St. Anthony.

What was the dispute?

The dispute was over who owns Katchatheevu. Negotiations began in 1921, between the British colonial governments of Madras and Ceylon, with both sides claiming territorial ownership. The matter was settled some five decades later, after the Governments of India and Sri Lanka, under Prime Ministers Indira Gandhi and Sirimavo Bandaranaike, signed two bilateral agreements in 1974 and 1976. The governments agreed that Katchatheevu falls within Sri Lanka's territory, and on a maritime boundary in the Gulf of Mannar and Bay of Bengal to define the two countries' exclusive economic zones. With the exclusive economic zones, India and Sri Lanka agreed to exercise sovereign rights over the living and non-living resources of their respective zone. The understanding was that fishing vessels and fishermen of India and Sri Lanka shall not fish in each other's waters, territorial sea and the exclusive zone.

However, despite the historic dispute over its territorial definition, fishermen from Tamil Nadu visit Katchatheevu every March, along with their Tamil-speaking counterparts of northern Sri Lanka, for the annual St. Anthony's festival. The Indian fishermen do not require a passport to visit the island in Sri Lankan territorial waters for this purpose, because the 1974 agreement expressly permitted them to access the island for rest, drying of nets, and the festival, while prohibiting any fishing activity.

What did India get?

Commentary and analysis from the time, including in The Hindu, shows New Delhi was seen as gaining some diplomatic mileage with its neighbour, which was tilting towards China then. A few years after the liberation of Bangladesh, and alongside the difficult question of citizenship for Indian-origin Tamils who were rendered stateless in Sri Lanka, New Delhi deemed strong and close ties with Sri Lanka important. Further, New Delhi got sovereign rights over Wadge Bank, located near Kanniyakumari, and its rich marine resources. Earlier this year, the Union Ministry



of Petroleum and Natural Gas, Directorate of Hydro-Carbon put out Notice Inviting Offers (NIO) for the exploration and development of oil and gas blocks in India, under the Hydrocarbon Exploration and Licensing Policy (HELP). The move drew flak from residents of Kanniyakumari and environmentalists who raised concerns over such activity impacting the marine ecosystem around Wadge Bank.

Are fishermen arrests related to the island?

No, they are not. Indian fishermen from Tamil Nadu have been facing arrests by the Sri Lankan Navy for many years now, for fishing illegally in Sri Lanka's territorial waters. Invariably, the arrests are made well past Katchatheevu, very close to Sri Lanka's northern shores. Northern Sri Lankan fishermen, also Tamil speaking, have been agitating since the end of the island nation's civil war in 2009, to assert their fishing rights. The Indian fishing boats are a major impediment to their post-war recovery.

In particular, they resist the use of the bottom-trawling fishing method used by their Indian counterparts, where trawl nets go down to the seabed, and scoop out all marine organisms, including small fishes and eggs. Eager to boost its marine exports, India began encouraging mechanised trawler fishing decades ago, when the Norwegian government invested millions of dollars into modernising India's fishing fleet from the 1950s and up to the early 1970s. Owing to the practice, marine resources along Tamil Nadu's coast have depleted, pushing Indian fishermen towards the Sri Lankan coast, rich in marine biodiversity, especially shrimps. Northern Sri Lankan fishermen are opposing the use of the fishing method that Indian fishermen stubbornly hold on to, despite the two governments in 2016 agreeing to expedite the "transition towards ending the practice of bottom trawling at the earliest". The fishermen's conflict is a contest between Tamil-speaking fishermen in India and Sri Lanka, with those from Tamil Nadu habitually fishing illegally in Sri Lankan waters, using bottom trawlers that are banned in Sri Lanka. Although many politicians in India often conflate the two issues, Katchatheevu is not the site of this struggle, and its "retrieval" cannot be a solution to it.

What has been the response?

Opposition parties led by the Congress have slammed the remarks, citing the government's own position in 2015 that the previous agreements did not "involve either acquiring or ceding of territory belonging to India". Tamil Nadu Chief Minister M.K. Stalin asked if PM Modi raised the issue of the retrieval of the Katchatheevu island with Sri Lanka once during his 10-year rule. Senior diplomats, who have led Indian missions in Sri Lanka, said questioning past agreements could damage India's credibility and impair relations with our neighbour. Former National Security Adviser Shiv Shankar Menon told The Hindu that reopening the 50-year-old-agreement could prove to be a "self-goal."

In what some see as a muted response from the Sri Lankan government, the country's Foreign Minister Ali Sabry has said there is no need to resume talks on a matter resolved 50 years ago. Sri Lanka's Fisheries Minister Douglas Devananda has accused India of acting in self-interest "to ensure Sri Lankan fishermen do not have access" around Katchatheevu. Fishermen on both sides have voiced concern over the remarks, while reminding the two governments that much needs to be done to resolve the actual fisheries conflict that is threatening both the region's marine ecosystem and livelihoods of fisher folk who depend on it.



A DISTINCT RIGHT

In recognising the right to be free of the adverse effects of climate change as a distinct fundamental right, the Supreme Court of India has advanced the case for a healthy environment and sustainable development. The apex court had long ago recognised the right to live in a clean environment as part of the right to life under Article 21 of the Constitution. However, the Court has now reasoned that the right to be protected from climate change and the right to a wholesome environment are two sides of the same coin; and given the increasing threat from climate change year after year, the time has come to treat the former as a distinct right. It has explained how the vagaries of climate change have an adverse impact on life through factors ranging from rising temperatures, storms and droughts to food shortages due to crop failure and shifts in vector-borne diseases. If environmental degradation and climate change lead to acute shortage of food and water, the right to equality will also be violated, as the poorer, under-served communities will not be able to cope with the adversity. The Court's emphasis on climate change came in a case that pitted the concern over multiple deaths of the Great Indian Bustard due to solar power transmission lines against India's international obligation to meet its emission reduction and increase its energy capacity through non-fossil fuel sources.

The context is a conundrum peculiar to some parts of the country. The Bench was faced with a plea by three Union Ministries — Environment, Power, and New and Renewable Energy — seeking modification of the Court's April 2021 order that sought to protect the critically endangered Great Indian Bustard from being killed in collisions with power transmission lines put up by solar energy companies in Rajasthan and Gujarat. The earlier order had directed that all low-voltage power lines in both 'priority' (where the bird is known to live) and 'potential' (where conservation efforts are going on) areas be laid underground and existing overhead lines converted to underground lines. It had also directed that high-voltage lines in identified areas be shifted below the ground. The modification was sought as conversion to underground lines was technically not possible and too expensive and the renewable energy sector was adversely affected by the order, especially because the area had considerable solar and wind energy potential. The Court has now asked an expert committee to decide on the extent of underground and overground lines and recalled its earlier orders. It is unfortunate that the goal of reducing the country's carbon footprint and the need to protect a critically endangered species are at odds with each other. The sooner a solution is found the better.

BEAT THE HEAT

With the advent of summer, the India Meteorological Department (IMD) has warned that more heatwaves are likely than last year. Andhra Pradesh, Gujarat and Maharashtra are expected to be particularly vulnerable. Heatwave days are defined as when day temperatures in a place are at least 4.5° C above normal or greater than 45° C on two consecutive days. For several years on the trot now, the IMD has been forecasting hotter summers. The causes are multi-fold. India is battling an El Niño wave, that, in most years, dries up rainfall and contributes to elevated temperatures. Though the El Niño and its converse, La Niña, are cyclical, there is also the larger phenomenon of warming temperatures (El Niño) causing accelerated melting in the Arctic, a drying up of moisture-laden tropical wind and, consequently, fewer clouds, and, thus, dry, baking ground temperatures.

This year, the weather agency's warnings are more portentous as millions are expected to queue up outside polling stations in India over several afternoons in April and May. Last April, at a mid-



day, open-air public, political function in Navi Mumbai, 12 people died due to dehydration and 600 had to be hospitalised. Some of the speakers in fact congratulated the crowd for 'braving' the heat before the disaster unfolded. This highlights the degree of disregard that the governmental machinery accords to the public-health impacts of heatwaves. This election year, for instance, the Election Commission of India had already issued an advisory to its State electoral officers — ahead of the IMD's public heat warnings — to prepare for the polls amid blistering heat. The trouble is that these advisories are too generic. There is a perfunctory note to provide for oral rehydration supplements and mothers to avoid bringing children with them to the polling booths. There is no requirement that polling stations prioritise cooling beyond the confines of the rooms where the officers are seated. There has been, for many years, a suggestion, even by prominent politicians, for elections to be held in the relatively more clement months of February-March or October-November but it is one that loses traction almost immediately after the polls. India's size and logistical challenges have seen the electoral process innovate and adopt measures such as multi-phase polling and even the use of electronic ballots. With temperature records collapsing every year and the links between heatwaves, climate and health becoming even more explicit, it is time that the electoral process mulls over creative ways to account for the crisis.

HEAT AFFECTS INDIA'S AIM TO MOVE FROM COAL TO RENEWABLES

In what many would have hoped was a Fool's Day joke, the India Meteorological Department (IMD) said on April 1 that India will have more than the 'usual' number of days with heat waves in the forthcoming summer. The forecast comes against the backdrop of an impending water crisis in the south, Lok Sabha polls, and rising food inflation.

Higher heat is bad for crop yield (to different degrees depending on the crop), agricultural workers' productivity, and the availability of water. Maps 1A and 1B depict the probability of maximum and minimum temperatures, respectively, the IMD expects for April-June 2024. It predicted "above-normal" temperatures for the month, with a 55%-65% probability in one half of the country and over 65% in the other half. Very few parts are likely to record normal or below normal temperatures.

Heat increases power demand in urban and industrial centres; makes the consequences of outdoor work, especially at construction sites, deadly; overwhelms health service providers by its effects on the very young and the very old; and places a premium on access to clean, cool water, indoor ventilation, and indoor bathrooms. The availability of power undergirds our ability to respond to all these effects of heat. In March 2024, the peak demand reached a new high of 190 GW.

A lot of this power comes from coal-fired plants. Coal is easily stored and has a high load factor, and these plants meet both peak and off-peak demands. The government is targeting 500 GW of power generation capacity from renewable energy sources by 2030 and has committed to producing 50% of its power from non-fossil-fuel energy sources by the same year. A big chunk of this addition will be in the form of solar power. But because solar output is intermittent and power storage capacity is still being established, peak demand has been met with coal. Coal's share in total electricity generated has remained 70-74% since at least FY16.

The most commercially viable forms of energy storage in India are currently battery-based storage and pumped hydro storage (PHS). PHS works like a hydroelectric power-generation facility in most respects except pumping the water from a lower to a higher elevation using off-peak power and running the turbines to load-balance the grid during peak power, among others.



However, both hydroelectric and PHS facilities are undermined by water shortage — which is the case during periods of intense heat, when water demand for other needs is higher. The share of renewables (solar, hydro, wind, etc.) has remained 20-25% since at least FY16.

While the effects of climate change are hard to predict, especially at longer timescales and smaller spatial resolutions, concerns about the underperformance of dams India is building in the sub-Himalayas in the event of high heat and water stress persist for this reason. Thermal power isn't free of this necessity either: according to one analysis by the World Resources Institute, "India lost about 14 terawatt-hours of thermal power generation due to water shortages in 2016." All these challenges add to the multifaceted nature of extreme weather in India. Ready or not, the heat is on.

'HYDRATION IS KEY TO BEAT THE HEAT AS MERCURY RISES IN SUMMER'

This week, the Tamil Nadu health department released an advisory urging people to remain hydrated by drinking plenty of water. "This will compensate for the loss of moisture through sweat," said T.S. Selvavinayagam, director of public health and preventive medicine. Pregnant women, the elderly, people with health conditions, and children on the list of those who should remain indoors have been advised to stay indoors between 11 a.m. and 3.30 p.m. They have also been told to wear loose-fitting, thin cotton clothes and footwear when stepping out.

To stay hydrated, people should stock up on liquids. The health department has advised people to consume tender coconut water, oral rehydration solution, lemon juice, buttermilk, and fruit juices, but avoid aerated drinks, alcohol, and smoking. To beat the heat, eat seasonal fruits and vegetables and choose home-cooked food, advisories say.

Exposure to excessive heat could cause people to faint and lead to confusion and disorientation. People who experience these issues may require immediate medical attention. Dousing yourself with cold water will also reduce the impact of intense heat, the advisory states. Street vendors, construction workers, those involved in the 100-day employment guarantee schemes, drivers and conductors in the public transport system, home delivery personnel, fire service, and traffic police should all take extra care since their work keeps them out during the day. They have been advised to carry a bottle of water. "People who feel overcome by these symptoms should consume ORS, as recommended by the World Health Organisation. It will help to replenish minerals such as sodium and potassium that the body loses through sweat," Dr. Selvavinayagam said.

FINALITY AND JUSTICE

The Supreme Court of India has used its extraordinary powers to set aside its own judgment of 2021 and relieve the Delhi Metro Rail Corporation (DMRC) of an exorbitant burden of ₹7,687 crore in a dispute with a former concessionaire. The verdict vindicates the existence of the Court's curative jurisdiction on the one hand, and flags, on the other, a possible conflict between finality in litigation and the need for substantive justice. In this case, an arbitral tribunal had ruled in 2017 in favour of Delhi Airport Metro Express Private Ltd. (DAMEPL), which got the contract to construct, maintain and operate the line from New Delhi railway station to Delhi airport. DAMEPL had invoked the termination clause in its agreement in October 2012, citing the DMRC's alleged failure to cure some defects. While the DMRC invoked the arbitration clause, DAMEPL halted operations in June 2013 and handed over the line to the DMRC. Meanwhile, based on a joint application, the Commissioner of Metro Rail Safety (CMRS) issued a certificate of safety that helped revive the metro's operations. On appeal, a single judge of the Delhi High Court upheld the

3RD FLOOR AND 4TH FLOOR SHATABDI TOWER, SAKCHI, JAMSHEDPUR



arbitration award against DMRC, but a Division Bench set it aside, holding that the award suffered from perversity and patent illegality. In 2021, a two-judge Bench of the Supreme Court restored the award, reversing the High Court Bench's findings in favour of the DMRC. A review petition was also rejected.

A curative petition is an extraordinary remedy, as it is filed after the apex Court refuses to review its judgment. There are only two main grounds for entertaining such a petition: to prevent abuse of process and to prevent gross miscarriage of justice, although it is not possible to enumerate all the circumstances that warrant it. It is founded on the principle that the court's concern for justice is no less important than the principle of finality. Under India's arbitration law, an award can be set aside only on limited grounds. It is normally inexpedient for arbitration issues to have many levels of litigation — in this case there was a statutory appeal to the High Court, and appeals to a Bench, the apex Court, a review petition and a curative petition. In the ultimate analysis, the DMRC case appears to have been rightly decided as the earlier two-judge Bench was ruled to have erred in setting aside the Delhi High Court Bench's view that the CMRS certificate was a vital piece of evidence. The outcome only underscores the importance of arbitrators and judges sitting on appeal over awards getting both fact and law right, lest commercial litigants be discouraged from arbitration due to the constant stretching of the idea of finality. Not all disputants can go up to the level of a curative petition.

WHY HAVE MADRASAS BEEN IN THE SPOTLIGHT IN UTTAR PRADESH?

The story so far:

This past week, the Supreme Court stayed a ruling of the Allahabad High Court on the U.P. Board of Madrasa Education Act 2004 calling it an infringement of the fundamental rights guaranteed under the Constitution. The top court also found the High Court's ruling to be against the principles of secularism. The decision gave massive relief to around 17 lakh students of the State's 16,000 recognised madrasas.

What happened?

Earlier, the High Court had dubbed the U.P. Board of Madrasa Education Act "unconstitutional" and asked for immediate closure of the madrasas. It called for the relocation and integration of the madrasa students with regular schools. The Supreme Court called the High Court's ruling "not warranted" and imposed a stay on the relocation.

The three-judge Supreme Court Bench, headed by Chief Justice D.Y. Chandrachud, scrutinised the provisions of the Act and made it clear that "the object and purpose of the statutory board which is constituted under the Act is regulatory in nature." The apex court did not agree with the High Court's ruling on educational institutions funded by the State being prohibited from imparting religious instruction. The Bench cited a 2002 judgment clarifying the term "religious instruction." The judges felt that striking down the 2004 Act was not the solution towards making a provision for secular education alongside religious instruction.

Why are madrasas in the spotlight?

Uttar Pradesh has around 25,000 madrasas of which 16,500 are recognised by the U.P. Madrasa Education Board. Only 560 madrasas receive grants from the government though there have been complaints in recent years of delayed payment and arrears in salaries. The irregular madrasas are usually strapped for resources and manage to provide only elementary learning.

3RD FLOOR AND 4TH FLOOR SHATABDI TOWER, SAKCHI, JAMSHEDPUR



The latest case in the Supreme Court is in continuation of a long trail of madrasas being the focus of attention. In 2022, the U.P. Government ordered a survey of the State's madrasas to find out the number of unrecognised or illegal madrasas. Though the findings of the complete survey were not made public, the State government caused a ripple in Muslim education circles when in October 2023, irregular madrasas operating in the western U.P. township of Muzaffarnagar were ordered to be closed within 24 hours. The Basic Education Department issued a notice to these educational institutions stating that unregistered madrasas operating in Muzaffarnagar would be subject to a daily penalty of ₹10,000 if they were not able to submit relevant documents within three days of the notice.

The move upset minority organisations, with the Jamiat Ulama-i-Hind calling the move discriminatory. "These madrasas provide free education to around 10,000 students. They will not have the resources to pay the fine. The order seems targeted at a particular community," a Jamiat official had then said. Around the same time, a Special Investigation Team (SIT) was formed to investigate the sources of the madrasas' alleged foreign funding. The SIT claimed that the madrasas had received over ₹100 crore from abroad over the past three years though evidence was not shared with the public.

What next?

Madrasas have been under the spotlight since the Yogi Adityanath government was first sworn in 2017. At the time, the government had instructed madrasas to hoist the national flag and sing the national anthem on Independence Day. The circular issued by the U.P. Madrasa Shiksha Parishad also asked these schools to videograph and photograph the Independence Day function as evidence. The order upset many madrasas who claimed it called into question their patriotism.

Meanwhile, the Supreme Court Bench on the U.P. Board Madrasa Education Act case has asked the State to file its counter affidavit before May 31. It has also given the appellants time till June 30 to respond to the State's views. It will hear the arguments in the second week of July.

PERVERSE INTENT

Offering citizenship to migrants who have fled their countries of origin because of persecution and have stayed a sufficient time in their adopted country, is a humane endeavour by any nation-state and should be generally welcomed. But by limiting this measure only to migrants from an arbitrary group of neighbouring nations and to narrow the definition only to "religious persecution", and to further constrict this to not include Muslims, atheists, and agnostics among others, would suggest that the reasoning to provide this citizenship has less to do with humanitarianism and more to do with a warped and perverse understanding of Indian citizenship. By its very intent, the Citizenship (Amendment) Act, whose rules were notified by the Ministry of Home Affairs last month, over four years since the Act was passed in Parliament, goes against the ethos of the Indian Constitution. It is a short-sighted piece of legislation in its understanding that only religious persecution merits a reason for providing asylum and citizenship. It is fairly evident that persecution can be due to other reasons as well, such as linguistic discrimination in the case of Sri Lanka in recent years, and erstwhile East Pakistan from which Bangladesh was born. Besides, as the case of the Rohingya from Myanmar shows, Muslims have also faced the severest form of discrimination in recent years, with thousands killed, more than a million of them rendered stateless and lakhs fleeing to other countries including India due to deliberate genocidal policies implemented by the ruling regime in the country. Even in Muslim-majority countries and



those professing Islam as the state religion, such as Pakistan, minority Islamic sects such as the Ahmadiyyas have been subject to oppression and persecution.

The argument by petitioners against the CAA in the Supreme Court of India that the rules of the Act do not require foreign applicants to effectively renounce citizenship of their native countries, and that this allows for the possibility of dual citizenship which is directly violative of the Citizenship Act is also fair even if it is only a procedural one. While India is not party to the 1951 UN Convention Relating to the Status of Refugees and the 1967 Protocol Relating to the Status of Refugees, they have provisions that require signatories to provide refugee status to those who are subjects of different forms of persecution beyond just due to their religion. Signatories must also apply these provisions “without discrimination as to race, religion or country of origin” and it is clear that the CAA would run afoul of them if India were a signatory. The Court must declare the CAA as unconstitutional and revoke its implementation because of its arbitrary and selective norms for providing citizenship to migrants.

PANDORA'S BOX

In the last month or so, ever since the State Bank of India was compelled by the Supreme Court of India to release information on donations via electoral bonds to political parties, emerging details have only confirmed the worst fears of naysayers in regulatory and policy-making institutions about the scheme before it was introduced by the Bharatiya Janata Party (BJP)-led government in 2018. A joint investigation that included The Hindu found that at least 33 companies that had aggregate losses of over ₹1 lakh crore from 2016-17 to 2022-23 had donated close to ₹582 crore, of which 75% went to the ruling BJP. Loss-making companies were donating substantial sums; profit-making firms were making donations exceeding their aggregate profits; some donor firms were not reporting data on net profits or direct taxes; some newly incorporated firms were making donations before the stipulated three-year period (after being formed) — the list of the rule-breaking and suspect sources of funding is significantly large. The nature of these donations raises several questions. Were these loss-making firms fronts to launder money? Were the firms that did not report profit/losses shell companies? Were donor firms that made significant profits — but did not pay net direct taxes in aggregate for a significantly long period — engaged in tax evasion? These supplement other questions raised earlier — was the fact that a number of firms, under investigation by agencies such as the Enforcement Directorate and the I-T Department, were significant donors for the ruling party, an indication that these agencies were being used as a means to ensure quid pro quo?

