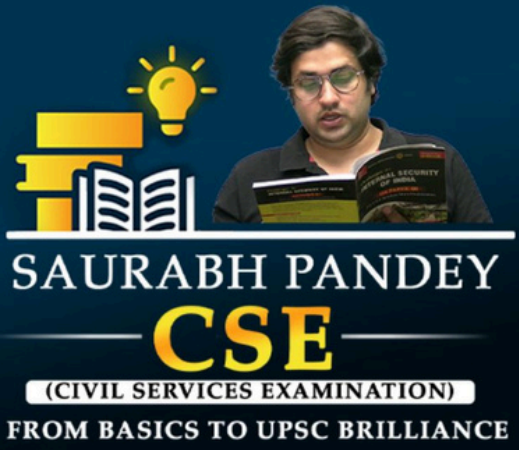


Monthly Current Affairs Compilation PDF May 2024

**UPSC CSE / Civil
services exam**

**By Saurabh
Pandey
Sir**



Topics

- **.Methane**
- **Mount Ruang**
- **Why do we shiver when it is cold?**
- **Expanded Programme on Immunization (EPI)**
- **street vendor act**
- **Wealth Distribution**
- **Mains**



By saurabh pandey sir.



Microbes, not fossil fuels, produced most new methane: study

A modelling study has found methane emissions from fossil fuels declined between 1990 and the 2000s and have been stable since, whereas microbes have been producing more methane of late. One reason could be an increase in cattle-rearing in Latin America and more emissions from waste in South and Southeast Asia

Monika Mondal

For the last three years, Naveen Chandra has been spending most of his days running simulations at the Research Institute for Global Change in Japan. He is trying to recreate the last 50 years of the earth's atmosphere on a supercomputer roughly the size of an auditorium.

Mr. Chandra has been trying to answer a question that came out of his team's research. During 2019-2020, these researchers examined the concentration of methane in the atmosphere and how it changed with time. Until the 1990s, the concentration increased, then stabilised for a bit, and then started to increase again around 2007. According to recent estimates, the atmospheric concentration of methane today is three-times what it was 300 years ago.

Where is this methane coming from? That's what they wanted to know.

Evolving understanding

Methane is the second most abundant anthropogenic greenhouse gas after carbon dioxide (CO₂) but it warms the planet more. Over a century, methane has a global warming potential 28-times greater than CO₂, and even higher over shorter periods like two decades.

It wasn't until recently that policymakers began to focus on methane vis-a-vis addressing global warming. At the U.N. climate talks in 2021, member countries launched the 'Global Methane Pledge' to cut the gas's emissions and slow the planet's warming. Yet our understanding of methane also continues to evolve.

For instance, Mr. Chandra and his team recently reported that microbes have been the biggest sources of methane in the atmosphere, not the burning of fossil fuels.

The sources of methane

Scientists are increasingly recognising various sources of methane, most of which fit in two categories: biogenic and thermogenic. When fossil fuels such as natural gas or oil are extracted from deep within the earth's crust, thermogenic methane is released. Biogenic methane comes from microbial action.

The microbes that produce methane are archaea – single-celled microorganisms distinct from bacteria and eukaryotes – and are called methanogens. They thrive in oxygen-deficient environments, such as the digestive tracts of animals, wetlands, rice paddies, landfills, and the sediments of lakes and oceans.

Methanogens play a crucial role in the



A cow walks through a field as an oil pumpjack and a flare burn off methane and other hydrocarbons in the background in the Permian Basin, Texas. Methanogenic bacteria thrive in oxygen-deficient environments, including the digestive tracts of animals. AP

global carbon cycle by converting organic matter into methane. While methane is a potent greenhouse gas, its production by methanogens is an essential part of natural ecosystems. But human activities like agriculture, dairy farming, and fossil fuel production have further increased methane emissions.

Both biogenic and thermogenic activities produce different isotopes of methane. Tracking the isotopes is a way to track which sources are the most active.

Modelling with a supercomputer

According to Prabir Patra, principal scientist at the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) and one of the lead authors of the study, carbon-13 is key. (Atoms of this carbon isotope have 13 nucleons: 6 protons + 7 neutrons.)

If there are fewer carbon-13 atoms than a certain level in a group of 1,000 methane molecules, the methane is from a biological source. If the methane is from thermogenic sources, such as trapped

results with two emissions inventories, called EDGAR and GAINS, and found some discrepancies. EDGAR had reported that methane emissions from oil and natural gas exploration had increased between 1990 and 2020. GAINS had recorded a large "unconventional" rise in emissions since 2006. Their findings disagreed with both inventories.

Mr. Patra said combining the numbers for all biogenic and thermogenic isotopes should match the total emissions in a year. They also took insights from other available data like, number of rice fields, wetlands, dairy farms, biomass burning and likewise sources of methane emissions, and estimated the emissions from those sources. But when they ran their atmosphere models with this data, the year-wise total methane emissions overshot the total production.

In fact, the models said methane emissions from fossil fuels declined between 1990 and the 2000s and that they've been stable since. They also found microbes were producing more methane than fossil fuels.

Need for local data

One possible reason could be an increase in cattle-rearing in Latin America and more emissions from waste in South and Southeast Asia, Latin America, and Africa, the study's authors wrote in their paper. They added that the number of wetlands worldwide had increased as well.

Studies in the past have pointed to microbes like anaerobic archaea as potentially top contributors of atmospheric methane using satellite data. But according to Mr. Patra, "Most studies that use satellites cannot measure the actual [changes over time] of methane." Satellite data is interpreted using models "and thus are prone to uncertainties." He said ground models are required to confirm these interpretations.

He added that their own atmospheric model was also only the beginning. The data for it came from observatories located in far-flung places. "If you really want to ask what is from the wetland, what is from the rice fields, we need measurements in those exact locations," per Mr. Patra. "We don't have that kind of observation at all anywhere in the world to make that kind of measurement. We can only speak for global emissions."

But what we do know is: "If you want to reduce methane, anthropogenic activity should be first controlled. And we can clearly outline what is anthropogenic here. Waste and landfills, rice fields, enteric fermentation, oil and gas, and coal," he said.

(Monika Mondal is a freelance science and environment journalist.)

THE GIST

Methane is the second most abundant anthropogenic greenhouse gas after carbon dioxide but it warms the planet more. Over a century, methane has a global warming potential 28-times greater than CO₂

Methane is released by two main processes: biogenic and thermogenic. When fossil fuels are extracted from the earth's crust, thermogenic methane is released. Biogenic methane comes from microbial action

Studies in the past have pointed to microbes like anaerobic archaea as potentially top contributors of atmospheric methane using satellite data, but this information contains gaps that ground-based models can bridge



.Methane

- .Methane is the second most abundant anthropogenic greenhouse gas after carbon dioxide (CO₂) but it warms the planet more.
- Over a century, methane has a global warming potential 28-times greater than CO₂, and even higher over shorter periods like two decades.
- At the U.N. climate talks in 2021, member countries launched the 'Global Methane Pledge' to cut the gas's emissions and slow the planet's warming

METHANE (CH₄)

Methane emissions caused by human activities are one of the most significant drivers of climate change. Methane is also the main precursor of tropospheric ozone, a powerful greenhouse gas and air pollutant.

SOURCES

Methane is one of the fastest growing greenhouse gases in the atmosphere. Human activity causes 2/3 of emissions.



% = global emissions

IMPACTS

CLIMATE

Responsible for 40% of warming since the industrial revolution

86x

times more powerful than carbon dioxide over a 20-year period

HEALTH

Increasing emissions are driving a rise in tropospheric ozone air pollution, which causes 1+ million premature deaths annually. Methane is responsible for roughly 1/2 of these deaths.



Respiratory diseases
Heart disease
Damaged airways and lung tissue

AGRICULTURE & ECOSYSTEMS



Up to 15% annual yield losses of soy, wheat, rice and maize

LIFETIME IN ATMOSPHERE: 12 YEARS

Since methane does not last long in the atmosphere, efforts to reduce it will bring immediate benefits for the climate and human health.

The sources of methane

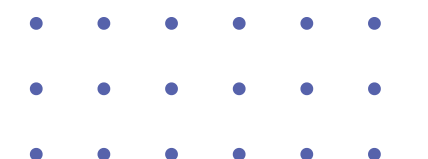
- Scientists are increasingly recognising various sources of methane, most of which fit in two categories: biogenic and thermogenic.
- When fossil fuels such as natural gas or oil are extracted from deep within the earth's crust, thermogenic methane is released.
- Biogenic methane comes from microbial action.
- The microbes that produce methane are archaea — single-celled microorganisms distinct from bacteria and eukaryotes — and are called methanogens.
- They thrive in oxygen-deficient environments, such as the digestive tracts of animals, wetlands, rice paddies, landfills, and the sediments of lakes and oceans.