RBI and Election Commission of India officials were emphatic in their apprehensions that the bonds scheme could be utilised in money laundering and tax evasion. Yet, the Union Finance Ministry went ahead with the scheme. In the five and a half years of its operation, thousands of crores were encashed by political parties via electoral bonds, with the BJP receiving the lion's share. While the Court must be lauded for ending an opaque scheme with serious issues, the fact that large amounts were donated from dubious sources before every election is an indictment of the nature of campaign financing in place during this period. With the polity in India busy campaigning for the general election, it is up to the electorate to assess the effects of the electoral bonds scheme. But, more importantly, once the election is over and governance takes over, Parliament and the regulatory institutions must conduct a thorough investigation into the nature of donations and whether the donors and recipients broke laws. The judiciary must prod these institutions. A clean-up of campaign and electoral financing is a must for a healthy democracy.



IS TRANSPARENCY LACKING IN CANDIDATE DISCLOSURE?

The story so far:

The Supreme Court recently held that candidates need not disclose every piece of information and possession in their election affidavit unless it is substantial in nature. In another development, the Election Commission of India (EC) has asked the Central Board of Direct Taxes to verify the declaration with respect to yearly income in the affidavit filed by Rajeev Chandrashekar, the BJP candidate from Thiruvananthapuram.

What does the law specify?

Section 33 of the Representation of the People Act, 1951 (RP Act) read with rule 4A of election rules, requires every contesting candidate to file their nomination paper for elections along with an affidavit in a prescribed format. In Association of Democratic Reforms (ADR) Vs Union of India (2002), the Supreme Court held that voters have the right to know about the criminal antecedents, income and asset details of the candidate and his/her dependants and educational qualification of contesting candidates. This resulted in Section 33A being added to the RP Act that requires details of criminal antecedents to be part of the election affidavit.

Section 125A of the RP Act further provides that failure to furnish required information; giving false information or concealing any information in the nomination paper or affidavit shall be punishable with imprisonment up to six months or fine or both.

What are the issues?

In a recent case, an independent candidate from Arunachal Pradesh failed to declare three vehicles as assets in his election affidavit while contesting the Assembly election in 2019. His election was set aside by the Gauhati High Court. However, the Supreme Court reversed the decision and held that non-disclosure of information that is not material or substantial cannot be treated as an attempt to unduly influence the voters. In the case of Mr. Chandrashekhar, the complaint is about alleged concealment of his income and substantial assets in his election affidavit that can have a potential impact on the decision of the voters.

An even more significant issue relates to candidates with serious criminal charges contesting elections. Some candidates circumvented the requirement of rule 4A by leaving certain columns blank and filing incomplete affidavits. It once again required an order of the court in Resurgence India Vs EC (2013), to ensure that all columns are filled appropriately. According to a report by ADR, 19% of candidates in the 2019 Lok Sabha election faced charges of rape, murder or kidnapping.

The Law Commission in its 244th report on 'Electoral Disqualifications' (2014) and EC in its memorandum on 'Electoral reforms' submitted in 2016 had provided certain recommendations. First, a conviction for filing a false affidavit should attract a punishment of a minimum of two years imprisonment and be a ground for disqualification. Second, the trials in such cases must be conducted on a day-to-day basis. Finally, persons charged by a competent court with offences punishable by imprisonment of at least five years should be debarred from contesting in the elections provided the case is filed at least 6 months before the election in question.



The Supreme Court in Public Interest Foundation Vs Union of India (2018) directed candidates as well as political parties to issue a declaration about criminal antecedents, at least three times before the election, in a newspaper in the locality and electronic media.

What can be the way forward?

Debarring chargesheeted candidates from contesting elections is likely to be misused by various ruling parties. However, the other recommendations with respect to increasing punishment for filing false affidavits and making it a ground for disqualification need to be implemented. The Supreme Court's order to provide wide publicity of criminal records should also be strictly implemented. This would enable a discerning voter to exercise a well-informed choice.

WHY VVPAT WAS BROUGHT IN, WHY OPPOSITION WANTS ALL SLIPS VERIFIED

With the first phase of voting set to take place on April 19, the Supreme Court (SC) last week said that petitions seeking 100% verification of Voter Verified Paper Audit Trail (VVPAT) slips would be taken up soon.

In March 2023, the Association for Democratic Reforms had filed a petition before the apex court saying that to ensure free and fair elections, the tally from Electronic Voting Machines (EVMs) should be cross-verified with the VVPATs. To make sure that this process is carried out as fast as possible, ADR suggested the use of barcodes on VVPAT slips.

What is a VVPAT machine? How does it work?

The VVPAT machine is attached to the ballot unit of the EVM, and provides visual verification for the vote cast by a voter by printing a slip of paper with the voter's choice on it. This slip of paper, containing the candidate's serial number, name, and party symbol, is displayed in the machine behind a glass window, giving the voter seven seconds to verify her vote. Following this, the slip falls into a compartment underneath.

No voter can take the VVPAT slip back home, as it is later used to verify votes cast in five randomly selected polling booths. The idea is that by allowing for a physical verification of the electronically cast vote, both voters and political parties have greater faith in the process — that their vote is being recorded correctly.

Why did the Election Commission introduce VVPATs?

The idea of the VVPAT machine first emerged in 2010, when the Election Commission of India (EC), held a meeting with political parties to discuss how to make the EVM-based polling process more transparent.

After a prototype was prepared, field trials were held in Ladakh, Thiruvananthapuram, Cherrapunjee, East Delhi, and Jaisalmer in July 2011. After fine-tuning the design, holding more trials, and taking feedback from political parties, an EC expert committee approved the design in February 2013.

Later that year, the Conduct of Elections Rules, 1961 were amended to allow for a printer with a drop box to be attached to the EVM. The VVPAT was used for the first time in all 21 polling stations of the Noksen Assembly constituency of Nagaland in 2013, after which the EC decided to introduce VVPATs in a phased manner. By June 2017, there was 100% adoption of VVPATs.



Why are VVPAT slips of only five polling booths randomly counted?

To determine what percentage of VVPAT machines' slips need to be counted to verify the accuracy of an election, the EC, in 2018, asked the Indian Statistical Institute (ISI) to come up with a "mathematically sound, statistically robust and practically cogent sample size for the internal audit of the VVPAT slips with electronic result of EVMS", the EC mentioned in an affidavit it has filed in the Supreme Court.

In February 2018, the EC mandated the counting of VVPAT slips of one randomly selected polling station per Assembly constituency. This was increased to five polling stations per Assembly seat, following a Supreme Court judgment in April 2019 on a petition filed by TDP leader Chandrababu Naidu. The five polling stations are selected by a draw of lots by the Returning Officer concerned, in the presence of candidates/ their agents.

What have been the legal cases surrounding the VVPAT?

The VVPAT has been a subject of multiple legal cases, starting with Subramanian Swamy vs Election Commission of India, in which the SC ruled that a paper trail was indispensable for free and fair elections, and ordered the government to provide funding for the roll-out of VVPATs.

In 2019, Chandrababu Naidu moved the SC asking for a minimum 50% randomised VVPAT slips to be counted. The EC, however, argued that if this were to happen, results would be delayed by five to six days.

Moreover, it pointed to ISI's calculations which found that even counting of slips from 479 randomly selected VVPATs across the country would guarantee over 99% accuracy — but the EC's guideline at the time of verifying slips from one polling station per constituency would have led to counting of 4,125 VVPATs.

Nonetheless, the court ordered the EC to count VVPATs in five polling stations instead.

Why does the EC not want to count 50% of VVPAT slips?

As per a previous submission in the SC, the EC claims that it takes about an hour for election officers to match VVPAT slips with the EVM count in one polling station. Moreover, since the counting of VVPAT slips can begin only after EVM votes for the concerned polling station have been tabulated, for five polling stations, it would mean a delay of five hours in all, EC sources said.

The EC has also highlighted infrastructure challenges, including the availability of manpower, as obstacles to increasing the number of polling booths where VVPAT slips are counted.

Why are political parties demanding widened verification of VVPAT slips?

Opposition parties continue to call for verification of more polling booths to make voting more transparent. They argue that the sanctity of a fair election outweighs the concern of delay in the declaration of results.

Parties have called for anything from 50% to 100% verification of VVPAT slips. In December, the Opposition INDIA alliance, which includes the Congress, the Communist Party of India (Marxist),



the Communist Party of India, the Trinamool Congress, the DMK and the Samajwadi Party, passed a resolution demanding 100% verification of VVPAT slips. The INDIA Alliance has sought time to meet Chief Election Commissioner Rajiv Kumar to discuss their concerns.

However, the EC has, thus far, been reluctant to do so. As per EC sources, the EVM and VVPAT concerns have been litigated and addressed by the Commission many times.

JOB, INFLATION KEY ISSUES IN LS POLLS, FINDS SURVEY

Unemployment and price rise are the key concerns of nearly half the electorate, the CSDS-Lokniti pre-poll survey in the run-up to the 2024 general elections revealed. This was a significant finding in the first part of a series of articles on the pre-poll survey.

Nearly two-thirds of those surveyed (62%) across localities, with the highest among cities (65%), expressed that getting jobs had become more difficult. The numbers for those living in villages and towns were 62% and 59%, respectively; 65% of the men shared this opinion compared with 59% of the women. Only 12% said getting jobs had become easier.

The concern was highest among Muslims with 67% saying that getting jobs had become difficult, a number closely matched by Hindus from Other Backward Classes and Scheduled Castes (63% each) and Scheduled Tribes (59%). The opinion that jobs were easier to get was shared the highest among Hindu upper castes (17%), even as 57% of them felt otherwise.

The opinions on price rise mirrored that of unemployment with a whopping 71% saying that prices have increased, with the number increasing to 76% among the poor, 76% and 75% among Muslims and Scheduled Castes.

While the numbers on these two issues indicate that prospective voters were worried about the state of the economy, the survey also revealed that a near-equal number believed that State governments (17% as opposed to 21% for the Centre, with 57% saying “both”) were responsible for shrinking job opportunities.

HOW INDIA PULLED OFF ITS FIRST GENERAL ELECTION

India's first Lok Sabha election, conducted over four months in 1951-52, began the democratic process by which the reins of the newly independent nation were put in the hands of its people. Votes were cast for 489 Lok Sabha and 3,283 state Assembly seats around the country.

Besides the Indian National Congress led by Jawaharlal Nehru, others in the race included the Socialist Party, with Jayaprakash Narayan as one of its leaders; Kisan Mazdoor Praja Party (KMPP) of J B Kripalani; Communist Party of India (CPI); Akhil Bharatiya Jana Sangh (BJS, the precursor of the BJP); Hindu Maha Sabha (HMS); Karpatri Maharaj's Akhil Bharatiya Ram Rajya Parishad (RRP); and Tridib Choudhuri's Revolutionary Socialist Party (RSP).

The elections represented a remarkable ambition — they were “an act of faith”, as Ramachandra Guha wrote in *India After Gandhi: The History of the World's Largest Democracy* (2007). Of the 176 million electors of age 21 and older (the voting age was brought to 18 only in 1989), about 82% were unlettered.



And there weren't many precedents to follow. Very few countries had universal adult franchise at the time — the US, for instance, granted all its adult citizens the right to vote only in 1965. India, four years after throwing off two centuries of colonial rule, had to chart its own course.

ECI's unique challenges

The office of the Election Commission of India (ECI) was set up on January 25, 1950. Sukumar Sen, an officer of the Indian Civil Service and a former Chief Secretary of West Bengal, became Chief Election Commissioner on March 21, 1950. On April 19 that year, while proposing The Representation of the People Act, India's election law, Prime Minister Nehru told Parliament that polls would be held in the spring of 1951.

But neither the government nor the people had any experience of conducting or participating in such an exercise. The 1937 election in nine 'Part-A States' — Assam, Bihar, Bombay, Madhya Pradesh, Madras, Orissa, Punjab, United Provinces and West Bengal — were smaller, with limited franchise based on land ownership, literacy, etc.

CEC Sen viewed Nehru's "haste" in holding elections "with some alarm", Guha wrote. "For no officer of state, certainly no Indian official, ever had such a stupendous task placed in front of him," he wrote.

The challenges were formidable and unique — not only was the electorate spread over more than a million square miles, there was a peculiar social problem. "Many women in northern India...wished to register themselves as A's mother or B's wife [and not by their own names]," Guha wrote. CEC Sen was outraged, "and directed his officials to correct the rolls by inserting the names of the women...".

Ultimately, 17.32 crore voters from across the country (excluding J&K) were enrolled, and 45% were women.

Colourful ballot boxes

Some 1.32 lakh polling stations with 1.96 lakh booths were set up, and 3.38 lakh policemen were deployed on election duty. The first mock polling drill was held in Udaipur on August 5, 1951.

Over a dozen manufacturers were contracted to supply 19 lakh steel ballot boxes, with the price per box fixed at Rs 4-6.12. The boxes for the Lok Sabha election were in four colours — olive green, meadow green, pale green, and Brunswick green; those for Assembly candidates were in shades of chocolate, mahogany, teak, dark tan, and bronze.

Given that India's literacy rate in 1951 was only 18.33%, the idea was to have ballot boxes in different colours, each representing a candidate. But this was not practical, and it was finally decided that there would be a separate ballot box for each candidate at all booths, with the candidate's election symbol on it.

The ballot papers were the size of a Re 1 currency note. They were pink in colour, with "Election Commission India" inscribed on them. They displayed a serial number with two letters of the alphabet denoting the state — BR for Bihar, AS for Assam, etc.

The ballots also had serial numbers printed in black, and the national crest in white. The papers for Lok Sabha elections had a thick vertical bar of olive green colour; those for state Assemblies had a chocolate-coloured bar.



Voters were to collect the ballots at the polling station, and put them in the boxes of candidates of their choice.

Himachal was first to vote

After delays, polling finally took place between December 1951 and February 1952. However, votes in Chini and Pangi Assembly constituencies of Himachal Pradesh were cast in October 1951, before snow could cut these areas off from the rest of India. On December 10, 1951, voting began in the rest of the country with the Thiruvella and Trichur Lok Sabha constituencies of Travancore-Cochin (present-day Kerala) first to cast their vote.

The first election had 1,874 Lok Sabha candidates and 15,361 state Assembly candidates. Kottayam (Travancore-Cochin), Alleppey (Travancore-Cochin), and Gudivada (Madras) saw the highest voter turnouts of 80.5%, 78.1%, and 77.9% respectively.

When the results were declared on April 2, 1952, the Congress won 318 seats, the Socialist Party won 12, KMPP 9, CPI 8, HMS 4, and BJS, RRP, and RSP won 3 seats each. Independents won 37 seats.

Expected wins, shock defeat

The likes of Nehru and Syama Prasad Mookerjee expectedly won. But Morarji Desai lost in Bombay, and Jai Narayan Vyas in Rajasthan. The biggest upset, however, was the defeat of B R Ambedkar, who lost to his former personal assistant, Narayan Sadoba Kajrolkar, by around 15,000 votes at the Bombay North Central seat.

The first Lok Sabha also had multiple-member constituencies, a practice that was done away with in the elections of 1962. Under this, some constituencies returned two members — one from the general category, another from the SC or ST categories — and, in one constituency, all three categories returned one member each.

The ECI had granted 14 parties the status of ‘national parties’, and designated more than 50 parties as ‘state parties’. After the elections, only the Congress, Praja Socialist Party (formed with the merger of the Socialist Party and KMPP), CPI, and BJS were able to retain their national party status.

Elections a remarkable success

The “biggest experiment in democracy in human history”, as CEC Sen described the elections, ended as a resounding success, putting to rest the doubts that many, including even Nehru on occasion, had.

CEC Sen’s initial scepticism too dissipated. The Election Commission’s Report on the First General Elections 1951-52 quoted Sen as saying, “Adult suffrage was a remarkable success and proved a potent factor in itself for advancing the political education of an illiterate mass which had little or no background of political experience.”

EXPRESS VIEW ON NCERT REVISIONS: NARROWING THE VIEW

An investigation by this newspaper has revealed significant changes in NCERT’s history, sociology and political science textbooks of classes VI to XII. Revision of learning material should be par for the course in a robust education system. But school curricula in India — especially social science



textbooks — have not always kept pace with the latest research. History textbooks, for instance, haven't done adequate justice to the archaeological findings that have changed understandings of the Indus Valley Civilisation (IVC).

Recent historiography on understudied areas, such as the country's Northeast, is yet to find a way into the school curriculum. Political science textbooks have very little on the new forms of mobilisation enabled by social media. It's also time that the student is apprised of climate change politics.

The NCERT's latest revisions do not address such knowledge-related imperatives either. Instead, they appear burdened by the ruling dispensation's anxiety to paper over fraught political moments in the country's recent history — the demolition of the Babri Masjid, for instance. They underplay social faultlines such as those related to caste. Even the changes that take note of new research on the IVC, seem of a piece with the deeply contested and politically loaded narrative that harps on continuity between the Harappan and Rig Vedic epochs.

Last year, another investigation by this newspaper on NCERT textbooks had shone a light on the deletion of key passages on Mahatma Gandhi's assassination, the Emergency, Gujarat 2002 and protest movements. Of course, social sciences have always been an arena of ideological and political contestation and textbook committees have a long history of being fettered by government interventions.

However, the recent revisions belie the hopes raised by the NEP — they go against the policy's ideologically agnostic approach to education reform. Some of the changes described as “minor editing” — the deletion of the reference on the poverty and powerlessness of Scheduled Caste and Scheduled Tribe communities in the Class XII Sociology textbook, for instance — seem to tie in with a political agenda of playing up the notion of a cohesive Hindu society. Similarly, the removal of a sentence linking big dam projects to the destitution of tribal groups — also in the Class XII Sociology textbook — betrays an unease with argumentative engagements with developmental processes.

Young minds today are exposed to a glut of information on culture, history and politics from a variety of sources, including social media. Veracity is often a casualty. Classrooms must, therefore, provide a grounding in objectivity while alerting students to social complexities, with all their diversities, conflicts and inequities. The country's foremost textbook framing body should be an enabler of this process, not a hurdle in it.

EXPRESS VIEW ON IIT DELHI'S ACADEMIC PROGRESS GROUP: REACHING OUT

If 21-year-old Anil Kumar's long journey from Banda district in Uttar Pradesh to the hallowed halls of IIT-Delhi embodied the hope that animates the arcs of lakhs of young Indians, as they follow the path of higher education, his death by suicide in September last year echoed an all-too-familiar despair. Following Kumar's death and in response to the alarming trend of suicide by students who find themselves crumbling under academic pressure, IIT-Delhi set up an Academic Progress Group (APG), also in September, to help out those struggling to keep up with their studies.

This was an encouraging sign of an institute responding to the needs of its students and stepping up to the need to create a supportive and enabling environment. According to documents accessed by the Indian Express through the Right to Information Act, the APG has so far identified 192



undergraduate students as “academically adrift” and has permitted “exceptional cases” to stay with a family member on campus.

Already in 2024, five student suicides have been reported at various IITs — two in the Kanpur campus and one each in Delhi, BHU and Roorkee. In July last year, the Union Minister of State for Education, Subhas Sarkar, told Parliament that in the previous five years, there had been 98 student suicides in central educational institutes (central universities, IITs, NITs, IIITs, IIMs and IISERs).

The numbers speak of a sobering reality, and of a pressure that, in most cases, begins at home and continues in the highly competitive environment of institutes like the IITs. For many students with several years of hard work behind them and the promise of a better future for themselves and their families before them, failure is unendurable. The problem becomes far more acute in the case of students from marginalised groups and regions, for whom success at an IIT may seem like the only way out of generations of poverty.

According to data presented by the Ministry of Education in Lok Sabha in March last year, nearly half of those who died by suicide in IITs since 2018 were from SC, ST and OBC communities. Clearly, it is not enough that students from deprived backgrounds, like Kumar, make it to prestigious institutes; they must be enabled to avail themselves of the opportunities. This can only happen when the institutes themselves become sensitive to their needs.

Before he joined IIT-Delhi, Kumar had written in one of his notebooks, “Since my childhood, my aim was to become a scientist. I didn’t know then that scientists are not made, they are born...” For institutes tasked with helping young people shape their own futures, listening to them is the first step towards addressing their anxieties.

ALL-WEATHER ROAD GIVES A STRATEGIC FILLIP TO LADAKH

The latest feat of the Border Roads Organisation (BRO) in Ladakh, connecting Himachal Pradesh and Leh through the Nimmu-Padam-Darcha road, has come as a shot in the arm for security forces stationed in the region, and added significantly to India’s strategic depth in the hostile border neighbourhood. The BRO’s breakthrough, achieved on March 27, has paved the way to open up the far-off Zaskar Valley for the safest ordnance depot, away from the prying eyes of China and Pakistan, officials privy to the development told The Hindu.

The Nimmu-Padam-Darcha road allows surface movement from Leh to Lahaul-Spiti through the world’s highest tunnel at Shinku La Pass at 16,580 feet, which is under construction. “It will be the first all-weather road connecting Ladakh to the rest of the country,” an official said. The tunnel is likely to be completed by 2025.

Maintaining logistics in the absence of all-weather roads to the region, especially during Ladakh’s harsh winters, has always been a concern to security strategists. At present, security forces stock ration and ammunition months in advance to maintain a vigil on the borders. China, on the other hand, has already developed all-weather road networks close to the Line of Actual Control.

‘Much faster, safer’

Once the Shinkula tunnel is thrown open in western Ladakh’s Zaskar Valley, the mobilisation of troops to Ladakh will be much faster and less exposed than the current routes passing close to the northern and eastern areas, surrounded by Pakistan and China.



“It will make defence preparedness much safer,” another official said.

However, there are murmurs of discontentment among local people. “On one hand, I am happy to learn that BRO India has connected the strategic Nimmu-Padam-Darcha road in Ladakh recently. However, I am really concerned that it might change the landscape of Zaskar, the land of rich culture and heritage,” climate activist Sonam Wangchuk said in a post on X.

Advocate Mustafa Haji, a social activist from Kargil, said the construction of four lanes on the Kargil-Zaskar section is “completely needless, unless it is part of a bigger plan”.

“Not to mention the number of trees that will have to be cut in the Suru Valley for this project,” Mr. Haji pointed out.

THE VALLEY IS NOT FAR

Passing through difficult mountainous terrain, the Udhampur-Srinagar-Baramulla Rail Link is expected to provide year-round connectivity to the Kashmir Valley

At a height of 359 metre over the river Chenab, taller than the Eiffel tower in Paris, the Chenab bridge is the world’s highest railway bridge.

The arch bridge will connect Bakkal and Kauri villages in Reasi district of Jammu division in Jammu and Kashmir. The engineering marvel lies in the seismic zone IV, and can withstand earthquakes up to a magnitude of 8 on the Richter scale, high-intensity blasts, and winds up to speeds of 260 kilometre per hour.

The bridge, expected to become functional later this year, is part of the Udhampur-Srinagar-Baramulla Rail Link (USBRL) project of the Indian Railways. Passing through difficult mountainous terrain, the project includes several major bridges and tunnels, including the Pir Panjal tunnel — India’s longest railway tunnel at over 11 kilometre in length. The USBRL aims at connecting J&K’s summer capital Srinagar with the rest of India’s rail network.

Construction work on the bridge began in 2004 but was suspended in 2008-09, considering safety issues due to frequent high-velocity winds in the area. However, the work resumed in 2010. The bridge is expected to have a lifespan of 120 years.

On February 20, Prime Minister Narendra Modi flagged off various rail projects in J&K including the new 48-km railway line between Banihal-Khari-Sumber-Sangaldan and the newly electrified Baramulla-Srinagar-Banihal-Sangaldan section (185.66 km). The Prime Minister also flagged off the first electric train in the Kashmir valley and a train service between Sangaldan and Baramulla stations. There are at least eight tunnels between Sangaldan and the beginning of Chenab Bridge, which connects Jammu with Kashmir. The project also includes the Anji Bridge, the first cable-stayed bridge of Indian Railways.

The partial commissioning of USBRL, which includes the Banihal-Khari-Sumber-Sangaldan section, is significant as it features the usage of Ballastless Track (BLT) all along the route, providing a better riding experience to the passengers.

As of now, the operational extent of the railway line is till Udhampur district in Jammu. In the Valley, the operational section is from Banihal in southern Kashmir to the border district of Baramulla in northern Kashmir.



The only road link to the Valley, NH-44, often remains closed in winter months due to snowfall, landslides and other natural calamities. This strategic rail link can provide connectivity during such conditions while also providing the armed forces an efficient transport system to access sensitive border areas along the Line of Control with Pakistan and the Line of Actual Control with China.

EXPRESS VIEW ON ANDAMAN AND NICOBAR ISLANDS: TURNING SEAWARD

A report in The Indian Express revealed the government's expansive plans to transform the Andaman and Nicobar Islands into a genuine security sentinel to the east of peninsular India and a crucial node for peace and security in the Indo-Pacific. The report points to the rapid expansion of military infrastructure in the island chain that will allow the basing of advanced military platforms, improve communication and surveillance infrastructure, and the permanent deployment of troops. These plans mark the end of Delhi's prolonged strategic neglect of these islands. Tucked away under the control of the Union Home Ministry, the islands were treated as closed territory, with limited access to the Indian mainland and no connection to the neighbouring South East Asian nations. The NDA government deserves credit for recognising the strategic and economic significance of the Andaman and Nicobar Islands and Lakshadweep.

Given its deep maritime orientation and a global primacy rooted in naval power, the British Raj was conscious of the value of island territories — as crucial places for trans-oceanic commerce and the projection of power in the emerging age of capitalism and great power competition for markets and geopolitical influence. The innocent internationalism of independent India, its inward economic orientation, preoccupation with the consequences of Partition, and the Chinese occupation of Tibet, saw India pay little attention to its vast possibilities at sea despite a long coastline and the vital location of its two island chains. As Delhi's economic reforms began to change the picture in the 1990s, it was the Indian Navy that called for a fresh perspective on sea power. It was hard to change landlubbers that dominated India's policy establishment in Delhi. Even when they moved, for example, with the setting up of the first and only joint tri-service command at Port Blair in 2001, it was never given the financial and military resources to realise the full potential of the Andaman and Nicobar island chain.

Successive coalition governments did not have the strategic bandwidth or the bureaucratic energy to do justice to the island territories. It needed a strong government in Delhi, with a full majority and the political will of Prime Minister Narendra Modi, to force policy changes in the maritime domain. Delhi's maritime push to develop the islands was reinforced by China's naval pull. Since the turn of the 21st century, a rising China began to send regular naval squadrons into the Indian Ocean and develop bases and dual-use facilities at key locations in the littoral. Like the British Raj, a rising China had the geopolitical sensibility of a great maritime power and understood the strategic value of islands. It made consistent political outreach to island states in the Indian Ocean — from Sri Lanka and Maldives to Seychelles and Mauritius. Even as it began to compete with China, Delhi has woken up to the possibility of developing its own ignored island territories. It is for a good reason that the Chinese strategic community calls the Andaman and Nicobar Islands a "metal chain" strung right down the Bay of Bengal to the mouth of the Malacca — with the potential to block China's access to the Indian Ocean. A bestirred Delhi will hopefully waste no time in turning its impressive plans into concrete outcomes.



COCHIN SHIPYARD SIGNS SHIP REPAIR AGREEMENT WITH THE U.S. NAVY

As India and the U.S. look to expand cooperation in ship repair and maintenance to turn India into a regional hub, Cochin Shipyard Limited (CSL) became the third Indian shipyard to enter into a Master Shipyard Repair Agreement (MSRA) with the U.S., which will enable to repair U.S. Navy ships.

The State-run shipbuilding facility in Kochi is the latest in the line after Larsen & Toubro (L&T) and Mazagon Dock Shipbuilders Ltd. (MDL)

L&T shipyard in Kattupalli near Chennai was the first Indian shipyard to sign the agreement in July last year. Last month, a U.K. naval ship arrived for the first time at Kattupalli for repairs.

“... The MSRA is a non-financial agreement and is effective from April 5, 2024. This will facilitate repair of US Naval vessels under Military Sealift Command in CSL,” the entity said in a disclosure to stock exchanges, adding: “CSL has been qualified for entering into the MSRA after a detailed evaluation process and capability assessment by the US Navy – Military Sealift Command”.

Both India and the U.S. are quite keen on expanding cooperation in ship maintenance and repairs as it benefits both countries, giving business and expertise to Indian shipyards while giving alternate options to the U.S. Navy for the smaller repairs of its ships without going faraway increasing their turnaround time and at a lesser cost.

In a joint statement issued after bilateral talks held between Prime Minister Narendra Modi and U.S. President Joe Biden in September last year, both sides recommitted to advancing India’s “emergence as a hub for the maintenance and repair” of forward-deployed U.S. Navy assets and other aircraft and vessels.

U.K. deploying its fleet

On March 26, the U.K.’s Littoral Response Group (LRG) arrived in Chennai as the first engagement of its deployment to the Indian Pacific region. The U.K. High Commission said the Royal Fleet Auxiliary Argus and RFA Lyme Bay conducted maritime exercises with the Indian Navy as they entered the Arabian Sea and will undergo essential maintenance at L&T shipyard.

“The visit of LRG attests to the U.K.’s capability and commitment to the Indo-Pacific. The sight of Royal Navy ships undergoing essential maintenance at an Indian shipyard is yet another example of the India-UK Logistic Exchange Memorandum of Agreement in practice,” said Brigadier Nick Sawyer, Defence Advisor, British High Commission.

Following the completion of its maintenance in India, the LRG will operate in the Indo-Pacific to conduct training, exercises, and wider engagement with allies and partners, the statement added.

ISRO’S ‘ZERO ORBITAL DEBRIS’ MILESTONE

The story so far:

The Indian Space Research Organisation (ISRO) has said its PSLV-C58/XPoSat mission has practically left zero debris in earth orbit. The space agency explained that the last stage of the Polar Satellite Launch vehicle (PSLV) used in the mission was transformed into a kind of orbital station — called the PSLV Orbital Experimental Module-3 (POEM-3) — before it was left to re-



enter the earth's atmosphere instead of floating in orbit once its mission was completed. ISRO said that after it completed the primary mission of injecting all satellites into their target orbits, the fourth stage of the PSLV was transformed into the POEM-3. It was subsequently de-orbited from 650 km to 350 km, rendering it more susceptible to being pulled towards the earth and burning up in the atmosphere. ISRO also said it "passivated the stage," meaning dumped its fuel, to avoid an explosion that could have flung small pieces of debris into orbit.

What is POEM?

Developed by the Vikram Sarabhai Space Centre (VSSC) as an inexpensive space platform, POEM uses the spent fourth stage of a PSLV rocket as an orbital platform. Used for the first time in the PSLV-C53 mission in June 2022, ISRO had POEM orbit the earth to perform in-orbit scientific experiments with various payloads onboard.

POEM is powered by solar panels mounted on the fuel tank of the rocket's fourth stage and a lithium-ion battery. It has a navigation, guidance, and control (NGC) system to stabilise its altitude along with helium control thrusters. The NGC system has four Sun sensors, a magnetometer, and gyroscopes, and talks to ISRO's NavIC satellite constellation for navigation. POEM also has a telecommand system to communicate with the ground station.

ISRO first demonstrated the reuse of the spent fourth stage of its rocket in its PSLV C-44 mission in 2019. After satellites were injected into the target orbits, the fourth stage, carrying a student payload called Kalamsat-V2, was moved to a higher circular orbit of 443 km and stayed there, facilitating the payload's requirements.

What has POEM-3 achieved?

ISRO launched the PSLV C-58 mission from the Satish Dhawan Space Centre in Sriharikota on January 1.

After deploying the XPOsat satellite in its desired orbit of 650 km, the fourth stage, now called POEM-3, was lowered to a 350-km-high circular orbit. The lower a satellite is in orbit around the earth, the more drag it experiences and the more energy it needs to expend to stay in orbit.

POEM-3 featured nine payloads: two each from VSSC and Bellatrix Aerospace Pvt Ltd, one each from the start-ups TakeMe2Space, Inspecity Space Labs Pvt Ltd., Dhruva Space, and from LBS Institute of Technology, KJ Somaiya Institute of Technology, and ISRO's Physics Research Laboratory, Ahmedabad.

It completed 400 orbits around the earth by its 25th day. The payloads were operationalised to perform their experiments at this time. ARKA200, RUDRA, and LEAP-TD completed their respective experiments while the data from WeSAT, RSEM, and DEX were collected after every orbit for further analysis on the ground. Two fuel cells from VSSC demonstrated their ability to generate power. By January 27, 2024, all of POEM-3's payload objectives were completed.

For two months, POEM-3 prepared for its re-entry while ISRO tracked it with its Telemetry, Tracking and Command Network stations in Bengaluru, Lucknow, Mauritius, Sriharikota, Port Blair, Thiruvananthapuram, Brunei, and Biak (Indonesia) and the Multi-Object Tracking Radar (MOTR) at Sriharikota. On March 21, POEM-3 re-entered the earth's atmosphere, meeting its fiery end.



Why is this significant?

With the rise in the number of satellites in orbit around the earth, space debris has become a pressing issue. Space debris in the low earth orbit (LEO) mainly comprises pieces of spacecraft, rockets, and defunct satellites, and the fragments of objects that have deteriorated explosively as a result of anti-satellite missile tests. This debris often flies around at high speeds of up to 27,000 km/hr. Due to their sheer volume and momentum, they pose a risk to several space assets.

The LEO extends from 100 km above the earth's surface up to 2000 km above. It includes satellites tracking intelligence data, encrypted communication, and navigation. According to ISRO's Space Situational Assessment Report 2022, the world placed 2,533 objects in space in 179 launches in 2022.

Debris also exists, but in smaller volumes, in the geosynchronous orbit (GEO) 36,000 km above the earth's surface. Currently, 7,000 operational satellites are orbiting the earth at different altitudes along with millions of pieces of space debris. The U.S. Space Command tracks and catalogues space debris larger than 10 centimetres in LEO and larger than 0.3-1 metres in GEO.

How are agencies dealing with debris?

The latest incident of space debris causing havoc was recorded on March 8 when a discarded battery pallet dropped by the International Space Station ripped through the roof of a house in Florida.

As more communication satellites/constellations are launched and more anti-satellite tests are conducted, more on-orbit breakup and collisions occur, producing smaller fragments in orbit. The number of space objects (debris or functional equipment) greater than 10 cm in size in LEO is expected to be about 60,000 by 2030, per ISRO estimates. Space debris can also create unusable regions of the orbit where too much debris has accumulated, and which can trigger a cascading avalanche of collisions that produce yet more, but smaller pieces of, debris.

Currently, there are no international space laws pertaining to LEO debris. Most spacefaring nations abide by the Space Debris Mitigation Guidelines 2002 specified by the Inter-Agency Space Debris Coordination Committee (IADC), which the U.N. endorsed in 2007.

EXPRESS VIEW: HEPATITIS WARNING

A WHO report has flagged the seriousness of India's Hepatitis challenge. With nearly 3 crore Hepatitis B patients and more than 50 lakh Hepatitis C patients, the country's burden of these liver diseases is the second highest in the world. They claimed more than a lakh lives in 2022. Even more worrying is that a very small fraction of the infected come under the diagnostic ambit. Less than 30 per cent of Hepatitis C cases are detected; the figure for Hepatitis B is less than 3 per cent. The National Viral Hepatitis Control Programme (NVHCP) aims to eliminate Hepatitis C by 2030 and "achieve significant reduction in morbidity and mortality associated with Hepatitis B" by that year. The WHO report is a warning that the country has much work to do to attain this target. However, the global health agency has also struck a note of optimism: "Course correction between 2024 and 2026 can bring NVHCP on track".

Hepatitis B and C are spread through contact with contaminated blood. Hepatitis B can lead to the scarring of liver tissues and increase the risk of cancer. Diagnosis is complicated — carriers can harbour the virus for years without appearing to be diseased. They can infect others even when



they do not show symptoms — these often show up only when the pathogen takes an aggressive form. There is no cure, though treatment can help manage symptoms to an extent. The NVHCP, initiated in 2018, provides free testing and medication. However, the WHO report indicates that the programme hasn't touched most patients. Rigorous adoption of blood screening protocols in the past 20 years has substantially reduced the risks from transfusion. Most of the Hepatitis B infections in the country are today passed on from mother to child. Vaccination can prevent the disease but the highest immunity is conferred when the child is administered a jab just after birth. In India, less than 50 per cent infants get vaccinated this early. This is largely to do with the low rate of institutionalised births in large parts of the country. Informing community healthcare workers with vaccination protocols could increase the efficacy of the immunisation regime.

Hepatitis C is far easier to treat. Anti-virals can cure the disease and prevent long-term liver damage. According to WHO, treatment costs in India are amongst the lowest in the world. But 70 per cent patients eluding the diagnostic network speaks of a healthcare deficit that must be addressed immediately. Whether it's containing viral diseases like hepatitis or bacterial infections like TB, there can be no shortcuts to expanding the country's medical facilities.

GROSS MISMANAGEMENT

With less than two years left to achieve the ambitious goal set by Prime Minister Narendra Modi in 2018 to "eliminate" TB in India, the pharmacy of the Global South is once again struggling to treat patients with drug-sensitive TB. Shockingly, India is experiencing a TB drug shortage, with increasing frequency. Just seven months ago, there was an acute shortage of critical MDR-TB drugs; disruptions in drug supply, which began with drug-sensitive medicines in 2022 and snowballed to include MDR-TB drugs, lasted for nearly a year. Similarly, in September 2021, India faced a stockout of MDR-TB drug Delamanid. Delay in diagnosis and treatment initiation are already a huge concern in the TB care cascade. Patients who start therapy but fail to achieve treatment success is another gap. However, addressing this gap, which takes drug availability for granted, will become harder if drug stock outs become a recurring issue. A 2010 study found that non-availability of drugs was responsible for 8% of non-adherent patients missing treatment. Making sure that medicines for different categories of TB patients are always available across India is a no-brainer. That 14 years later and close to the target date of 2025, there is still a shortage of drug-sensitive TB medicines, which are manufactured entirely in India by multiple players, only underscores how poorly the national TB programme is being managed.

Renaming the National TB Control Programme as the National TB Elimination Programme in line with Mr. Modi's goal without addressing the fundamentals such as drug availability reeks of incompetence and a lack of seriousness in the war against TB. What makes the situation worse is the Health Ministry's permission to States to procure drugs locally at the last minute, creating huge challenges at the field level. A March 18, 2024 Health Ministry circular to all States mentions that the supply of certain drug-sensitive medicines may get "delayed due to unforeseen and extraneous circumstances". While States have been asked to procure drugs locally for a period of three months, the circular also gives an option for States to reimburse the cost of medicines procured by patients in case the district health facilities fail to provide them free drugs. If the last minute permission to States for local procurement is condemnable, leaving it to the patients to buy medicines themselves, even as a last resort, is abominable, given the poor socioeconomic background of most TB patients. Far from reaching the 2025 goal, India does not seem to have a handle on the most basic elements of TB control.



OVER-RELIANCE ON SMEAR MICROSCOPY FOR TB DETECTION

The presumptive TB testing rate in the country increased from 1,352 per lakh population in 2022 to 1,710 per lakh population in 2023. However, even two years before the 2025 deadline that the government has set to “eliminate” TB in India, only 21% of presumptive TB testing in 2023 was upfront done using a rapid molecular diagnostic test.

According to the India TB Report 2024, which is yet to be made public, at 79%, the vast majority of presumptive TB testing was still carried out using the 100-year old sputum smear microscopy, which has low sensitivity. Ironically, compared with 2022, there has actually been a marginal decrease — from 23% to 21%—in the percentage of presumptive TB testing offered upfront using a molecular test in 2023.

The number of molecular testing facilities in the country has increased from 5,090 in 2022 to 6,496 in 2023. Also, there was a small increase in the rate of molecular testing in 2023 compared with 2022; the number of rapid molecular tests offered for presumptive TB testing increased from 292.7 per lakh population in 2022 to 358 per lakh population in 2023.

However, this has not been reflected in an increase in the proportion of molecular testing last year compared with 2022. India has still a long way to go before it reaches the goal of offering a molecular test upfront to all presumptive TB patients, with nil reliance on smear microscopy.

In 2023, 37.19 lakh patients were offered a CBNAAT test, of which 7.4 lakh people were diagnosed with TB, representing a yield of 20%. In the case of TrueNat, of the 31.13 lakh patients who were tested using TrueNat, 3.3 lakh persons were diagnosed with TB, representing a yield of 11%. For smear microscopy, of the 1.89 crore persons tested, only 5.78 lakh were diagnosed with TB, representing a yield of just 3%.

Smear microscopy

The National Strategic Plan 2017-2025 wanted to reduce the number of presumptive TB patients who are offered sputum smear microscopy from over 9.1 million in 2015 to 5.1 million in 2023 while increasing the number of molecular tests from 40,000 in 2015 to over 14.7 million in 2023. However, as per the India TB report, in 2023, India was far from reaching the ambitious target set by NSP 2017-2025. The overreliance on smear microscopy has continued in 2023 with 79% of presumptive TB cases detected using smear microscopy and just 21% cases detected using a molecular test.

The revised National Strategic Plan 2020-2025 has raised the bar even higher for precision tests to be used for initial diagnosis.

Four years after the launch of the revised NSP, India is nowhere near meeting the targets. One of the main objectives of the revised NSP 2020-2025 is the early detection of presumptive TB cases.

It clearly says there should be “prompt diagnosis” using highly sensitive diagnostic tests for detecting presumptive TB cases “at the first point of contact” both in the private and public sectors.

Universal drug-susceptibility testing in all drug-sensitive TB cases is crucial for early identification of drug-resistant TB. The revised NSP 2020-2025 clearly states that NTEP should provide “universal access” to drug resistance testing.



However, in 2023, the proportion of notified TB patients offered drug-susceptibility testing was just 58% as against the target of 98%. In the absence of drug-susceptibility testing, it is not possible to ascertain drug-resistant cases and offer them suitable MDR-TB medicines.

PROGRESS IN COMBATING MALNUTRITION REMAINS 'SLUGGISH'

Malnutrition is a significant contributor to the disease burden in India. The United Nations Sustainable Development Goals (SDGs) have an ambitious target of eradicating malnutrition by 2030, prompting the World Health Organisation (WHO) to designate 2016–2025 as the decade of nutrition. Despite strides made in reducing undernutrition indicators through national nutrition programmes, progress in India has been sluggish. A study by the Indian Institute of Public Health (IIPH) Hyderabad examined undernutrition across the nation and evaluated the distribution of nutritional indicators among children under three at the state level, utilising data from the National Family Health Surveys (NFHS). This study published in the *Clinical Epidemiology and Global Health* journal centred on children below the ages of three and explored the prevalence and trajectory of undernutrition indicators across India, both nationally and at the state level. The analysis aimed to assess changes over a decade to understand the extent of the issue. Undernutrition can lead to vision impairment, weakened bones, protein deficiency, and gastrointestinal ailments in children. “We firmly grasped the importance of comprehending the epidemiology of the condition before advocating for policy changes or interventions. It’s crucial to know who is affected, their locations, and how these factors evolve over time. Armed with this comprehensive understanding, we can aptly tailor existing policies and implement precise nutritional interventions,” said Sirshendu Chaudhari, Yashaswini Kumar, AY Nirupama, and Varun Agiwal, authors of the study.