- Methanogens play a crucial role in the global carbon cycle by converting organic matter into methane.
- While methane is a potent greenhouse gas, its production by methanogens is an essential part of natural ecosystems.
- But human activities like agriculture, dairy farming, and fossil fuel production have further increased methane emissions.
- Both biogenic and thermogenic activities produce different isotopes of methane.
- Tracking the isotopes is a way to track which sources are the most active.

BIG SHOT



Mount Ruang seen erupting from Tagulandang island in Sitaro, North Sulawesi, on Tuesday. Ruang's eruption prompted authorities to order an evacuation and forced a nearby airport to close. The remote Indonesian volcano sent a tower of ash spewing into the sky on April 19. AFP



Mount Ruang

- Mount Ruang seen erupting from Tagulandang island in Sitaro, North Sulawesi,

Indonesia volcano

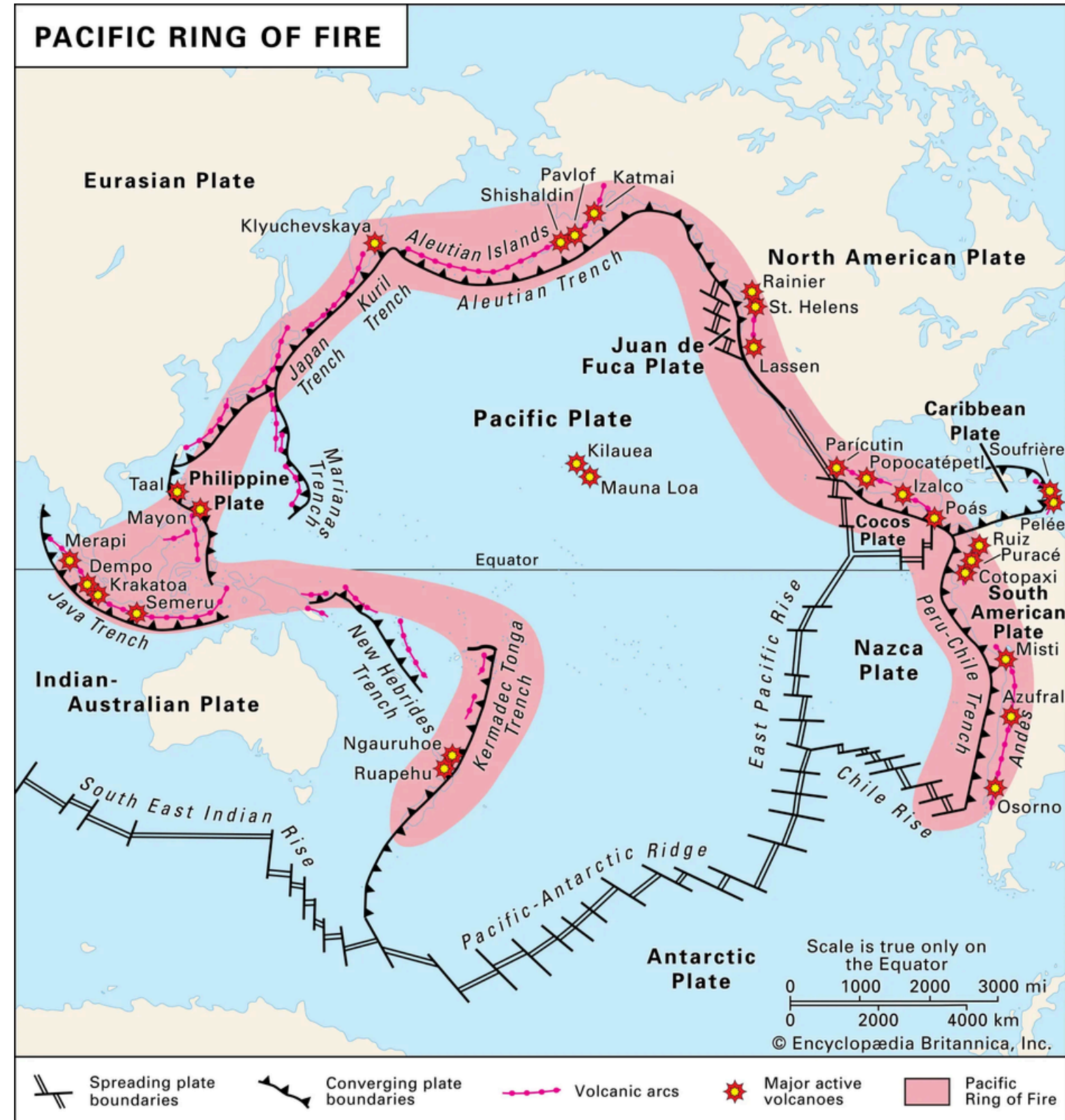


The Hindu analysis by saurabh pandey sir



Mount Ruang erupts in Indonesia

11,000 residents evacuated after Mount Ruang erupted multiple times



The Hindu analysis by saurabh pandey sir

QUESTION CORNER

Shivering produces heat to keep you warm

Q

Q: Why do we shiver when it is cold?

A: Shivering (physical thermogenesis) occurs when the tension of the

skeletal muscles rises beyond a critical level or when the body temperature falls below the critical level of 37.1 degrees C.

Shivering is actually an involuntary contraction of muscles to maintain body temperature during fever and in cool environments. It involves oscillating skeletal-muscle contractions that occur at 10-20 per second. The movement is at first irregular, then assumes quick involuntary movements during which small groups of muscles contract asynchronously. Due to the asynchronous movement, they do not move the parts associated with them in a coordinated manner.

The posterior hypothalamus region in the brain harbours the primary motor centre responsible for shivering. When the body temperature falls below 37.1 degrees C, the skin sends cold signals to the spinal cord. These are picked by the hypothalamus, which takes advantage of the fact that increased skeletal-muscle activity generates heat. Acting through descending pathways that terminate on the motor neurons controlling the body's skeletal muscles, the hypothalamus gradually increases



EGOR IVLEV/UNSPLASH

skeletal-muscle tone (constant level of tension within muscles).

Thus shivering begins throughout the body when the tension of the skeletal muscles rises beyond the critical level, producing heat and increasing the temperature of the body within a matter of seconds. Studies reveal that shivering may produce as much as 42.5 cal/hr, almost seven times greater than man's normal resting metabolism at room temperature. In a resting person, most body heat is produced by the thoracic and abdominal organs due to ongoing metabolic activities.