Education and gender

Comparing data from NFHS-1 (1992–93) to NFHS-5 (2019–20), the study found that while the prevalence of wasting (low weight for height) increased marginally from 19.9% to 20.5%, stunting (impaired growth) and the incidence of underweight decreased from 51.9% and 34.1% to 45.8% and 29.4%, respectively. Wasting exhibited a slight increase of 0.21%. The study identified significant factors affecting children’s nutritional status, including maternal education and the child’s gender. According to the study, all States and Union territories mirrored the national trend of decreasing rates of stunting and underweight among children, though no consistent trend was observed for wasting prevalence. In the NFHS-1 survey, stunting prevalence ranged from 33.2% (lowest) in Nagaland to 63.8% (highest) in Bihar. By NFHS-5, this range decreased from 23.1% (lowest) in Manipur to 41.6% (highest) in Meghalaya. Similarly, underweight prevalence in NFHS-1 varied from 19.7% in Mizoram to 60.2% in Bihar, but in NFHS-5, it ranged from the lowest of 11.6% in Manipur to the highest of 39.7% in Bihar. In NFHS-1, wasting prevalence spanned from 4.5% in Mizoram to 26.8% in Rajasthan. However, in the 2019–2021 survey, these figures shifted, with the lowest wasting prevalence at 11.4% in Punjab and the highest at 27.7% in Maharashtra. In Chhattisgarh, Jharkhand, and Uttarakhand, stunting, underweight, and wasting rates have consistently decreased over time. Children in urban areas face an increased risk of stunting, underweight, and wasting over the years, although the statistical significance has remained relatively stable. Male children exhibited a higher likelihood of experiencing stunting, being underweight, and wasting compared to their female counterparts, although this trend did not consistently emerge across all NFHS surveys. Maternal education emerged as a highly significant factor influencing children’s susceptibility to undernutrition. Children whose mothers had either no education or only primary education were at double the risk, while those with mothers having



secondary education faced a 1.5 times higher risk of developing stunting and being underweight, although this risk decreased from NFHS-1 to NFHS-5.

Valuable insights

The findings of this study highlight the evolving trends in various malnutrition indicators, providing valuable insights into the necessary action to be taken at the State level and their correlation with socio-demographic factors. Looking ahead globally, if the trends observed in NFHS 5 persist, India may fall short of meeting the WHO and SDG-2 targets by 2030, further exacerbated by a potential decline in the Global Hunger Index ranking. Speaking about the study, one of the authors and also Associate Professor at IIPH Hyderabad, Sirshendu Chaudhari, said, "Enhancing overall nutrition presents a significant hurdle, but one that India has the capacity to conquer. The country boasts numerous initiatives directly or indirectly combating undernutrition. While the government shoulders a substantial part of this responsibility through initiatives like Mission Indradhanush, the onus also falls on parents, caregivers, and educators at the preschool level to identify and address this issue."

EXPRESS VIEW ON UKRAINE-RETURNED MEDICAL STUDENTS: TO BE A DOCTOR

In February 2022, 18,000 Indian medical students studying in Ukraine were forced to return home after the country's conflict with Russia escalated into a war. As a one-time exception, India's medical education regulator, the National Medical Commission, allowed 4,000 of these students, who were in their final semesters, to complete their internship at home.

With tensions between Russia and Ukraine showing little sign of abating, countries in Central Asia, Eastern and Southeastern Europe have become the preferred destination for a large number of the repatriated students.

According to a report in this newspaper, 70 per cent of these MBBS aspirants are now pursuing their dreams in colleges in Serbia, Kyrgyzstan, Uzbekistan and Georgia. These countries are also attracting new batches of Indian students. These developments also point to the deficits in the Indian medical education system.

In July last year, Union Health Minister Mansukh Mandaviya told Lok Sabha that India added more than 220 medical colleges in the last five years. The number of medical seats grew more than 60 per cent to 1,07,950. However, medical college seats are still far less than the number of aspirants who leave school with the dream of becoming a doctor.

Last year, for instance, more than two million students took the NEET examination for entrance to MBBS courses. In other words, the ratio of medical college seats to aspirants is about 20:1. The need to offer more opportunities to students who seek a medical career cannot be more pressing.

A 2019 study by researchers commissioned by the National Institute of Educational Planning revealed that a large section of students who migrate for medical education come from aspirational middle and lower middle classes, including those from rural areas.

NEET figures attest to the increase in the aspirational quotient of the medical profession — the number of students taking the test has increased almost three times in the past 10 years. But the examination remains extremely brutal — only the top 0.25 per cent make it to the elite colleges. Government institutions are more affordable than those run by private bodies, but they account for only about half of the seats on offer.



Experts have suggested a variety of ways out of the problem. In 2020, the Niti Aayog proposed linking private colleges to district hospitals to serve underserved areas. Another school of thought advocates enhancing the skills of paramedics and nurses to cater to non-specialist demands of the medical sector.

In other words, tweaks in medical pedagogy could significantly increase the numbers of the professionals, equivalents of the general practitioners today.

Several European countries have deployed this strategy with great success. Moreover, MBBS graduates from foreign institutes have to undergo another rigorous test to practice in India.

In several parts of Europe, in contrast, the transfer of credits ensures a relatively easier transition to hospital internship for migrants.

In recent years, the government has initiated conversations to reform the educational landscape. It should conduct similar exercises to address the absences and shortfalls in medical education.

NATIONAL GREEN TRIBUNAL: STUBBLE BURNING

The National Green Tribunal has told Punjab to submit by May 5 its detailed plan to manage the 19.52 million tonnes of paddy stubble it is estimated to generate in 2024.

Many farmers in North India, especially in Punjab and Haryana, burn the residue of their wheat and paddy crop in order to prepare their fields for the next round of planting.

The resulting smoke contributes to the National Capital Region's dense pre-winter smog, sending air pollution levels spiralling.

According to the report filed by the Punjab government, the state generated 19.50 million tonnes of paddy straw in 2023 of which 15.86 million tonnes were utilised. Of the 15.86 million tonnes, 11.5 million tonnes were managed on site and 3.66 million tonnes were used off site — in boilers, biomass plants, biogas plants, bio-ethanol plants, thermal power plants and brick kilns.

The National Green Tribunal, established in 2010, as per the National Green Tribunal Act is a specialised judicial body equipped with expertise solely for the purpose of adjudicating environmental cases in the country.

The Tribunal has a presence in five zones- North, Central, East, South and West. The Principal Bench is situated in the North Zone, headquartered in Delhi.

The decisions of the Tribunal are binding.

The Tribunal is an open court and its proceedings can be attended in person.

LAVENDER CULTIVATION TURNS FARMERS INTO BIG BUSINESSMEN IN J&K'S DODA

When lavender cultivation was first introduced to Bhandarwah subdivision in Jammu and Kashmir's Doda district in 2015, most farmers were sceptical and just a handful gave it a go. Today, these early adopters have significantly expanded cultivation, employ 30-40 people each on a full-time basis, have their own distillation units for making lavender oil, and market their products in different parts of the country.



According to officials, more than 700 acres of farmland has been brought under lavender cultivation in the area since 2017, and another 100 acres is set to be added.

— The crop was officially introduced in Bhaderwah by the Council Of Scientific and Industrial Research-Indian Institute of Integrative Medicine (CSIR-IIIM), Jammu, in 2015.

— CSIR plans to distribute lavender plants to farmers in parts of Kathua, Rajouri, Poonch, and the Kashmir Valley, besides Utrakhand, Himachal Pradesh and the Northeast.

— CSIR-IIIM, Jammu, provides lavender growers end-to-end support, from supplying them quality planting material, to training them, helping them with distillation, and providing them market linkages.

— There is a sharp decline in the price of lavender oil, now around Rs 2,500-3,000 per litre as opposed to Rs 12,000 a few years ago. The price drop has been attributed to the import of oil from Bulgaria, France and China by buyers elsewhere in India.

The CSIR-Aroma Mission is a flagship project of CSIR under which Lavender cultivation is being promoted in the temperate regions of J&K. The aim of the project is to increase the income of small and marginal farmers and develop agriculture-based Startups.

Lavender, which can be grown in areas that experience snowfall and have a hilly terrain, blossoms and is ready for harvesting two-and-a-half years after it is planted.

— The same plant can bear flowers for 18-20 years, and does not require the amount of insecticides, pesticides, and other chemicals used on conventional crops like maize and paddy.

— The uses of lavender includes manufacturing perfumes, soaps, agarbatti, and room fresheners.

— The variety of Lavender is highly suitable for cultivation in the rainfed temperate regions of India.

— The benefit of selling dried flowers is that the buyer knows there is no adulteration, and apart from extracting oil from it as per requirement, the buyer can also use it for other products.

AS ABUNDANT CHITAL COST AUTHORITIES DEARLY, A TINY ANDAMAN ISLAND STRUGGLES TO KEEP UP

Introduced to the Andaman and Nicobar Islands for game hunting in the early 1900s by the British, a herbivore that multiplied unchecked for years in the absence of large predators has become an expensive and an “invasive” problem for the Union Territory’s authorities.

For years, the chital (spotted deer) — the staple food for large predators in forests of mainland India — sustained themselves on local ground vegetation on Netaji Subhash Chandra Bose Island, which lies east of Port Blair and does not have any major residential enclaves. But now, with the nearly 500 chital having depleted much of the low-ground vegetation, the Andaman and Nicobar Forest Department has been spending Rs 15-20 lakh per month since the past few months to feed them on the island, a source told The Indian Express.

“There is negligible ground vegetation left on Bose Island (formerly Ross Island) because the chital population has stretched beyond the carrying capacity of the place,” said the source.



To deal with the “invasive species”, the department has been seeking solutions — to either rehabilitate the chital or relocate them elsewhere. Under the Wildlife Protection Act, 1972, an officer of the rank of Chief Wildlife Warden can permit translocation for the purpose of scientific management. The law mandates that such translocation should cause minimum trauma to animals.

On February 13, the Andaman and Nicobar Forest Department reached out to the Dehradun-based Wildlife Institute of India (WII), seeking its help in devising safe strategies to manage the deer population. The forest department told WII that it “intends to rehabilitate/relocate around 500 nos. of spotted deer presently located at Netaji Subhash Chandra Bose Dweep to Biological Park, Chidiyatapu (a mini zoo in Port Blair)”.

In its response in late March, WII suggested that consultative meetings should be held with “select officials” to develop strategies in handling the chital population. The institute also shared a list of officials, including officers from Madhya Pradesh and Chhattisgarh forest departments, a retired forest official from West Bengal, WII scientists and independent experts from the Wildlife Trust of India, a non-profit organisation.

Besides this, WII told the Union Territory administration that capturing ungulates (hooved animals) was a “complex process” that required knowledge of the species, the diseases they suffer from, their behavioural ecology and appropriate restraint procedures.

Elaborating on the different methods available for capturing ungulates, WII said the “passive Boma capture technique has gained relevance over the years”. As per this technique, WII stated, a funnel-like fencing is used to lure herds into an enclosure that tapers into a loading chute, which helps load animals into the transport vehicle. This technique has been used to capture chital and hard ground swamp deer (barasingha) in Madhya Pradesh, Chhattisgarh and West Bengal; nilgais in Madhya Pradesh and swamp deer in Assam.

Over the years, wildlife biologists and ecologists have studied the impact of the invasive chital on local flora and fauna. Non-native flora and fauna that pose a threat of decline and elimination to local species are considered invasive. They also upset the ecosystem of local habitats by competing for resources and through predation.

These studies, done in other parts of the Andaman Islands, have all pointed out to one thing — chital are detrimental to the endemic flora and fauna. An August 2022 study on this subject, published in *Biotropica*, found that increasing chital presence was associated with a decrease in the density and richness of understory (shrubs that grow beneath the main canopy of a forest).

An October 2015 study on the impact of the invasive spotted deer on tropical island lizards in the Andaman archipelago found that the herbivores were a potential threat to the island’s native forest floor and semi-arboreal lizards (which live in trees). The study also inferred that spotted deer “depressed the abundance of forest floor and semi-arboreal lizards approximately five-fold, by reducing vegetative cover in the understory”.

Karthikeyan Vasudevan, chief scientist, Centre for Cellular and Molecular Biology, Hyderabad, and the co-author of 2015 study published in Springer journal, said the issue of the invasive chital needs a thorough understanding and examination, including their social behaviour and feeding patterns, on all of the Andaman islands, not just Bose Island.



Vasudevan told The Indian Express, “The spotted deer have impacted the understory vegetation. The effect on lizards is that they have lost spaces to perch and bask on. Their insect prey, which feed on certain plants, has also been impacted. This is the impact a non-native ungulate has on native flora.”

TRAINS TO PLY AT 40 KMPH AT NIGHT TO SAVE LIONS FROM COLLISION DEATHS

The Railways and Gujarat forest department told the High Court that they have framed a revised standard operating protocol (SOP), limiting train speed to less than 40 km per hour on the busy Pipavav-Surendranagar rail line during night to avoid collision with lions in Amreli district.

— A joint meeting of forest and railway officials was held after the HC took note of three lion deaths in January, two of them dying from train accidents.

The Pipava-Surendranagar railway track of PRCL is lifeline of Pipavav port on Rajula coast of Amreli.

— The areas that record a frequency of lion movements as lion hotspots and the Railways agreed to restrict the speed of trains to below 40 kmph during night to avoid collision with lions.

— The speed restriction will eliminate chances of train-lion collision by 60 to 70 per cent.

— The train speed is restricted to 20 kmph on Visavadar-Talala section in Gir (west) wildlife division in Junagadh and Gir Somnath districts and no train operations are allowed during night.

even lions had died on being hit by trains between July 2023 and January 2024 on the Pipavav-Surendranagar section.

— The HC, in its order, recorded that “when these accidents occurred in January 2024, the appropriate course of action of the forest and railway officials was to make an inquiry jointly or separately to ascertain the cause of death on the railway track and take corrective measures, which ought to have been done at their own ends without intervention” from the court.

KARNATAKA HC QUASHES CENTRE’S CIRCULAR BANNING 23 BREEDS OF ‘DANGEROUS’ DOGS

The court said that the Central government could not have imposed a blanket ban on dog breeds through a circular in the absence of any such power available under the provisions of the Prevention of Cruelty to Animals Act, 1960 or the Animal Birth Control (ABC) Rules.

Justice M. Nagaprasanna passed the order while allowing a petition filed by King Solomon David and Mardona Jones, both residents of Bengaluru.

The High Court of Karnataka noticed that the circular was issued following an affidavit filed by the Centre before the Delhi High Court giving an undertaking that it would consider representation of a PIL petitioner for banning certain dog breeds, after hearing all the stakeholders. Also, the Centre had told the High Court of Karnataka that there was no consultation with the stakeholders.

Meanwhile, the court said that the obliteration of the circular will not prevent the Centre from amending the rules for imposing the ban. However, the court also said that the Centre has to hear all the stakeholders, not all pet owners but all the organisations certifying dog breeds, and the People for Ethical Treatment of Animals if it wants to amend the rules to ban the dog breeds.

3RD FLOOR AND 4TH FLOOR SHATABDI TOWER, SAKCHI, JAMSHEDPUR



“The responsibility of the pet owner would not be limited to owning oral responsibility but should be made accountable for the payment of entire treatment of the victim who would be injured by the dog,” the court observed in its order.

Some of the banned dog breeds are Pitbull Terrier, Tosa Inu and American Staffordshire Terrier.

NEHRU, BOSE, OR... MAULANA BARKATULLAH? WHO WAS INDIA'S 'FIRST PRIME MINISTER'?

Kangana Ranaut, in a recent interview, claimed that Subhas Chandra Bose, not Jawaharlal Nehru, was the first prime minister of independent India. After being criticised for the historicity (or lack thereof) of her comments, Kangana doubled down, citing the provisional government setup by Bose in 1943 as evidence of her claim. What exactly is she talking about?

The Azad Hind government

Subhas Chandra Bose proclaimed the formation of the Provisional Government of Azad Hind (“Free India”) in Singapore on October 21, 1943.

“In the name of God, in the name of bygone generations who have welded the Indian people into one nation, and in the name of the dead heroes who have bequeathed to us a tradition of heroism and self-sacrifice — we call upon the Indian people to rally round our banner and strike for India’s freedom,” Bose said in a fiery speech in the Cathay Theatre. (as quoted in Sugata Bose’s *His Majesty’s Opponent*, 2011).

Bose was the Head of State of this provisional government, and held the foreign affairs and war portfolios. A C Chatterjee was in charge of finance, S A Ayer became minister of publicity and propaganda, and Lakshmi Swaminathan was given the ministry of women’s affairs. A number of officers from Bose’s Azad Hind Fauj were also given cabinet posts.

The Azad Hind government claimed authority over all Indian civilian and military personnel in Britain’s Southeast Asian colonies (primarily Burma, Singapore, and Malaya) which had fallen into Japanese hands during World War II. It also claimed prospective authority over all Indian territory that would be taken by Japanese forces, and Bose’s Azad Hind Fauj, as they attacked British India’s northeastern frontier.

To give legitimacy to his government, much like Charles de Gaulle had declared sovereignty over some islands in the Atlantic for the Free French, Bose chose the Andamans. “It [the Azad Hind government] obtained de jure control over a piece of Indian territory when the Japanese handed over the Andaman and Nicobar islands in late December 1943, though de facto military control was not relinquished by the Japanese admiralty,” Sugata Bose wrote. The government also handed out citizenship to Indians living in Southeast Asia, and according to Sugata Bose, 30,000 expatriates pledged allegiance to it in Malaya alone.

Diplomatically, Bose’s government was recognised by the Axis powers and their satellites: Germany, Japan, and Italy, as well as Nazi and Japanese puppet states in Croatia, China, Thailand, Burma, Manchuria, and the Philippines. Immediately after its formation, the Azad Hind government declared war on Britain and the United States.



Not the first provisional government

Notably, 28 years before the Azad Hind government came into existence, the Provisional Government of India was formed in Kabul by a group known as the Indian Independence Committee (IIC).

Much like Bose allied with the Axis powers during World War II to fight the British, during World War I, Indian nationalists abroad (mostly in Germany and the US), as well as revolutionaries and Pan-Islamists from India, attempted to further the cause of Indian independence with aid from the Central Powers. The IIC, with the help of the Ottoman Caliph and the Germans, tried to foment insurrection in India, mainly among Muslim tribes in Kashmir and the British India's northwestern frontier.

To further this cause, the IIC established a government-in-exile in Kabul under the presidency of Raja Mahendra Pratap, and prime ministership of Maulana Barkatullah, revolutionary freedom fighters who spent decades outside India trying to gather international support for Indian independence.

Barkatullah was also one of the founders of the Ghadar movement, which began in California in 1913, and aimed to overthrow British rule in India. Lala Har Dayal, one of the movement's leaders put forth the following plan of action for the Ghadarites: "...use the freedom that is available in the US to fight the British...British rule must be overthrown, not by petitions but by armed revolt...carry this message to the masses and to the soldiers in the Indian Army...enlist their support." (as quoted by Bipan Chandra and others in *India's Struggle for Independence*, 1988).

While the movement was crushed in India by the end of the War, the Ghadarite left a strong and lasting impression on Indians and the British. "If success and failure are to be measured in terms of the deepening of nationalist consciousness, the evolution and testing of new strategies and methods of struggle, the creation of tradition of resistance, of secularism, of democracy, and of egalitarianism, then, the Ghadarites certainly contributed their share to the struggle for India's freedom," Chandra and others wrote.

The Kabul provisional government was one of many moves orchestrated by Ghadarite revolutionaries.

Acts of defiance & political necessity, not actual governments

Setting up provisional governments, and governments-in-exile, has long been a way for resistance movements to gain political legitimacy. Take, for example, the Central Tibetan Administration (CTA) in Dharamshala. The very purpose of this government-in-exile is to challenge the legitimacy of the Chinese occupation of Tibet. By running a parallel government which claims to represent the will of the Tibetan people, the CTA keeps the flame of resistance burning, even when brutal repression and government-sponsored Han migration in Tibet has made things difficult.

Similarly, both the 1915 and 1943 provisional governments were, more than anything else, symbolic acts of defiance against British rule in India, made with certain political considerations kept in mind.

Bose proclaimed the Azad Hind government in order to legitimise his armed struggle against the British. By proclaiming a provisional government, he gave his army legitimacy in the eyes of international law — they were not just mutineers or revolutionaries, but soldiers of a duly



constituted government. Crucially, citizenship oaths taken by Azad Hind Fauj officers were produced during the 1945-46 Red Fort trials as evidence of legality of their actions.

The Kabul provisional government was, on the other hand, proclaimed to establish the seriousness of IIC's intentions, which it hoped would help gain the support of the Afghan Emir, who remained neutral but faced unrelenting pressure from the British to crack down on anti-colonial revolutionaries. In 1917, it even reached out to the Soviets, and as a government-in-exile right on India's borders, posed a looming threat to the British.

That being said, neither of the two can, in any seriousness, be called the Government of India. This is for two main reasons. First, both these governments failed to gain widespread international recognition. While some countries did recognise and support them, they did so for their own motives. After the World Wars (in which the British emerged victorious), this support swiftly vanished. Second, both these governments never controlled Indian territory. While Bose did officially hold the Andamans, effectively, the islands were still under Japanese occupation. So was all the territory in the Northeast captured (briefly) by the combined Indian and Japanese armies. The Kabul government never set a foot on Indian soil, and in all seriousness, was a government only on paper until its dissolution in 1919.

WHY KERALA BJP CHIEF WANTS SULTHAN BATHERY RENAMED

The BJP president of Kerala, K Surendran said the renaming of Sulthan Bathery in Kerala's Wayanad district is "inevitable". He said, "Sulthan Bathery should be renamed as Ganapathyvattam. This is not the land of Tipu Sultan who massacred Hindus and Christians. Congress and CPM want the place to be known after a criminal (Tipu).

One of the three municipal towns in Wayanad, along with Mananthavady and Kalpetta, is Sulthan Bathery. It is home to a stone temple that was formerly known as Ganapathyvattam.

The temple was established by Jains who came to Wayanad from regions in what is now Tamil Nadu and Karnataka in the 13th century. It is designed in the dominant Vijayanagara architectural style.

The temple was partly destroyed during the invasions of Tipu Sultan, the ruler of Mysuru in the second half of the 18th century.

It remained abandoned for nearly 150 years. Later, it was taken over by the Archaeological Survey of India, which declared it as a monument of national importance.

Tipu Sultan was born Sultan Fateh Ali Sahab Tipu on November 10, 1750 in Devanahalli, present-day Bangalore. He was born to Hyder Ali, who rose through the ranks of the army of the Wodeyars, the then Hindu rulers of Mysore. Hyder Ali ceased power in 1761 with Tipu succeeding his father in 1782.

While fighting the British in 1767, Tipu first came in contact with European culture and lifestyle, something that would fascinate him. This fascination would be reflected in his rule of Mysore: Tipu undertook various policies and reforms which would modernise the princely state and go on to become a lasting aspect of his legacy.



Hyder Ali died in 1782, during a period of conquest and expansion of his realm. Thus, Tipu inherited the throne under trying circumstances, with his primary motivation being to consolidate the territory he had inherited from his father.

Over the past 20 years, the kingdom of Mysore had slowly expanded by capturing disputed areas at its borders. Tipu inherited rebellious provinces in Malabar, Kodagu, and Bednur, all of which were crucial to Mysore's strategic and economic interests. His rule in these areas is what is often cited as proof of his bigotry and authoritarianism.

The Mysuru ruler's military used Ganapathyvattam as a battery for their ammunition and the town became known as 'Sultan's Battery' in British records.

Tipu Sultan died defending his fortress of Srirangapatna against British forces in the Fourth Anglo Mysore War in 1799. His forces were heavily outnumbered and his French allies had not been able to come to his aid.



DreamIAS

**BUSINESS & ECONOMICS****TRADERS RUE UNDERPRICED ONION EXPORTS TO THE UAE**

Amid an extended ban on onion exports, farmers and traders are miffed that some shipments allowed by the government to markets such as the UAE have been sold at a pittance, even as global prices have soared, yielding windfall profits for selected importers.

An Indian farmer is being paid just ₹12 to ₹15 for a kg of onions procured for export, which are then being sold in UAE stores for more than ₹120 a kg, exporters alleged.

Fearing a domestic shortage of the politically sensitive crop, the government had imposed a ban on its export in December, extending it indefinitely “till further orders” last month. However, it had kept the window open for exports to countries in response to requests received through diplomatic channels.

On March 1, the Centre permitted the export of 14,400 tonnes of onions to the UAE, with a quarterly cap of 3,600 tonnes. While over 3,000 tonnes of such exports were cleared last month, the Commerce Ministry last week okayed an additional 10,000 tonnes for the UAE, “over and above” the quarterly quota.

Rate mismatch

Usually, global onion prices hover in the \$300-400 a tonne range. In recent months, however, rates have soared in major markets such as the UAE to as high as \$1,500 a tonne, exacerbated by the export bans imposed by India, Pakistan, and Egypt.

India’s recent shipments to the country, however, have been sent at around \$500 to \$550 a tonne, exporters have learnt.

“UAE importers have already got windfall gains of over ₹300 crore through such shipments, and if this situation continues, another ₹1,000 crore is likely with the additional 10,000-tonne quota opened up now, apart from the gains likely on the additional 3,600 tonnes of export quota available for that country till June,” a leading exporter of horticulture produce told The Hindu.

These exports are being channelled exclusively through the National Cooperative Exports Limited, a government-owned body under the Ministry of Cooperation. Exporters were told that exports were being done on a government-to-government basis, with the importing country allocating quotas to nominated importers. Procurements for such exports are being done through an e-tendering process on the Agribazaar portal.

On the UAE side, the importers identified to receive these shipments are learnt to be private traders and supermarket chains, not government agencies dealing with food security concerns. As is typical for trade deals, local onion suppliers are required to bid for the lowest possible price they can offer; buyers were also expected to be picked on the highest price offered, but exporters say that is not the case here.

The Horticulture Produce Exporters’ Association has been seeking clarity on the process for permitting exports and setting the price for shipments. In an email to NCEL on March 25, it flagged concerns that the prices at which onions are being sold abroad are lower than international prices, which were about \$1,450 a tonne at the time. The mail, which was also marked to the Commerce



and Consumer Affairs Ministries, noted that buyers were not government bodies but government-nominated firms.

Queries sent by The Hindu over the past week to the Ministries of Commerce, Consumer Affairs, and Cooperation on the modalities for determining the export price, and identifying the exporters and importers under this window, went unanswered. An Agriculture Ministry source said it was only concerned with providing crop estimates.

WHAT IS CDP-SURAKSHA, GOVT'S NEW DIGITAL PLATFORM TO DISBURSE SUBSIDIES TO HORTICULTURE FARMERS?

The BJP-led government has come up with a new platform to disburse subsidies to horticulture farmers under the Cluster Development Programme (CDP) — the Centre's initiative to promote horticulture crops. The platform is known as CDP-SURAKSHA.

The move seeks to push the growth of India's horticulture sector, which contributes nearly one-third to the agriculture gross value addition (GVA), making a substantial contribution to the Indian economy. The total production of horticulture crops has also spiked in recent years. While in 2010-11, it stood at 240.53 million tonnes, the number rose to 334.60 million tonnes in 2020-21.

Here is a look at the CDP-SURAKSHA and how it works.

What is the CDP-SURAKSHA?

The CDP-SURAKSHA is essentially a digital platform. SURAKSHA stands for "System for Unified Resource Allocation, Knowledge, and Secure Horticulture Assistance." The platform will allow an instant disbursal of subsidies to farmers in their bank account by utilising the e-RUPI voucher (more on this later) from the National Payments Corporation of India (NPCI).

The CDP-SURAKSHA has features such as database integration with PM-KISAN, cloud-based server space from NIC, UIDAI validation, eRUPI integration, local government directory (LGD), content management system, geotagging, and geo-fencing.

How does the CDP-SURAKSHA work?

The platform allows access to farmers, vendors, implementing agencies (IA), and cluster development agencies (CDAs), and officials of the National Horticulture Board (NHB).

A farmer can login using their mobile number and place an order for planting material such as seeds, seedlings, and plants based on their requirement.

Once the demand has been raised by the farmer, the system will ask them to contribute their share of the cost of planting material. The subsidy amount paid by the government will appear on the screen automatically.

After the farmer pays their contribution, an e-RUPI voucher will be generated. This voucher will then be received by a vendor, who will provide the required planting material to the farmer.

Once the ordered planting material is delivered to the farmer, they have to verify the delivery through geo-tagged photos and videos of their field. It is only after the verification that the IA will release the money to the vendor for the e-RUPI voucher. The vendor will be required to upload an invoice of the payment on the portal.



The IA will collect all the documents and share them with the CDA for subsidy release, then only the subsidy will be released to the IA.

However, the farmer, who raised the demand for the plant material using the platform, can avail of the subsidy at the first stage only.

What is e-RUPI?

The CDP-SURAKSHA platform uses e-RUPI vouchers from the NPCI. The voucher is a one-time payment mechanism that can be redeemed without a card, digital payments app or internet banking access, at the merchants accepting e-RUPI. According to the NPCI, the e-RUPI can be shared with the beneficiaries for a specific purpose or activity by organisations or government via SMS or QR code.

How is the new system different from the old one?

In the old system, a farmer had to buy planting materials on their own. They would then have to approach the officials concerned for the release of the subsidy.

The CDP-SURAKSHA platform, however, will provide subsidies to farmers upfront, at the time of purchasing the planting material. Vendors, who will supply planting materials to farmers, will receive their payment only after farmers verify the delivery of their orders.

How many farmers and banks have come on board?

While the platform is yet to be unveiled at the national level, around 8,400 farmers' details have been uploaded on the CDP-SURAKSHA platform so far. These included 8,000 farmers of Sahyadri Farms Private Ltd, which is implementing the grape cluster in Nasik, Maharashtra. The rest of the 400 farmers are from Meghalaya Basin Management Agency (MBMA), which is implementing the turmeric cluster in Meghalaya.

Besides this, four banks — HDFC Bank, ICICI Bank, State Bank of India (SBI) and Bank of Baroda — have been onboarded on the platform. These banks will generate e-RUPI vouchers for fund disbursement.

What is the Cluster Development Program (CDP)?

The CDP is a component of the central sector scheme of NHB. It is aimed at leveraging “the geographical specialisation of horticulture clusters and promoting integrated and market-led development of pre-production, production, post-harvest, logistics, branding, and marketing activities.”

So far, 55 horticulture clusters have been identified, out of which 12 have been selected for the pilot. These clusters are in different stages of development. Four more clusters — a floriculture cluster in West Bengal, coconut clusters in Kerala and Tamil Nadu, and white onion clusters in Gujarat — are also in the pipeline. Each cluster will have an implementing agency and a cluster development agency (CDA).

According to the government, about 9 lakh hectares of area will be covered through all 55 clusters, covering 10 lakh farmers. It is estimated that the initiative will attract private investment of Rs 8,250 crore, in addition to the government's assistance, which is fixed according to the size of the



cluster — up to Rs 25 crore for mini cluster (size up to 5,000 ha), up to Rs 50 crore for medium clusters (5,000 to 15,000), and up to Rs 100 crore for mega clusters (more than 15,000 ha).

RISKY PREMISE

The Asian Development Bank (ADB) on Thursday raised its forecast for India's GDP growth in the current fiscal year ending on March 31, 2025, to 7%, from 6.7% earlier, citing robust public and private investment as well as expectations of a gradual improvement in consumer demand as the rural economy recovers. The regional multilateral lender also projected that India's economy would expand by 7.2% in fiscal 2025-26. The ADB's latest growth forecast for India's GDP is, however, still slower than the 7.6% pace that India's National Statistical Office has estimated for the 12 months that ended on March 31. Last year's expansion too was driven by strong investment while consumption remained muted. The ADB, however, cautioned that its forecast could be proven wrong by global risks including a sharp rise in oil prices or prolonged high interest rates in the West to tackle inflation. It estimated that India would likely be the economy most affected in Asia by the high interest rates due to the greater sensitivity of the rupee to western interest rates. It also noted that while the Centre's capital expenditure spending had been strong and was projected to grow with rising budgetary allocation, project completions in the private sector had failed to match rising project announcements. Most conspicuously missing from the ADB's report, however, was the absence of any comment on the controversies surrounding the integrity of India's national income data or concerns raised about the heavy influence of government tax receipts on final GDP.

The lender also failed to make any mention of the absence of significant structural reforms in India, particularly since the COVID-19 pandemic. One of the reasons the strong growth numbers reported by the government have been questioned is that they have come at a time when economic reforms have taken a back seat. The ADB's assumption of a likely rebound in consumer spending to support its 2024-25 growth projection is also at risk of being undermined. Global country risk research firm BMI recently flagged the risk to consumption spending from stretched household savings which are near all-time lows. In any case, the Centre would do well to listen to the ADB's suggestion to create large-scale special economic zones with an easier policy environment to boost exports. Given the challenges flagged by the lender to global merchandise trade, including the extremely volatile situation in West Asia and the disruptions to the normal east-west shipping route through the Red Sea, India must heed the ADB's recommendations to integrate better with global supply chains and improve its logistics infrastructure post haste.

EXPRESS VIEW ON US FED: HOLDING BACK

In its March meeting, the US Federal Reserve had decided to hold rates steady. The minutes of that meeting released now show that policymakers had expressed concerns over the trajectory of inflation, noting that "recent data had not increased their confidence that inflation was moving sustainably down to 2 per cent". The inflation data released by the US Labour Department on Wednesday seems to confirm those fears. CPI inflation rose to 3.5 per cent in March, up from 3.2 per cent in February, surpassing expectations. The increase was driven by fuel, housing, and clothing, among others. Core inflation, which excludes food and fuel, remained at 3.8 per cent. As RBI Governor Shaktikanta Das had noted in his comments on the global economy at the last monetary policy committee meeting, "Inflation is moving closer to targets, but the last mile of disinflation is turning out to be challenging."



Until now, there were expectations that the Fed would cut interest rates three times this year, with the first cut likely to be in June. However, recent macroeconomic data seem to suggest that this may not be the case — the rate cuts may not come as soon or in the magnitude that many had previously expected. Data shows that non-farm payrolls rose by 3.03 lakh in March. Alongside, average hourly earnings were up by 4.1 per cent, and the jobless rate fell to 3.8 per cent. A stronger-than-expected economy, and continued uncertainty over the trajectory of inflation, with higher-than-expected readings, could possibly delay the much anticipated Fed pivot. Even though inflation has fallen from the high of 9.1 per cent in June 2022, the absence of clear and convincing evidence of it falling sustainably back to the target, only raises the odds of the Fed having to keep interest rates higher for longer. As per reports, the markets are now pricing in two rate cuts this year, beginning in September. Some are less optimistic. The minutes of the FOMC meeting did, however, reveal that “all participants” thought that it would be “appropriate” to shift to a “less restrictive stance” this year, if economic conditions were in line with expectations.

More clarity on the possible trajectory of interest rates will perhaps emerge during the next Fed meeting, between April 30 and May 1. But for central banks in countries around the world looking to the US Fed for policy clues, the situation has become more complicated.

WAYWARD ELEPHANT

The RBI’s Monetary Policy Committee (MPC) has opted to keep the benchmark policy repo rate unchanged at 6.5% for a seventh consecutive meeting citing food price pressures that are impeding its efforts to slow inflation to the 4% target on a durable basis. Explaining the rate decision and the MPC’s resolve to keep the policy stance focused on the withdrawal of accommodation, RBI Governor Shaktikanta Das remarked that the ‘elephant in the room – inflation’, which had hit a peak of 7.8% in April 2022, ‘appeared to be returning to the forest after having gone out for a walk’. “We would like the elephant to return to the forest and remain there on a durable basis,” he said, emphasising that in the best interest of the economy, it was essential to ensure that retail inflation continued to moderate and aligned to the target on a durable basis. The monetary authority’s repeated emphasis on ‘a durable basis’ underlines its concern that headline inflation and food price inflation in particular have remained stubbornly unpredictable, with the headline Consumer Price Index-based reading stuck above the RBI’s 4% target for 53 months through February 2024. Nor are the MPC’s projections for price stability in the new fiscal year significantly reassuring in terms of the target: CPI inflation is expected to slow slightly to an average of 4.9% in the current quarter, then decelerate markedly and dip below target to 3.9% in Q2, before quickening again to 4.6% and 4.5% in Q3 and Q4, respectively.

The MPC is, however, more confident about the outlook for economic growth in the 12 months through March 2025, with the GDP expected to expand by 7% on average this year. For this it cites a multiplicity of factors: from expectations of a normal south-west monsoon, that it posits will boost agricultural activity and rural demand, to sustained momentum in the manufacturing and services sectors. It also points to the RBI’s March round of the consumer confidence survey, which indicates that urban households are less pessimistic about the current situation and anticipate improvements in one year’s time on all five key parameters surveyed. Monetary policymakers assert that improving incomes and a rise in readiness to spend on non-essentials augur well for a strengthening in private consumption, which has been struggling for momentum in recent quarters. It is the expectation of strong growth that gives the RBI the policy space to focus on targeting inflation, Mr. Das said. Only too aware that sticky inflation has not only dampened discretionary spending so far but also led to a sharp surge in personal loans for meeting essential



expenditure, the RBI chief's determination to send the elephant back to the forest or risk seeing growth lose momentum again is well justified. Price stability can and must be non-negotiable.

HOUSEHOLDS' DEBT SURGED TO NEW HIGH BY DEC. 2023

In what may be construed as a sign of rising financial distress, India's household debt levels are reckoned to have touched an all-time high of 40% of Gross Domestic Product (GDP) by December 2023, while net financial savings had likely dropped to their lowest level at around 5% of GDP, as per a research report from leading financial services firm Motilal Oswal.

In September 2023, the Reserve Bank of India (RBI) estimated that households' net financial savings had dropped to 5.1% of GDP in 2022-23, a 47-year low, triggering a flurry of criticism that the Finance Ministry had refuted sharply. It had argued that households are adding fewer financial assets than in the past because they were taking loans to buy real assets such as homes and vehicles which is "not a sign of distress but of confidence in their future employment and income prospects".

The first revised estimates of national income for 2022-23 published this February, raised the estimated net financial savings in households to 5.3% of GDP, which is still the lowest in 47 years, and weaker than the average of 7.6% of GDP recorded between 2011-12 and 2019-20.

The revised estimates also scaled up household debt levels to 38% of GDP in 2022-23, second only to the 39.1% of GDP recorded in 2020-21.

"Our estimates suggest that household debt has risen to approximately 40% of GDP as of December 2023, reaching a new high. Based on banks' data, it is clear that unsecured personal loans continue to grow at the fastest pace within household debt, followed by secured debt, agricultural loans, and business loans," Motilal Oswal research analysts Nikhil Gupta and Tanisha Ladha said.

The report ascribed the dismal 2022-23 net financial savings numbers to weak income growth, robust consumption and growth in physical savings.

WHAT IS THE OUTLOOK ON WOMEN'S EMPLOYMENT?

The story so far:

The authors of the India Employment Report, 2024, released recently by the Institute for Human Development and the International Labour Organization, point out that key labour market indicators have improved in recent years. The Labour Force Participation Rate (LFPR), the Workforce Participation Rate (WPR) and the Unemployment Rate (UR) showed long-term deterioration between 2000 and 2019 but improved thereafter, the authors note, saying that the improvement coincides with periods of economic distress, both before and during the COVID-19 pandemic, with the exception of two peak pandemic quarters.

What about women's participation?

The female LFPR is very low compared to the male counterparts; in 2023, the male LFPR was pegged at 78.5; and the women LFPR was 37. The world women LFPR rate is 49, according to the World Bank figures. The female LFPR had been steadily declining since 2000 and touched 24.5 in



2019, before inching up, particularly in rural areas. But the writers point out that notwithstanding the modest improvements, employment conditions remain poor.

Amit Basole, who teaches Economics at Azim Premji University, and heads the Centre for Sustainable Employment, explains that the increase in labour force participation has come mostly in rural areas and mostly in self-employment, which means largely unpaid work. “This suggests that it is distress resulting from the economic slowdown prior to COVID and then the pandemic itself that has contributed to women entering the labour force,” he says.

Prof. Basole adds that there are some other hypotheses out there, such as improvements in measuring women’s work in the Periodic Labour Force Survey and increased non-farm employment for men that has led to women substituting for men in agriculture. “But this is less likely. However, definitive evidence on the cause(s) is lacking,” he notes.

Where are women employed?

The India Employment Report shows that it is women who largely account for the increase in self-employment and unpaid family work. Nearly two-thirds of the incremental employment after 2019 comprised self-employed workers, among whom unpaid (women) family workers predominate. The share of regular work, which steadily increased after 2000, started declining after 2018.

The rate of youth not in employment, education or training globally has been consistently the highest in South Asia, at an average of 29.2% between 2010 and 2019 (ILO 2022a). India also has a large share of youth not in employment, education or training, and the rate is higher among young women than men.

What are some of the reasons for low women’s participation in the labour force?

Economists and women’s rights experts point at various barriers women face in terms of a careers or a job. They list factors from a lack of jobs, women being made responsible for all care-giving duties at home plus cooking and cleaning to low wages, patriarchal mindsets and safety issues. In her 2022 book, *The Making of a Catastrophe: The Disastrous Economic Fallout of the COVID-19 Pandemic in India*, Jayati Ghosh, observing the sharp decline in women’s labour participation between 2004 and 2018, writes that only some part of the phenomenon of women moving out of the labour market could be explained by greater involvement in education, especially for the age cohort 15 to 19. But with participation rates falling for women across all ages, “clearly, there was a process in operation, which has also been noted globally, of women being squeezed out of employment because of overall scarcity of paid work.”

Prof. Basole feels there are both supply and demand side reasons for the decline in women’s LFPR. On the labour demand side, in general, India’s growth pattern has not been job intensive. This combined with social norms that restrict women’s mobility and make them primary caregivers at home, means that women are not free to take up available opportunities. In addition, concerns over public safety and lack of transport also confine women to looking for work close to home, further limiting their options, a point Prof. Ghosh too makes.

The 2023 Economics Nobel Laureate Claudia Goldin’s research showed that several factors have influenced the supply of and demand for female labour. “These include women’s opportunities for combining paid work and a family, decisions relating to education and childrearing, technical innovations, laws and norms, and the structural transformation of the economy.” In a paper about



her research, the Royal Swedish Academy of Sciences, pointed out that at the heart of Golden's analysis is the fact that women's choices have often been, and remain, limited by marriage and responsibility for the home and family. Her research may have been conducted in the U.S., going back 200 years, but her insights hold true in many other countries, including India as well.

What needs to change?

Economists say interventions are needed on both the demand and supply side of the labour market. On the demand side, says Prof. Basole, policies that promote labour intensive sectors (in both manufacturing and relatively higher productivity services) are needed. Public investment in safety and transport is also critical as is public investment in affordable child and elderly care. "All of these types of support can enable women to work outside the home and take advantage of relatively better paying opportunities," he adds.