Generally, shivering is seen only in birds and mammals.



For feedback and suggestions

for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'



Why do we shiver when it is cold?



- Physical thermogenesis) occurs when the tension of the skeletal muscles rises beyond a critical level or when the body temperature falls below the critical level of 37.1 degrees C.
- Shivering is actually an involuntary contraction of muscles to maintain body temperature during fever and in cool environments.
- It involves oscillating skeletal-muscle contractions that occur at 10-20 per second.

- The posterior hypothalamus region in the brain ~~harbours~~ the primary motor centre responsible for shivering.
- When the body temperature falls below 37.1 degrees C, the skin sends cold signals to the spinal cord.

Make EPI an ‘Essential Programme on Immunisation’

The year 2024 marks a significant milestone for immunisation programmes, both globally and in India. It commemorates 50 years since the launch of the Expanded Programme on Immunization (EPI) by the World Health Organization (WHO) in 1974. The EPI was introduced as the eradication of smallpox virus was on the horizon, and a need to leverage the then immunisation infrastructure and a trained workforce was recognised to expand the benefit of available vaccines. Following the announcement, nearly every country across the world initiated its national immunisation programme. India launched the EPI in 1978, which was later renamed as the Universal Immunization Programme (UIP) in 1985. In India, this year is also two decades since the country conducted the last nationwide independent field evaluation of the UIP, in collaboration with international experts. This is an opportune moment to assess the progress made and envision the future.

Globally, and in India, there has been significant progress in terms of the impact of immunisation and vaccines. While in 1974, there were vaccines to prevent six diseases, five decades later, there are vaccines against 13 diseases which are universally recommended; and vaccines against 17 additional diseases are recommended for a context-specific situation. There is research in progress to develop vaccines against nearly 125 pathogens – many would prevent diseases prevalent in low- and middle-income countries.

A success story

The children with three doses of DPT, a tracer indicator of coverage, has been rising over these years. In the early 1970s, around 5% of children in low- and middle-income countries had received three doses of DPT, which increased to 84% in 2022 at the global level. Smallpox has been eradicated, polio eliminated from all but two countries and many vaccine preventable diseases have nearly disappeared. In India, the coverage has increased every passing year and in 2019-21, 76% of children received the recommended vaccines.