THE 'IMPORT RESTRICTIONS' ON SOLAR PV CELLS

The story so far:

Recent government orders on attempts to increase local sourcing of solar modules to support India's renewables manufacturing ecosystem has been widely reported in the media as 'import restrictions'. This follows the Ministry of New and Renewable Energy's (MNRE), March 29 order to re-implement its 2021 notification of an 'Approved List of Models and Manufacturers of Solar Photovoltaic [PV] Modules', also called the ALMM list.

What is the ALMM list? Why is it being re-implemented?

This list consists of manufacturers who "are eligible for use in Government Projects/Government assisted projects/ projects under Government schemes & programmes.... including projects set up for sale of electricity to the Central and State Governments." However, this notification was "kept in abeyance" two years after it was issued, for the past financial year. While the government did not give an explicit reason for this, it has been reported that it stems from concerns and demands of renewable power producers who had secured sale contracts with the government before these rules were issued, when solar modules and cells were overwhelmingly imported from China at highly competitive rates. India's domestic renewables sector, at the time, was unlikely to meet the spike in demand for solar power production equipment at rates offered by Chinese manufacturers.

The government's re-introduction of this rule has been premised on the estimation that following measures, such as the Production Linked Incentive (PLI) scheme, India's domestic sector has boosted its production capacities and bettered price competitiveness to meet local demand. This is an import substitution effort, and not an attempt to restrict imports.

Does India rely on solar PV imports?

India is overwhelmingly import dependent to meet its demand for solar cells and modules — with China and Vietnam being the country's major suppliers. According to a reply by the Minister for New and Renewable Energy in Parliament in February last year, India imported about \$11.17 billion worth solar cells and modules in the past five years. This is worth 0.4% of India's total exports in the same period. And until January of 2023-24, data from the Ministry of Commerce's Import-Export showed that China accounted for 53% of India's solar cell imports, and 63% of solar PV modules. Ratings agency ICRA estimates that China commands more than 80% share of



the manufacturing capacity across polysilicon, wafer, cell and modules. “In comparison, the manufacturing capacity in India is relatively low and is largely restricted to the last manufacturing stage,” ICRA stated in its November 2023 report, adding that the PLI scheme is expected to change this, with integrated module units expected to come up in India over the next 2-3 years.

How have our policies responded?

To address this over dependence, India made three significant efforts over the past five years. It began with the notification of the ALMM order in January 2019. But the issue attained centre stage in the wake of severe global supply chain disruptions during the COVID-19 pandemic. Finance Minister Nirmala Sitharaman proposed the ₹19,500 crore PLI scheme in the Union Budget of 2022-23. This was to scale domestic manufacturing of the entire solar supply chain — from polysilicon to solar modules. The government also introduced a steep 40% customs duty on PV modules and 25% on PV cells. These duties were halved as solar capacity additions slowed and as Reuters had reported, developers had quoted “aggressively low tariffs” to win power purchase contracts based on imports of Chinese equipment that put cost pressure on about 30 GW capacity worth projects.

Why is China a leading exporter?

In a July 2022 report, the International Energy Agency (IEA) noted that China was the most cost-competitive location to manufacture all components of the solar PV supply chains. This is mainly because of the lower cost of power supplied to the industry, the agency observed, as electricity accounts for more than 40% of production costs for polysilicon and almost 20% for ingots and wafers. The IEA also observed that ‘Chinese government policies prioritised solar PV as a strategic sector, and growing domestic demand enabled economies of scale and supported continuous innovation throughout the supply chain.’”

What is the scope for solar in India?

The government’s ambitious target of 500 GW of installed capacity from non-fossil fuels by 2030 is the main driver to scale solar power in India. India also accounts for the fastest rate of growth for demand of electricity through 2026 among major economies, according to the IEA. This is because of strong economic activity and expanding consumption of products to mitigate extreme weather. Solar power accounted for about one-third of all energy generated from renewables between April last year and February this year. “The country has an estimated solar power potential of 748.99 GW. Hence, the potential of solar energy is not fully tapped, so far. The government is making efforts to harness the available potential through various schemes & programs,” MNRE Minister R.K. Singh said in Parliament last year.

WHAT IS THE TECHNOLOGY BEHIND MANUFACTURING A SEMICONDUCTOR CHIP?

The story so far:

Semiconductor chip manufacturing capabilities are currently limited to very few regions in the world. With supply chain disruptions during the pandemic and recent geopolitical tensions, many companies and countries, including India, have realised the importance of investing in chip manufacturing infrastructure. The TATA group has partnered with Taiwan’s Powerchip Semiconductor Manufacturing Corporation (PSMC) to set-up a 300mm wafer fabrication plant in Gujarat. It will roll out its first 28nm chip in 2026. Two assembly and test plants in Gujarat and Assam have also been recently approved by the Government of India.

3RD FLOOR AND 4TH FLOOR SHATABDI TOWER, SAKCHI, JAMSHEDPUR



What is a semiconductor chip? How is it manufactured?

A semiconductor has properties between a conductor (which conducts electricity) and an insulator (which does not). In its purest form a semiconductor is a very weak conductor of electricity. However, its electrical properties can be changed by adding small amounts of certain substances called 'dopants'. By taking a pure semiconductor and carefully injecting certain parts with specific dopants, complex circuits can be 'printed' on the semiconductor.

The process is crudely analogous to creating an intricate work of art on a paper or a wall, by using a bunch of stencils and spray paints of different colours. The stencils are called 'masks' in the industry and the paint is analogous to the dopant.

What is a transistor?

The transistor, one of the earliest electronic components to be built using a semiconductor, is an extremely versatile device. In its most popular form it can function as an electronic switch. A typical semiconductor chip can have millions/billions of these interconnected switches that work together to perform various logical and computational operations.

A transistor can also function as an amplifier (to amplify the weak signal received by your cell phone) and is an integral part of circuits that generate and process high frequency signals (such as those required in wireless communication technologies). Today all these different avatars of the transistor are routinely packed into a single semiconductor chip (such as the WiFi chip in your mobile).

The transistor demonstrated how a single device could be built out of a piece of a semiconductor. 'Printing' multiple devices onto a single piece of a semiconductor to create entire circuits was the next leap. Both these breakthroughs laid the foundation for the semiconductor revolution and have been aptly recognised by Nobel Prizes (in 1956 and 2000).

What is fabrication technology?

Technology has progressed at a relentless pace since the semiconductor chip was first conceptualised more than six decades ago. Newer manufacturing technologies have been introduced at a regular cadence. The level of miniaturisation of the semiconductor has increased by orders of magnitude. Sticking with the stencil analogy this is mainly due to the stencils being able to etch smaller and more intricate patterns. There have been equally impressive gains in the switching capability of the transistors. They are able to switch on-and-off faster (more computations per second) and with lesser power consumption (longer battery life and lesser heat dissipation).

The industry has used labels like '45nm', '28nm' and '16nm' to introduce each new manufacturing technology. 'nm' is short for nano-meter and refers to an extremely small unit of length equal to one billionth of a meter. These numbers convey the level of miniaturisation that is achievable using a particular technology (so smaller is better). Though not always accurate, you can think of this number as representing the dimensions of single transistor. While traditionally electronic circuits have been laid out flat on the semiconductor, researchers are increasingly looking to capitalise on the third dimension (height). As the length and breadth of a transistor switch decreases, increasing its height can help ensure reliable performance. Stacking entire circuits on top of one another is another way to continue to shrink semiconductor chip sizes.



What is known as a wafer?

A semiconductor chip is manufactured much like a postage stamp. A sheet of stamps is printed on a piece of paper and then each individual stamp is cut out. Similarly, an array (typically 300-400) of chips are printed on a circular piece of semiconductor (called a wafer in industry parlance). This is then diced to create individual chips. A larger wafer size allows more chips to be printed on a single wafer which makes chip production faster and cheaper. Wafer sizes used in the industry have constantly been increasing. The current state of art is 300mm which is approximately 12 inches (this refers to the diameter of the wafer). Efforts are ongoing to move to a 450mm wafer size. While moving to a larger wafer size has its technical challenges and capital expenses, it has proven to be economical in the long run.

Once the wafer has been diced into chips, each individual chip has to be packaged in a protective covering. Tiny wires have to be routed from the device to the boundary of the package. Some of these wires supply power, while other are used for feeding in and reading out signals and data. A chip also has to be tested — this includes verifying its functionality and stress testing (subjecting the chip to high temperature and voltages) — to ensure reliability during its lifetime. All this is performed in an assembly and test plant.

What does India's semiconductor ecosystem look like?

India has had a thriving chip design industry since the 1990s. Due to the magic of computer aided design it is possible to design a semiconductor chip entirely in software. The process of specifying the functionality of a chip, translating this functionality to electronic circuits, validating the circuits, optimising for speed, power consumption and size, can be done by a team of skilled engineers sitting at their desktops. The final design is abstracted into a file and sent to a fabrication plant for manufacturing. It's a bit like designing an entire graphic novel on your laptop and then sending the pdf to your publisher for printing.

India's foray into semiconductor manufacturing will benefit from the existing ecosystem for chip design which was fuelled by a steady supply of electronics and computer engineers. Semiconductor manufacturing being an essentially inter-disciplinary endeavour, could present opportunities to a wider array of professionals such as process and control engineers, data scientists, material scientists, physicists and chemical engineers to contribute meaningfully to this industry.

WHY ARE VISTARA FLIGHTS BEING CANCELLED?

The story so far:

Vistara recently saw a large number of flight cancellations and delays which is being attributed to a mismatch between continuous route expansion and the strength of pilots at the airline. But coinciding with the announcement of a new pay structure ahead of the merger with Air India and deep discontentment among pilots over it, the disruption has unravelled a challenging consolidation of the four Tata Group airlines.

How bad was the massive flight disruption at Vistara?

Between March 31 and April 3, Vistara saw over 150 flights cancelled and 200 delayed for over two hours resulting in a massive disruption at the airline, primarily due to challenges with "crew unavailability" due to multiple factors. This was a sharp escalation from the "15-20" daily



cancellations that started in mid-February, soon after the airline announced that a pay structure implemented for pilots at Air India would also be extended to Vistara. This had led to widespread anger among junior pilots (First Officers) as the new salary formula cuts the minimum guaranteed flying allowance of 70 hours to 40 hours and would result in a pay cut of ₹80,000 to ₹1.4 lakh for them out of a salary of ₹3.4 lakh. There are also concerns among senior pilots over their seniority in the merged entity over a combined seniority list being prepared that isn't fully being implemented.

As things spiralled out of control, the airline announced in a press statement that it had decided to “temporarily reduce the number of flights” as well as deploy the bigger Boeing 787-9 Dreamliner and A321neo to accommodate more number of passengers. The DGCA too sought a daily report on flight cancellations and delays and instructed the airline to ensure affected passengers receive refunds and compensation as per regulations. The airline’s CEO, Vinod Kannan, has said that voluntary cancellations will continue till the end of April and industry sources say the airline has cancelled nearly 1,000 flights between March 31 to April 30 to streamline flight operations.



DreamIAS

**LIFE & SCIENCE****WHAT A NEW 3-D MAP OF UNIVERSE HINTS ABOUT THE NATURE OF DARK ENERGY**

That the universe is expanding has been known for close to a century, thanks to the observations by the American astronomer Edwin Hubble in 1929. More recently, in the late 1990s, scientists found that this expansion was happening at an accelerated rate — that is, not only was the universe expanding, it was expanding at an increasingly faster pace.

This discovery, honoured with the Nobel Prize in Physics (for Saul Perlmutter, Brian P Schmidt, and Adam G Riess) in 2011, forced scientists to hypothesise ‘dark’ energy. The reasoning was this: If the rate of expansion did not increase, it could be explained as a continuing after-effect of the expansion caused by the Big Bang. That would keep open the possibility of gravity prevailing at some point to either pull things back or to keep the universe in a stable state. But the accelerated rate of expansion meant some other ingredient — an invisible energy — was at work too. Since scientists did not have any clue about what this could be, they called it “dark energy”.

Since then, scientists have not got any closer to shedding new light on the hypothesis — even though dark energy must be accounting for nearly 70% of the universe if its observed behaviour is to be explained. The results from an ongoing experiment involving more than 900 researchers around the world have now offered the first glimmer of hope.

The DESI experiment

The results, announced on April 4, have come from observations of the Dark Energy Spectroscopic Instrument (DESI), a unique piece of equipment with 5,000 robotic ‘eyes’, each one of which can separately capture and process light coming from a galaxy. This gives DESI, mounted on the Nicholas W Mayall 4-meter Telescope at the Kitt Peak National Observatory in Arizona, US, the capability to observe 5,000 galaxies at the same time.

DESI has been operating for three years, and is scheduled to continue for at least another two years. Data from the first year of DESI observations — during which light from 6 million galaxies, some of which existed as far back as 11 billion years ago, was captured — have now been used to create the most comprehensive three-dimensional evolutionary map of the universe till date.

“We say it is a three-dimensional map because we have been able to measure the distances between these galaxies to a very high level of precision. Some of these galaxies existed billions of years ago at great distances from us. Lights originating from those galaxies are reaching us only now. These 6 million galaxies together produce a very good evolutionary picture of the universe,” Shadab Alam of Tata Institute of Fundamental Research (TIFR), Mumbai, who is part of the DESI collaboration, said.

The precise distances to these galaxies that scientists have been able to calculate has resulted in the mapping of the distribution and movement of these galaxies over time, by comparing the data with similar data for some of the galaxies obtained through other experiments.

This has, in turn, allowed scientists to work out the expansion rate of the universe through different times in history. Using the first year’s observational data, the DESI collaboration has calculated that the speed of expansion of the universe is increasing at the rate of 68.5 km per second after every 3.26 million light years of expansion.



More interestingly, through these precise measurements, the scientists have found that some of the calculated values are not consistent with current well-established theoretical models, which otherwise describe the universe very well.

Dark energy intensity

These theoretical models suggest that the energy density of dark energy, or the amount of dark energy contained in any volume of space, remains constant even under expansion. So, while the space itself expands, the energy density in the expanded space does not go down. In these theoretical models, a change in energy density would make the universe unstable.

The results of DESI, however, suggest that there are changes in energy density. “In fact, the whole purpose of the DESI collaboration is to look for possible changes in the energy density of dark energy,” Alam said.

“In the first year’s data, there is just this slight hint that energy density may not be constant. Energy density of dark energy is seen to increase as well as decrease. But we are being extremely cautious as of now. The confidence level is around two and a half sigma, translates to about 95% confidence — not enough for a scientific discovery of this magnitude and implication. We need to have a six sigma confidence level, a near certainty, for something like this,” he said.

But the initial hints have excited the scientific community. If change in energy density is confirmed, it could lead to a complete unravelling of our current understanding of the universe. It would be the first glimpse into the nature of dark energy, and could lead to entirely new physics.

“Right now, we know nothing about the nature of dark energy. Some scientists have speculated that it might be a new invisible field, like an electric, or a magnetic, or a gravitational field. There is also speculation about dark energy being a new particle. All these people must be looking at the data from DESI very keenly,” Alam said.

The DESI collaboration has announced that it will begin analysing data from subsequent years of observations almost immediately.

HOW AND WHY US WANTS TO ESTABLISH A TIME STANDARD FOR THE MOON

Last week, the US White House officially directed the National Aeronautics and Space Administration (NASA) to create a time standard for the Moon, which different international bodies and private companies can use to coordinate their activities on the lunar surface.

In a memo, the head of the White House Office of Science and Technology Policy (OSTP) told the space agency to work with other parts of the US government to finalise the strategy by the end of 2026 for establishing what it called a Coordinated Lunar Time (LTC), according to Reuters, which first reported about the project.

Here is a look at why a time standard is needed for the Moon, and how NASA could create it.

But first, how does Earth’s time standard work?

Most of the clocks and time zones — a geographical region which uses the same standard time — of the world are based on Coordinated Universal Time (UTC), which is set by the International Bureau of Weights and Measures in Paris, France. UTC is essentially an internationally agreed upon standard for world time.



It is tracked by a weighted average of more than 400 atomic clocks placed in different parts of the globe. Atomic clocks measure time in terms of the resonant frequencies — the natural frequency of an object where it tends to vibrate at a higher amplitude — of atoms such as cesium-133. In atomic time, a second is defined as the period in which a caesium atom vibrates 9,192,631,770 times. As the vibration rates at which atoms absorb energy are highly stable and ultra-accurate, atomic clocks make for an excellent device for gauging the passage of time.

To obtain their local time, countries need to subtract or add a certain number of hours from UTC depending on how many time zones they are away from 0 degree longitude meridian, also known as the Greenwich meridian. If a country lies on the west of the Greenwich meridian, it has to subtract from the UTC, and if a country is located on the east of the meridian, it has to add.

Why do we need a time standard for the Moon?

UTC, however, cannot be used to determine time on the Moon. That is because time on the Moon flows differently than it does on the Earth.

“A fundamental aspect of nature in the Universe is that time is not absolute. That seems crazy to us on Earth as our experience of time is that it just constantly ticks by. But if you travelled to the Moon, your clock would be ticking slightly faster than if you had stayed on the Earth. This is a consequence of [Albert] Einstein’s Theory of General Relativity which tells us that gravity bends space and time. As there is less gravity on the Moon, time ticks slightly faster there relative to the time on the Earth,” Catherine Heymans, the astronomer royal for Scotland and a professor of astrophysics at the University of Edinburgh, told The Indian Express over email.

In other words, for someone on the Moon, an Earth-based clock will appear to lose on average 58.7 microseconds per Earth day with “additional periodic variations”, according to the OSTP memo.

The discrepancy may seem small but it can create problems for situations such as a spacecraft seeking to dock on the Moon, data transferring at a specific time, communication, and navigation.

Currently, handlers of each lunar mission use their own timescale that is linked to UTC. “Take the example of two spacecraft, NASA’s Lunar Reconnaissance Orbiter (LRO) and ISRO’s Chandrayaan 2 Orbiter, which orbit the Moon in roughly the same kinds of polar orbits that have some overlap. To ensure that they do not collide with each other — the probability of this happening is quite low but it can happen — the mission control teams of the two orbiters talk to each other, and they synchronise their mission operations standard with each other as needed, based on differences in things like how they calculate the orbits and time,” Jatan Mehta, globally published independent space exploration writer and author of Moon Monday newsletter (<https://jatan.space/>), told The Indian Express.

The approach can work for a handful of independent lunar missions, but issues will arise once there are multiple spacecraft working together at the same time — a situation which is bound to become a reality in the near future.

Several countries, including India, are looking to populate the Moon in the following years. While NASA’s Artemis program aims to send astronauts back to the lunar surface no earlier than September 2026, China has announced plans to land its astronauts by 2030, and India intends to arrive by 2040. There are also proposals to build a long-term human outpost on the Moon. Therefore, there is a need for a unified lunar time standard.



How will a lunar time standard be established?

The specifics for creating a time standard for the Moon are not clear yet. An OSTP official, however, told Reuters that like on the Earth, atomic clocks can be deployed on the lunar surface to set a time standard.

According to a 2023 report by the journal Nature, there will be a need to place at least three atomic clocks on the lunar surface that will tick at the Moon's natural pace, and whose output will be combined by an algorithm to generate a more accurate virtual timepiece.

"These clocks have to be placed on the Moon at different locations since the Moon's rotation and even local lumps of mass, called mascons, beneath the crust of the Moon affect the flow of time ever so slightly," according to Mehta. Mascons or mass concentrations are so dense that they alter the Moon's local gravity field. These effects are minor but the output from these clocks can be synthesised to give the Moon its own independent time, which can be tied back to UTC for seamless operations from Earth as well.

Even on Earth, atomic clocks have been placed at different locations or rather latitudes. These clocks tick at different rates due to changes in Earth's rotational speed varying from the Equator to the poles, which also affects time. The planet rotates faster at the Equator than it does at the poles as it is wider at the Equator.

HOW PETER HIGGS CHANGED OUR UNDERSTANDING OF THE NATURE OF THE UNIVERSE

Why do some particles have mass? As a young lecturer in Mathematical Physics at the University of Edinburgh, the thought had consumed Peter Higgs. The British physicist's research into the flavour symmetries of particle physics threw up a tantalising possibility — the presence of a particle that accounted for how elementary particles acquire mass. The first paper he wrote on it was promptly rejected — it was thought to have no bearing on particle physics — but Higgs persisted. He resurrected the paper again with additions in 1964. This time, not only did it pass muster, it also concurred with parallel research. The Higgs boson or "the God particle" would revolutionise the discipline of Physics and human understanding of the fundamental nature of the universe. It would also earn Higgs, who died on April 8 at the age of 94, a Nobel Prize in Physics in 2013.

Higgs' discovery validated the Standard Model, the present framework for accessing the building blocks of the universe and paved the way for his work on spontaneous symmetry breaking, the mechanism behind the particle's existence. It continues to influence critical research into areas such as Dark Matter and the unification of forces, the latter first broached by Scottish physicist James Clerk Maxwell in the 1860s.

The Nobel that Higgs shared with Belgian theoretical physicist François Englert would have seemed to be a natural culmination of his pioneering work but before that there was a tease of a wait of nearly five decades for the elusive Higgs boson. In 2012, scientists at CERN in Geneva finally managed a breakthrough, thanks to the powerful Large Hadron Collider, the particle accelerator built at a cost of \$10 billion. Higgs had been specially invited for the occasion. His reaction to it, like most things outside of the lab, was self-effacing: He wiped a tear and told the assembled scientists that he was just grateful that the discovery had come in his lifetime before catching a flight back home.



WHAT MAKES TODAY'S TOTAL SOLAR ECLIPSE SO RARE?

On Monday (April 8), a total solar eclipse will cross North America, passing over Mexico, the United States, and Canada. This type of solar eclipse is a rare event for any particular spot. According to Royal Museums Greenwich, once a place on Earth witnesses a total solar eclipse, it will be about 400 years before that part sees the next one.

A solar eclipse takes place when the Moon moves in the middle of Earth and the Sun. The Moon blocks the light of the Sun, either fully or partially, which casts a huge shadow on some parts of the world.

There are four different types of solar eclipses, including total solar eclipse, annual solar eclipse, partial solar eclipse, and hybrid solar eclipse.

When the Moon blocks the Sun entirely, the areas in the centre of the Moon's shadow at the time witness a total solar eclipse. The sky darkens and people who are in the path of a total solar eclipse can get a glimpse of the Sun's corona — the outer atmosphere — which is usually not visible due to the bright face of the Sun.

Why is a total solar eclipse so rare?

While there can be between two and five solar eclipses every year, total eclipses only happen about once every 18 months or so. As mentioned before, a particular spot on Earth witnesses a total solar eclipse only once in 400 years.

This is because a total eclipse is only visible if one is standing in the umbra — the other part of the shadow is called the penumbra, which is not as dark as the umbra. The umbral shadow is very small, covering only a small part of Earth. In fact, the entire path of the umbral shadow during a solar eclipse will only cover less than one per cent of the globe. This is why only very few people will get to see a total eclipse at a time.

Moreover, about 70 per cent of the globe is underwater and half of the land is considered uninhabited. That's why, it is quite rare when a total solar eclipse happens and a lot of people get to see it.

A SICILIAN VOLCANO IS BLOWING SMOKE RINGS IN THE SKY. WHAT ARE VOLCANIC VORTEX RINGS?

Since last week, Mount Etna, the largest volcano in Europe, and among the world's most active and iconic volcanoes, has been sending up almost perfect rings of smoke into the air. The rings are a rare phenomenon that scientists refer to as volcanic vortex rings, which are produced roughly in the same way as the smoke rings that some cigarette smokers are able to blow out of their mouths.

When does any volcano spout volcanic vortex rings, and what is it about Mount Etna and this phenomenon?

But first, the setting — what and where is Mount Etna?

Mount Etna, sometimes referred to simply as Etna, is an active volcano on the east coast of Sicily, the largest island in the Mediterranean Sea, lying just off the toe of the Italian "boot". Etna's peak



is the highest in Italy south of the Alps, and it is Europe's largest and one of the most active volcanoes.

Etna's summit has five craters, which are responsible for most of the volcano's eruptions; there are also "flank" eruptions that occur out of 300-odd vents of varying sizes along the slopes of the mountain.

Etna is in almost constant activity, and has seen, since the year 1600, at least 60 flank eruptions and many more summit eruptions. In recent years, summit eruptions have occurred in 2006, 2007-08, on two occasions in 2012, in 2018, and 2021; flank eruptions have taken place in 2001, 2002-03, 2004-05, and 2008-09.

Etna has been a World Heritage Site since 2013, and according to UNESCO, the volcano's eruptive history can be traced back 500,000 years. At least 2,700 years of this activity has been documented.

And what are volcanic vortex rings?

Vortex rings are generated when gas, predominantly water vapour, is released rapidly through a vent in the crater. The vent that has opened up in Etna's crater is almost perfectly circular, so the rings that have been seen above the mountain since April 2 are also circular.

A scientific paper published on volcanic vortex rings in February 2023 noted that the phenomenon was first observed at Etna and Vesuvius in Italy in 1724, and has been documented in an engraved plate from 1755.

In more recent times, volcanic vortex rings have been observed at volcanoes such as Redoubt in Alaska, Tungurahua in Ecuador, Pacaya in Guatemala, Eyjafjallajökull and Hekla in Iceland, Stromboli in Italy, Aso and Sakurajima in Japan, Yasur in Vanuatu, Whakaari in New Zealand, and Momotombo in Nicaragua. ('Dynamics of Volcanic Vortex Rings': Scollo et al., Scientific Reports)

Simona Scollo, a volcanologist at the INGV Etna Observatory in Catania, Sicily and a co-author of the 2023 study, told The New York Times that volcanic smoke rings were produced in the same way as dolphins blow bubble rings. "They compress the water in their mouths, and using their tongue they push it out of their mouths and create such a pressure that it forms a ring," Scollo told The NYT.

According to the report, the rings can remain in the air for up to 10 minutes, but tend to disintegrate quickly if conditions are windy and turbulent.

Is Etna well known for this phenomenon?

Yes. In July 2023, volcanologist Boris Behncke reported seeing "dozens of gas rings every day" above Etna. After this month's phenomenon began, Behncke said on Facebook that "no volcano on Earth produces as many vapour rings as Etna".

The rings, Behncke posted on X last year, "are produced by the explosion of gas bubbles within a narrow conduit, which shoots the gas at high speed toward the surface. Attrition along the conduit walls slows the movement of the gas jet, relative to the center of the conduit".

Volcanic vortex rings are "not as rare as is often said", and "Etna is a particularly prolific producer of such rings", Behncke said in a linked post.



About the latest phenomenon, Behncke, who posted a video of Etna on Facebook, said: “...Now Etna is breaking all previous records. In the late afternoon of April 2, 2024, a small mouth opened on the northeastern edge of the Southeast Crater, producing gusts of incandescent gas. The next morning it was obvious that these blows were producing an impressive amount of steam rings, and the business has since been going on, having already issued hundreds if not thousands of these pretty rings.”

Does this mean Etna is about to erupt very soon?

“No, no, no,” Scollo told The NYT when asked if the activity meant Etna is going to erupt in a particularly spectacular way. In fact, the activity from the new vent was slowing down.

“It can stop because the properties of the conduit that allowed for the formation of these volcanic vortex rings can change, maybe with obstructions,” she told The NYT.

DIFFERENT APPROACHES TO AI REGULATION

The Artificial Intelligence (AI) space has seen certain developments crucial to its regulation in recent years — the United Nations’s Resolution on Artificial Intelligence, the AI Act by the European Parliament, laws introduced on AI in the U.K. and China and the launch of the AI mission in India. These efforts to formalise AI regulations at the global level will be critical to various sectors of governance in all other countries.

With the passing of the United Nations Resolution on Artificial Intelligence, the need and associated discourse on the regulation of AI has entered a new phase. A global acknowledgement of the risks associated with AI systems and the urgent need to promote responsible use was at the centre of the adopted resolution. It was recognised that unethical and improper use of AI systems would impede the achievement of the 2030 Sustainable Development Goals (SDGs), weakening the ongoing efforts across all three dimensions — social, environmental, and economic. Another controversial aspect mentioned in the UN resolution has been the plausible adverse impact of AI on the workforce. It would be imperative, especially for developing and least developed countries, to devise a response as the labour market in such countries is increasingly vulnerable to the use of such systems. In addition to its workforce, the impact on small and medium entrepreneurs also needs to be ascertained. Thus, being the first of its kind, the Resolution has shed light on the future implications of AI systems and the urgent need to adopt collaborative action.

The EU’s approach

The EU recently passed the AI Act, the foremost law establishing rules and regulations governing AI systems. With its risk-based approach, the Act categorises systems into four categories, namely unacceptable, high, limited, and minimal risks, prescribing guidelines for each. The Act prescribes an absolute ban on applications that risk citizens’ rights, including manipulation of human behaviour, emotion recognition, mass surveillance etc. While the Act allows exemptions to banned applications when it is pertinent to law enforcement, it limits the deployment by asking for prior judicial/administrative authorisation in such cases.

The landmark legislation highlights two important considerations — acknowledging the compliance burden placed on business enterprises, and start-ups, and regulating the much-deliberated Generative AI systems such as ChatGPT. These two factors warrant the immediate attention of policymakers, given their disruptive potential and the challenges of keeping pace with such evolving systems.



China's stand on AI

Identifying risks is evident in the approach adopted by China, which focuses on prompting AI tools and innovation with safeguards against any future harm to the nation's social and economic goals.

The country released, in phases, a regulatory framework addressing the following three issues — content moderation, which includes identification of content generated through any AI system; personal data protection, with a specific focus on the need to procure users' consent before accessing and processing their data; and algorithmic governance, with a focus on security and ethics while developing and running algorithms over any gathered dataset.

The U.K.'s framework

The U.K., on the other hand, has adopted a principled and context-based approach in its ongoing efforts to regulate AI systems. The approach requires mandatory consultations with regulatory bodies, expanding its technical know-how and expertise in better regulating complex technologies while bridging regulatory gaps, if any. The U.K. has thus, resorted to a decentralised and more soft law approach rather than opting to regulate AI systems through stringent legal rules. This is in striking contrast to the EU approach.

India's position

Amid the global movement towards regulating AI systems, India's response would be crucial, with the nation currently catering to one of the largest consumer bases and labour forces for technology companies. India will be home to over 10,000 deep tech start-ups by 2030. In this direction, a ₹10,300 crore allocation was approved for the India AI mission to further its AI ecosystem through enhanced public-private partnerships and promote the start-up ecosystem. Amongst other initiatives, the allocation would be used to deploy 10,000 Graphic Processing Units, Large Multi-Models (LMMs) and other AI-based research collaboration and efficient and innovative projects.

With its economy expanding, India's response must align with its commitment towards the SDGs while also ensuring that economic growth is maintained. This would require the judicious use of AI systems to offer solutions that could further the innovation while mitigating its risks. A gradual phase-led approach appears more suitable for India's efforts towards a fair and inclusive AI system.

UNDERSTANDING THE SCIENCE BEHIND THE FUNCTIONING OF A MOSQUITO BAT

As the winter months fall behind us and summer heat starts to rise, we have some visitors in our midst: the all-pervading mosquitos. Everywhere and anywhere, we find these creatures hovering all around us. So among all the electronic and chemical technologies humans have ever developed to battle them, perhaps the most impressive is the 'electric tennis bat'. While someone unaware may mistake it as one of the pieces of sports equipment Indians love, this single-player game is a pleasure to play. You chase and hit an airborne mosquito with the bat. If you succeed, you will hear the sweet sound of the blood-sucker's body crackling to death.

Complete the circuit

The bat's working principle is simple. There are three metal meshes. The one at the centre is positively charged and the outer ones are negatively charged. When the layers don't touch each



other, current cannot flow. But when a mosquito connects them, a current passes through and kills the insect.

Essentially the mosquito receives an electric shock, just like we might if we were hit by lightning on a stormy night. The mosquito bat is a portable thunderstorm for the mosquito. The physics of sparks and lightning is the same, whether it's in your gas lighter, in the belly of storm clouds or in the mosquito bat.

So the question arises: why do electric sparks — like a bolt of lightning — look white? If this is the 'colour' of electric current, shouldn't the current flowing through electric wires at home also be white? Yet they aren't.

Batteries and shocks

Electric current is carried by electrons, the negatively charged fundamental particles that usually revolve around positively charged protons in every atom. Every atom has an equal number of protons and electrons, rendering them electrical neutral.

In any piece of metal such as copper, there is a large number of atoms but every atom also shares some electrons with other atoms. The whole material still remains neutral but these common electrons can freely move from one atom to the other, and conduct current easily.

In an insulator, on the other hand, every atom holds onto its electrons and doesn't share. The air we breathe is a wonderful insulator — as are most of us. This barrier can be torn down by applying a high voltage, which will force electrons out of atoms. Suddenly, instead of a neutrally charged air, we have a gas made of positively charged atoms and negatively charged electrons floating together.

A battery generates electric force. How much electric force is generated depends on the battery's volt value. Higher the voltage, greater the force. For example, the pencil battery that powers our wall clocks is usually 1.5 V. A phone battery has a comparable range.

These are strong enough to drive currents through clocks and phones but not strong enough to give humans electric shocks. That's why you don't have to worry when holding them in your hand. On the other hand, the current supplied to our household appliances comes with a voltage of 220V, which is enough to electrocute us.

During a thunderstorm, the voltage can cross a hundred million volts, powering electrons to fly through the air.

The 'colour' of electricity

Strong voltages ionise and pull electrons away from atoms. These unhappy atoms then try to get their electrons back. If the electrons do go back, they need to lose the 'excess' energy they have, and they do this by emitting light. Every time the electron loses some energy, the light has some wavelength. In the case of air, the light the electrons lose is in the range of wavelengths human eyes can see. And this light is what we see.

The colour of the light and the spark depends on the type of atom. In fact, this emission can be thought of as an atom's fingerprint — its unique identifier. For example, in air, most of the atoms are of oxygen and nitrogen and so the sparks are white or near-white. On the other hand, on some alien planet with an atmosphere made of neon, the sparks will look red.



Interestingly this is also the physics which goes into the working of a tube light but in a slightly different way.

Circling back to the mosquitos and our mosquito bats: how much voltage do these devices generate?

It's around 1,400 V — equivalent to approximately a thousand regular batteries, and enough to drive a powerful electric current through the mosquito and at the same time drive electrons out of atoms in the air nearby, thus creating the sparks we see.

In case you are also wondering how certain wavelengths of light can be emitted by certain atoms: it is only by learning quantum mechanics can one understand this. So if you are interested, consider pursuing a course in physics.

And the next time a mosquito troubles you and you end up using the electric bat with crackling success, just remember: it's not just you. Quantum physics, electrons, and the atoms in the air are all joining in to celebrate your victory.

SENSING THE PRESENCE OF A CURRENT

Q: How does an electric line tester glow?

A: An electric line tester is used to test for the presence of an alternating current in the line.

In an electric line, the phase line carries an alternating current that has both positive and negative components. Usually, when an electric current is allowed to pass from the phase line through a bulb to the neutral line, which is at a lower potential, the bulb glows.

In the case of a tester, when we touch its metal cap, a very small amount of the current being tested passes through the neon bulb and through the body to the earth, which is at zero potential.

In other words, the body helps to complete the circuit, allowing the tester to glow.

The high resistance inside the tester acts as a safety mechanism by restricting the amount of current passing through the body.

EXPRESS VIEW: PROBLEM WITH COAL

According to the International Energy Agency (IEA), coal power plants produce a fifth of global greenhouse gas emissions, more than any other single source. Reducing the use of this fossil fuel is one of the most contentious issues in global climate change negotiations. The growing power station pipelines in China and India have, for long, been seen as the biggest hurdles in phasing out coal use.

The latest report of the US-based think-tank, Global Energy Monitoring, shows a rise in the number of thermal power plants in the two countries. China alone accounted for two-thirds of the world's newly operating coal plants last year. The country augmented its coal power capacity at a rate not seen in the past nine years, despite promises "to contain" the use of fossil fuel.

Also worrying is the slowing rate of coal power plant decommissioning in the US. At 9.7 GW, the country contributed nearly half of the capacity retired in 2023, but this was a drop from the 14.7 GW decommissioned last year. All this means that the coal-fired power capacity grew 2 per cent



last year, the highest annual increase since 2016. This does not augur well for meeting the Paris Climate Pact's target of limiting the rise in global temperatures to less than 1.5 degree Celsius.

To meet the goal of phasing out current coal capacity by 2040, the world must retire an average of 126GW of coal power plants every year for the next 17 years. Barely a sixth of that capacity was retired last year. China has committed to retiring 30 GW by 2025. But last year, it decommissioned only 4 GW. The US, too, has much work to do. The country plans to retire 5 GW this year, the lowest since 2008. However, experts believe that competitive natural gas prices and expanding renewable generation capacity will lead to an appreciable reduction in coal installations in the next two years. The US Energy Information Administration estimates a 10 per cent reduction in coal use by 2025.

There cannot be a one-size-fits-all approach to the green transition. Emerging and developing economies are faced with the task of lifting large sections of their population out of poverty. Some of them, like India, have made appreciable strides in installing renewable energy. However, the growth of green energy hasn't kept pace with the rise in demand for electricity. In several of these countries, the coal sector is a big employer. The IEA has advocated fitting power plants "with systems that can capture carbon emissions before they are released into the atmosphere".

The use of this technology has been debated for more than a decade. However, it's a costly proposition. Developmental finance institutions — national and global — have to work with key players to mitigate the social and environmental impacts of coal energy. The UNFCCC processes haven't given adequate importance to roping in these institutions to address one of the most vexed issues related to climate change. With global temperatures surging to record levels last year, this task cannot be postponed for long.

HOTTEST MARCH IN HISTORY WAS IN 2024: EU CLIMATE BODY

The world experienced the warmest March ever due to a combined effect of El Niño and human-caused climate change, making it the 10th consecutive month since June last year to set a new temperature record, the European Union's climate agency said on April 9.

The Copernicus Climate Change Service (C3S) said the average temperature of 14.14 degrees C in March was 1.68 degrees C higher than the month's average for 1850–1900, the designated pre-industrial reference period. It is 0.10 degrees C above the previous high of March 2016.

C3S said the global average temperature breached the 1.5 degrees C threshold for an entire year for the first time in January.

A permanent breach of the 1.5 degrees C limit specified in the Paris Agreement, however, refers to long-term warming over many years. According to climate scientists, countries need to limit the global average temperature rise to 1.5 degrees C above the pre-industrial period.

The earth's global surface temperature has already increased by around 1.15 degrees C compared to the average in 1850–1900, a level that hasn't been witnessed since 1.25 lakh years ago, before the most recent ice age.

The rise in global average temperature is attributed to the rapidly increasing concentration of greenhouse gases, primarily carbon dioxide and methane, in the atmosphere.



“March 2024 continues the sequence of climate records toppling in both air temperature and ocean surface temperatures, with the 10th consecutive record-breaking month.

“The global average temperature is the highest recorded, with the past 12 months being 1.58 degrees Celsius above pre-industrial levels. Stopping further warming requires rapid reductions in greenhouse gas emissions,” said Samantha Burgess, deputy director of C3S.

Globally, 2023 was the warmest year in the 174-year observational record, with the global average near-surface temperature at 1.45 degrees C above the pre-industrial baseline.

The warming may set a new record in 2024 as scientists say El Niño — periodic warming of the ocean surface in the central and eastern tropical Pacific Ocean — typically has the greatest impact on global climate in the second year of its development.

The continuing, albeit weaker, El Niño and predicted above-normal sea-surface temperatures over much of the global oceans are expected to lead to above-normal temperatures over almost all land areas until May, the World Meteorological Organisation (WMO) said in a March update.

The India Meteorological Department has also warned of extreme heat during the April-June period when around a billion people are expected to exercise their franchise during the seven-phase general elections, heightening concerns about vulnerability to heat waves.

EXPLAINED: THE CICADAS ARE COMING OUT AFTER 17 YEARS, WHY THEY TAKE SO LONG TO GET WINGS

A brood of periodical cicadas, noisy insects that breed underground for as long as 13-17 years are expected to emerge into some states on the east coast of the US this year.

This year, the grouping dubbed Brood IX will emerge after spending 17 years underground, into states including Southwest Virginia, parts of North Carolina and West Virginia. The emergence of over 1.5 million cicadas per acre is expected. According to Virginia Tech, people living in these areas will experience a “unique natural” phenomenon that has not occurred in most of the area since 2003.

What are cicadas?

Cicadas are insects that spend most of their lives underground and emerge from the soil mainly to mate. Once out of the ground, their life span is fairly short, somewhere between two-four weeks.

Doug Pfeiffer, a Fruit Entomologist at Virginia Tech, writes in his blog that there will be major outbreaks of periodical cicadas in 2020 and 2021. There are three species of 17-year cicadas and three species of 13-year cicadas. In the blog, Pfeiffer goes on to explain that originally 30 broods of periodical cicadas were defined, mostly separated by geography and the time they emerge from the ground. At present, there are about 15 active broods of these cicadas as some have gone extinct. The insects are found in the America’s as well as New Zealand and Australia.

The name 13 and 17 year refers to the number of years that cicada nymphs take to reach adulthood. It is not clear why their development period is so long, researchers suspect that it may be linked to avoiding predators above the soil. During this time underground the nymphs feed on sap from plant roots. After this developmental period, the cicada nymphs construct a “cicada hut” and burrow their way out from the soil and climb onto any nearby tree or vegetation, a fact sheet published by the Virginia State University states.

3RD FLOOR AND 4TH FLOOR SHATABDI TOWER, SAKCHI, JAMSHEDPUR



A BBC Earth video described the adult cicadas as “clumsy” and “very edible”, due to their lack of defences because of which they “virtually offer themselves to their attackers” which may include turtles and other inhabitants in a forest. Even though many cicadas are eaten by their predators, their “relentless” stream renders their predators full and overwhelmed, to the point of bursting, giving the survivors a chance to achieve their purpose of mating.

What happens when cicadas emerge?

After emerging from the ground in billions, the cicadas shed their exoskeletons or outer skins to take their winged form. Their exoskeletons are frequently found attached to tree trunks and twigs. The emergence of cicadas is often “tightly” synchronised, with most adults appearing within a few nights. The lifespan of adult cicadas is short, about two to four weeks during which time they feed relatively little and mate. Male cicadas “sing” to attract the females, the collective chorus of these male cicadas is very loud and can reach up to 100 decibels, which is as much as a powered lawnmower.

After mating, the females lay their eggs in twigs that are $\frac{1}{2}$ to $\frac{1}{4}$ in diameter. One female is capable of laying over 400 eggs in 40-50 different sites. The eggs remain in the twigs for six to ten weeks before they hatch and after hatching the nymphs fall to the ground where they burrow 6-18 inches underground to feed and emerge 13 or 17 years later, depending on their grouping.

The egg-laying by the cicadas causes significant damage to small twigs. They damage many ornamental and hardwood trees, especially newly planted fruit and ornamental trees such as apple, dogwood, peach, cherry and pear among others, which are the most seriously damaged.

WHY BOTSWANA THREATENED TO SEND 20,000 ELEPHANTS TO GERMANY

Botswana’s President Mokgweetsi Masisi on Wednesday (April 3) threatened to send 20,000 elephants to Germany. The statement came after Germany, earlier this year, proposed to enact stricter limits on the import of trophies from hunting animals.

In an interview with German tabloid Bild, President Masisi said such a move by Germany — one of the largest importers of hunting trophies in the European Union — would impoverish people in his country. He also said that hunting helped curb the skyrocketing number of elephants in Botswana, home to around the world’s largest elephant population (roughly 1.3 lakh).

Here is why Botswana doesn’t want Germans to stop hunting elephants.

But first, why are there so many elephants in Botswana?

Botswana, unlike its neighbours, has been a safe haven for elephants due to its stable government, and small human population.

For instance, after conflict-spurred mass poaching in Namibia and Angola, elephants, known to be highly intelligent creatures, stopped crossing the Chobe river, preferring to stay in the safer Botswana instead.

The Chobe river, also known as the Linyanti, flows through Angola and Namibia, and forms the northern border between Namibia and Botswana. It lies directly on ancient elephant migration routes.



Botswana also implemented strict conservation policies. When poaching incidents were on a rise in 2013, it announced a 'shoot-to-kill' policy targeting suspected poachers. The next year, the country also imposed a ban on trophy hunting — hunting that previously took place under an official government licence.

For these reasons, the elephant population in the country has steadily increased over the years. While in the early 1960s, there were fewer than 10,000 elephants in the country, by the mid-1990s, the population had touched 80,000, according to a report by Conservation Frontlines, an environmental conservation organisation.

Today, elephants inhabit about 40% of Botswana's land.

Why have elephants become an issue for Botswana?

Botswana's rising elephant population has led to a spike in human-animal conflict. Media reports suggest that the animal has become a menace for the country's rural communities, regularly damaging homes, drinking water from pipes, feeding on or destroying crops, and trampling people and cattle to death.

A large population of elephants also threatens other species, and leads to significant biodiversity loss and habitat degradation — elephants tear down trees for fodder and consume large amounts of water, which can cause a decline in non-elephant wildlife.

So, is hunting the only solution?

In an effort to deal with the problem, Botswana has donated elephants to other countries. Last year, it gave away around 8,000 elephants to neighbouring Angola and, in 2022, it donated 500 elephants to Mozambique. The exercise, however, has not really made a dent in the animal population. With more than one lakh elephants in Botswana, contraception is also not an option.

This is why the country lifted its ban on trophy hunting in 2019. Botswana has argued that it not only helps limit the number of elephants, but also boosts the local economy with hunters, often from other countries, paying much as \$50,000 for each elephant killed.

Botswana's government said the practice brought \$5 million to local communities in 2021, according to a report by Morning Brew — and there is a scope to make even more money. "Trophy hunters injected \$250 million into South Africa's economy yearly and supported 17,000 jobs, according to one estimate in 2018," the report said.

Authorities have also argued that regulated trophy hunting ultimately helps the species that hunters target. Governments can use rich hunters' money for conservation, and share profits with local communities, which can prevent habitat loss and better protect animals.

Western countries and animal rights advocates, however, deem the practice to be unethical, responsible for exacerbating population decline of imperilled species. "Trophy hunters prefer to kill the largest, strongest animals, whose loss causes population declines," conservation group Humane Society International's (HSI's) website states.

Furthermore, their contribution to the economy might also be overstated. "In eight key African countries, trophy hunters contribute at most 0.03 percent of gross domestic product (GDP) and at most 0.76 percent of overall tourism jobs," the HSI claims. Lastly, many allege that local communities do not benefit from trophy hunting as advertised due to rampant corruption.



Nonetheless, many experts argue that outright banning is not necessarily the right move. Conservation geographer Enrico Di Minin, from the University of Helsinki, told NPR: “If countries want to ban trophy hunting, they need to have an alternative source of revenue worth hundreds of millions of dollars every year... Just banning things without knowing the consequences is actually creating more problems for the species.”

A FREAK DNA CHANGE 25 MILLION YEARS AGO IS WHY HUMANS LACK TAILS

One of the most striking anatomical features of apes, which sets them apart from monkeys, is the absence of a tail. All mammals have a tail at some point during their development, but apes, including humans, chimpanzees, bonobos, gorillas, orangutans, and gibbons, lose them in utero, leaving behind three to five vestigial vertebrae called the coccyx, or tailbone.

Apes started to lose their tails in this way around 25 million years ago, when the ape and monkey lineages split from a common ancestor. And until recently, nobody knew why apes started to do this.

The compact genome

Every cell of an organism contains a full copy of that organism’s DNA, called the genome. The genome contains the information that the cell uses to make proteins, the workhorses of the cell. Each protein is coded by a specific section of the genome, called the gene.

Not all cells make all the proteins encoded in the genome. For instance, pancreatic cells make insulin, but skin cells don’t. Skin cells make other proteins, such as keratin, that the pancreas cells don’t. A cell achieves this selective protein production by first making a temporary copy of the gene, called the mRNA, that then drives protein production. So pancreas cells will first copy information in the insulin gene into insulin mRNA, and the insulin mRNA will be used to make insulin protein. Skin cells follow the same process to make keratin.

As scientists began to determine the genome sequence of organisms in the mid-1990s, they realised simple organisms like bacteria keep their genomes very compact while more complex life forms don’t. In the bacterial genome, the genes are arranged in tandem: where one gene ends, another begins. As a result, genes make up 85–90% of the bacterial genome.

‘Junk’ DNA

But in complex organisms, genes are spaced far apart. In humans, for example, only 1.5% of the genome codes for proteins. At the time, scientists didn’t know what the rest did and called it ‘junk’ DNA.

Today we know this ‘junk’ DNA is responsible for various functions, including controlling when to make a protein and when not to. A significant fraction of the ‘junk’ also contains transposable elements. These are pieces of DNA that can shift their positions within the genome.

One such element, called Alu, is unique to primates (both apes and monkeys). It is tiny, being made up of around 300 base pairs (the human genome is approximately 3 billion base pairs). But due to its ability to copy itself and ‘jump’ within the genome, it is present in 1.4 million different locations in the human genome. Normally, in nearly all cell types, these elements copy themselves, switch to different locations, and insert themselves into the genome again with minimal consequence to health or evolution. This is because the insertion event is unique to a given cell.



For example, if it happens in an essential gene, only that cell will die; others around it will function normally. The sole exception to this rule is if the insertion happens in the zygote: the fertilized cell after fusion of the sperm and egg that develops into the offspring. Then the change to the DNA will be permanent: it will be reflected in every cell of the offspring.

The Alu accident

Twenty-five million years ago, after the ape and monkey lineages separated, a chance insertion of an Alu element occurred in an important gene in the zygote of an ancient creature. The probability of the insertion occurring in that exact region was around one in a million. Yet it still occurred, and it caused that ancient creature to not develop a tail.

And because the insertion had happened in the zygote, it was imprinted in the DNA of every cell of that creature, and its subsequent offspring — all of them. That creature was the ancestor of all modern apes.

New York University (NYU) scientists reported the discovery of this fateful insertion in a paper in Nature in February.

Identifying the insertion was not easy. The NYU group first searched for DNA changes in 31 genes implicated in tail formation, and compared them across apes and monkeys. As a result, they identified 85,064 mutations (single changes to the DNA sequence), 5,533 deletions, and 13,820 insertions that could be the cause. While many of them were possibly involved in tail-loss, none of them stood out because the scientists were looking for changes in the part of the DNA that made the protein.

It was eventually found hiding in the 'junk' DNA.

A tailoring defect

A peculiar feature of the genome of complex animals is that a gene never exists as one continuous piece in the genome. The gene is divided into segments separated by 'junk'; it's stitched together only when the cell makes the mRNA. This strategy has multiple advantages. For example, the pieces can be rearranged differently at the time of stitching to make different proteins from the same DNA code.

The NYU group found the Alu insertion between two pieces of a gene called TBXT — a gene already known as one of many involved in tail formation in monkeys. As a result of this insertion, apes can't stitch the pieces together correctly and ultimately produce a TBXT protein with one part missing. The team realised this insertion was present in all apes and absent in all other monkeys — a strong sign that it's the cause of tail loss in apes.

The researchers proceeded to compare the size of the TBXT mRNA produced in human and mouse stem cells. They found that while the mouse mRNA was intact, a large fraction of the human mRNA was defective — which they had predicted.

An unfinished tail

They needed to conduct one more experiment to be absolutely sure the Alu insertion was the culprit. This one had to demonstrate that a defective TBXT protein led to tail loss.



The NYU team, led by Prof. Itai Yanai, Prof. Jef Boeke, and PhD student Bo Xia, engineered the embryos of mice to produce a defective version of TBXT — the version found in apes. As if by magic, the resulting mice were born without tails.

The team also determined that the defective TBXT protein caused other problems, including neural tube defects. They predict that there must have been compensatory changes to the genome to overcome these defects. Some of them could be the differences they themselves identified in the proteins involved in tail formation.

Despite the excellent work of the NYU team, we may never fully understand the tale of our tail. Tail loss has been implicated in bipedalism: our ability to walk on two legs. But it is difficult to speculate on exactly what evolutionary benefit was conferred on the ancestral tailless ape that led to its selection by nature. Whatever that selection pressure may have been, what is incredible is how evolution seized upon that one-in-a-million event and used it to create an ape that would go on to rule the world.

HOW GENETICS IS REVEALING THE BIOLOGY OF SKIN COLOUR IS MORE THAN SKIN-DEEP

Skin, with its wide spectrum of textures, hues, and histories, has long captivated the imagination of poets and storytellers. It has served as a canvas for the expression of beauty, identity, and cultural symbols. The diversity of skin colour across human populations is a product of human genetics, the migration of peoples, and the complex interplay between genes and the environment.

Together with its colour, skin opens a window into the underlying human pathophysiology, and not just because it's the largest organ — and has, as a result, been the subject of many scientific and medical investigations as well. The natural colour of human skin and the changes therein help clinicians diagnose a number of medical conditions. For example, genetic defects can result in the absence of pigmentation by birth, such as albinism; partial or complete depigmentation can also result in disorders like vitiligo. A number of drugs, including antimalarials and chemotherapy agents, also cause skin pigmentation.

But for all of skin's significance and wonder, its colour has also been the basis of social hierarchies, racism, and other forms of discrimination. Recognising the biological basis of skin and celebrating the diversity of skin colour could instead foster a deeper appreciation of human differences and promote inclusivity.

Light and dark skin

The pigment melanin determines the colour of the skin. It is produced by cells called melanocytes. A number of genes and factors influence the type and size of melanin particles as well as their production, transport, and distribution.

Scientists widely believe exposure to ultraviolet light from the sun has been the dominant driver of skin colour throughout history. Across geographies, colours have also displayed a close connection to latitude, which in turn is correlated with ultraviolet exposure. There is also consensus that lighter skin colour across higher latitudes is the result of humans adapting to produce vitamin D — again, a process induced by ultraviolet light. Skin pigmentation also protects nutrients like folate from being broken down by ultraviolet radiation.

This said, systematic approaches to understanding and documenting skin colour have only been of recent interest. In 1735, the Swedish biologist Carl Linnaeus classified humans into four



“varieties” based on skin colour. The Austrian anthropologist and explorer Felix von Luschan designed a scale with which to compare skin colour in the 19th century. The scale has 36 colours and is used to this day.

Dark-skinned humans evolved from apes around 1.2 million years ago by shedding body hair and adapting to ultraviolet radiation. Skin colour is also one of the more striking phenotypes (attributes produced by genes’ interactions with the environment) in humans, being closely related to their migration and adaptation as they moved out of Africa around 100,000 years ago. Researchers have found genes associated with the melanocortin 1 receptor, a protein associated with the creation of light skin, in the DNA of Neanderthals from Spain and Italy but not from Croatia, and not in Denisovans.

A few genes

As for modern-day human skin colour: the prevailing hypothesis is that it’s the result of natural selection across a few genes. Two of these, SLC24A5 and SLC45A2, are the most well-studied. They affect skin colour in modern Eurasians. Other genes like MC1R, TYRP1, and OCA2 affect that of East Asians. And all of them show signals of natural selection.

Researchers widely believe Europeans and East Asians adapted to have lighter skin through independent processes. Some evidence has been found for natural selection in Europeans around 11,000–19,000 years ago. A 2015 study led by Harvard Medical School, together with several international organisations, suggested Europeans became mostly light-skinned at least 4,000–6,000 years ago. Later, the admixture of global populations plus local adaptations resulted in the large diversity of skin colour we observe today.

There are many exceptions to this general rule, however. For example, the Inuit people who have inhabited Alaska for more than five centuries, have darker yellowish brown skin compared to other populations at the same latitude. This has been a puzzling exception for many years. Researchers have hypothesised a high vitamin D intake and high ultraviolet exposure due to longer days have combined to create this anomaly.

Inspiration to harmony

Human genetic conditions like albinism — which results in partial or complete loss of pigment in the skin — provide insights into the biology of skin pigmentation and how society addresses people with rare conditions. Around one in 20,000 individuals around the world is estimated to have this condition, but the prevalence could be 20 times higher among the Tonga people of Africa and 120 times higher among the Guna people of South America. Individuals with albinism are highly predisposed to developing skin cancer, not to mention having to suffer regressive social attitudes.

The latest advances in genomics are improving our understanding of the biology of skin pigmentation. In a paper published in the journal Nature Genetics in January 2024, researchers at the University of Pennsylvania used genome editing and chromosomal conformational capture to identify the regulators of a number of genes involved in skin pigmentation. They identified the mechanisms by which mutations in the regulatory regions of four genes could affect pigmentation and its variability. They also identified a new gene, CYB561A3, that regulates skin pigmentation. This work expanded the repertoire of genes we know to be involved in the processes driving pigmentation diversity.



By exploring the scientific and genetic underpinnings of skin colour diversity, we gain insights into the biological processes and our shared evolutionary history as well as confront the complexities of social norms, privilege, and prejudice. Embracing diversity prepares us to embrace the rich heritage of humankind and inspires us to strive for more harmonious living.

GAPE LIMITATION: ARE YOU A BIG EATER?

In ecology, 'gape limitation' stands for the idea that a predator can only eat things that fit in its mouth. Imagine a snake trying to eat a rabbit. If the rabbit is too big to fit in the snake's mouth, gape limitation says the latter won't be able to eat it.

Researchers pay attention to the concept because it specifies which animals can eat which other animals. For example, small predators can only eat small prey, while bigger predators can eat bigger prey. From the prey's point of view, if a predator's mouth isn't big enough to devour it, perhaps those animals are safe from that predator. This barrier can in turn lead to evolutionary pressure that selects the predator's ability to eat smaller prey or, conversely, adaptations in the predator's behaviour to overcome gape limitation.

Gape limitations also influence how animals evolve over time. Prey animals might get faster or grow bigger to avoid being eaten by predators with smaller mouths. On the other hand, predators may evolve larger mouths to eat larger prey. Understanding gape limitations is essential to predicting how changes in predator or prey populations, changes in habitats, and/or environmental disturbances could affect the structure and function of ecosystems. The study of gape limitations also helps researchers understand the intricate dynamics of animal interactions and the cascading effects they have on biodiversity.

INFLUENZA A H5N1 DETECTED IN DAIRY COWS IN 6 STATES IN THE U.S.

Avian influenza (bird flu) is a highly contagious viral infection that primarily affects birds. An emerging new lineage 2.3.4.4b of avian influenza has been spreading across the globe since late 2020, carried by migratory birds following specific routes. This panzootic has a significant effect on the avian population with disastrous consequences to the ecology and significant economic loss affecting poultry across the world. In rare instances, the virus can infect mammals from birds causing spillovers, and in recent years, several such instances of spillovers spanning over 200 species have been noted, the most recent being polar bears in Antarctica. Close contact with infected animals could mean the virus could spill over infecting humans and this comes with a significantly large fatality rate.

In late March 2024, a multistate outbreak of H5N1 in dairy cows was detected in the U.S. In what started as a mystery disease affecting dairy herds in Texas, the U.S. Department of Agriculture (USDA) detected the highly pathogenic strain of the virus in herds across the states of Texas and Kansas. The affected animals displayed symptoms including loss of appetite, low-grade fever, and reduced lactation. This marked the first time H5N1 had been detected in cattle, raising concerns about potential transmission routes and the broader impact on the dairy and meat industry. To date, H5N1 has been detected in over 12 herds from six states — Texas, Kansas, Michigan, New Mexico, Idaho and Ohio.

In Texas, other animals in proximity to the affected farms — wild birds and cats — also showed signs of illness and have tested positive for the virus. The exact extent of the spread of H5N1 in cows has not yet been ascertained since cattle are not routinely tested for avian influenza and the



symptoms have been relatively mild, leaving possibilities that there may be other undetected infected herds. The initial detections in late March in Texas, Kansas, and Michigan have yet to show a definitive pattern of transmission. Given the pace of the spread of infection across herds, the transmission of the virus within cattle has not yet been ruled out. Investigations are ongoing to determine the exact source of the spread to cows.

Genomic insights

In April 2024, a human infection of H5N1 was reported from Texas. The infected individual had contact with cows presumed to be infected with the virus. Fortunately, the patient had mild illness, with symptoms like eye redness, and has recovered after being treated with antivirals. Following this case, the CDC has reiterated that the risk of infections for humans remains low, although people with prolonged or close exposure to H5N1-infected animals such as farm workers, are at a higher risk. This is the second case of human H5N1 infection reported from the U.S. A previous case was reported in 2022 from Colorado. Human H5N1 infections are rare but have been sporadically reported in several countries.

H5N1 infections in humans can range from mild symptoms of eye infections to severe illness including pneumonia and death. Since 2003, more than 800 sporadic human H5N1 cases have been reported to the World Health Organization from over 20 countries, with a case-fatality ratio of 53%. In January 2024, concerns about H5N1 avian influenza rose in Southeast Asia when Cambodia reported two human cases, with tragically one resulting in death.

Researchers sequenced the H5N1 virus from both the infected Texas cows and the human case and found that both viruses belonged to clade 2.3.4.4b of H5N1, with the human strain having one minor mutation potentially linked to adaptation in mammals. However, this change has not led to increased transmissibility among humans, and the overall public health risk remains low according to the CDC. Since late 2021, H5N1 clade 2.3.4.4b has circulated in wild birds in the U.S.

Globally, 2023 also saw potential spillover events with H5N1 linked to the deaths of seals in Russia and infections in marine mammals in Peru. Early in 2023, dead seals in Russia and infected marine mammals in Peru suggested H5N1 might jump from birds to mammals. Additionally, the U.K. reported deaths of other animals including otters and foxes due to H5N1. These incidents underscore the need for further research to understand how H5N1 might evolve and potentially adapt to different species.

In summary, while the current risk of H5N1 transmission to humans is considered low, a combined approach of disease surveillance and monitoring the virus's genetic makeup (genomic surveillance) will be crucial for managing the outbreak.

CAN A DIABETES DRUG SLOW DOWN PARKINSON'S DISEASE? EXPERT EXPLAINS WHAT IT MEANS FOR PATIENTS IN INDIA

It may be early days yet but reports of a diabetes drug that can slow down symptoms of Parkinson's disease as well have given the impetus for a large-scale global trial. The drug, lixisenatide, belongs to a group of medications used in the treatment of diabetes worldwide and was tested on Parkinson's patients as both diseases result from common risk factors. And it was found to be neuro-protective for those suffering from Parkinson's, a common neurological disorder causing tremors, slowness of movements, stiffness and walking difficulties in most.



According to a recently published study in the New England Journal of Medicine, which tracked 156 French early-onset patients for a year, the 78 people on lixisenatide reported no further deterioration of their motor skills. The remaining patients on placebo saw a worsening of those symptoms. However, nearly half of the group who took lixisenatide reported nausea while 13 per cent experienced vomiting.

What is lixisenatide?

It is a glucagon-like peptide-1 (GLP-1) receptor agonist that belongs to a group of medications used in the treatment of diabetes. It has proven efficacy in sugar control, weight control and cardiac health. And unlike the more well-known diabetes and weight loss drug semaglutide, lixisenatide can easily cross into the brain. It was used because of common links between diabetes and Parkinson's.

What are common links between diabetes and Parkinson's?

Both diabetes and Parkinson's are a result of insulin resistance, glucose dysregulation, inflammation, oxidative stress and other genetic triggers. Some studies have shown that diabetics may have a higher risk of developing Parkinson's disease and vice versa.

The logic flows from the fact that insulin not only controls glucose levels in the brain but impacts levels of dopamine, the chemical released by the brain and used to send messages between nerve cells. Research shows that insulin helps with our cognitive functions, thinking, reasoning and memory. So insulin abnormalities in the brain may contribute to Parkinson's.

How do you know your Parkinson's is worsening?

Increased numbness in the feet and tips of your fingers, problems in balance while walking, back and knee pain, facial spasms, sleep disturbances, fatigue, depression and anxiety.

Dr Mohan, Chairman, Dr Mohan's Diabetes Specialities Centre, Chennai, feels the multiple effects of one drug could be beneficial for many provided trials prove their long-term effect. "This is good news. For those with diabetes and Parkinson's disease or those with diabetes, obesity and Parkinson's disease, this drug will probably have a two-in-one or three-in-one benefit," he says.

Lixisenatide in India?

"Lixisenatide has shown that over a year, it could slow down deterioration of motor skills in people with Parkinson's disease as against a placebo. The findings fit into one of the highest levels of evidence to get approval for therapy. As this family of medications is already in use across the globe, it may soon be used for management of Parkinson's Disease," says Dr Prashanth L K, neurologist and movement disorders specialist with the Parkinson's Disease and Movement Disorders Clinic, Bengaluru, and lead investigator with Parkinson's Research Alliance of India.

"Research in India is critical as therapies for Parkinson's disease are moving from a blanket approach to personalised therapy based upon genetics, geographical and environmental factors," he says.

According to a report in Frontiers in Neurology, India is home to nearly 0.58 million people living with Parkinson's Disease (as estimated in 2016) and a major increase in the prevalence is expected.