Since the launch of EPI, studies have shown that vaccines have saved millions of lives and prevented billions of hospital visits and hospitalisations. Economic analyses have estimated that vaccines are highly cost-effective interventions, with every single dollar (or rupee) of expenditure on vaccination programmes ensuring a seven to 11-fold return.

In nearly all low- and middle-income countries, including India, the immunisation programme remains a success among all government initiatives, nearly always with far greater coverage than any other health programme.

Moreover, in mixed health systems with both the public and private sector delivering services, immunisation often remains the only health



Dr. Chandrakant Lahariya

a medical doctor, has 15 years of work experience with the World Health Organization in its India Office, Regional office for Africa, Brazzaville, and Headquarters in Geneva



Dr. Rakesh Kumar

a medical doctor, is a former Joint Secretary, Reproductive and Child Health, Ministry of Health and Family Welfare, Government of India, and also a global health expert. He is the CEO of Wadhvani Initiative for Sustainable Healthcare (WISH), India

In the 50 years of the Expanded Programme on Immunization, it is time for another expansion

intervention with greater utilisation from the government sector. For instance, in India, the share of the private sector in overall health services is nearly two thirds; however, nearly 85% to 90% of all vaccines are delivered from government facilities. Experts often argue that the immunisation coverage is a tracer indicator of the possible highest coverage any government intervention can achieve in a given setting.

Yet, it is not without challenges. In early 2023, the UNICEF’s ‘The State of the World’s Children’ report revealed a concerning trend: for the first time in more than a decade, the childhood immunisation coverage had declined in 2021. In 2022, globally, an estimated 14.3 million children were zero dose (did not receive any recommended vaccine) while another 6.2 million children were partially immunised. Over the years, the vaccination coverage in India has increased, both nationally and State-wise. However, there are persisting inequities in coverage by geography, socio-economic strata and other parameters, which demand urgent interventions.

From childhood focus to life course

It is interesting that when it comes to vaccination, people often (and wrongly) believe that the vaccines are only for children only. The truth is that in nearly 225 years since the availability of the first vaccine against smallpox in 1798, vaccines have always been available for individuals of all age groups, including adults. The first anti rabies vaccine, cholera, and typhoid vaccines developed between 1880s to mid 1890s were primarily for adults. The first vaccine ever developed in any part of the world against plague (in 1897) was from India and meant for individuals across all age groups. The BCG vaccine (against tuberculosis) was first introduced in a nationwide campaign in 1951 and was also administered to the adult population. Influenza vaccines have always been administered to adults and children alike. This history clearly illustrates that vaccines have always been intended for individuals of all age groups.

However, considering that children are most vulnerable from vaccine-preventable diseases, they have rightly been prioritised for vaccination. A few decades ago, the supply of vaccines was limited, and the financial resources and trained workforce that governments had were scarce. Thus, vaccines were aimed to be delivered to the population groups which would benefit from them the most – children.

However, in the last five decades, things have changed for the better. With increased vaccine coverage, children are better protected. However, diseases that are preventable with vaccines are increasingly becoming common in the adult population. Therefore, it becomes imperative that government policies now focus on the vaccination of adults and the elderly, as well, as is happening in many countries. For better coverage of adult vaccines, we can learn from the past and five decades of the EPI.

First, there are some initial policy and technical discussions regarding expanding immunisation coverage in additional populations. The recent announcement on HPV vaccines for teenage girls is a good start.

However, the Indian government needs to consider providing recommended vaccines for a wider section of adults and elderly population. Considering that vaccines are highly cost effective, once recommended by the National Technical Advisory Group on Immunization (NTAGI), vaccines for all age groups should be made available as free at the government facilities.

Second, the NTAGI in India, which provides recommendations on the use of vaccines should start providing recommendations on the use of vaccines in adults and the elderly. We need to remember that once a vaccine is recommended by the government body, the coverage is likely to be far greater than if the vaccines are not recommended by the government.

Third, the prevailing myths and misconceptions about vaccines must be proactively addressed to tackle vaccine hesitancy. The government must consider the help of professional communication agencies to dispel myths (and in a layperson’s language and with the use of social media). This also requires citizens to learn and educate themselves about these vaccines from reliable sources.

Fourth, various professional associations of doctors – community medicine experts, family physicians and paediatricians should work to increase awareness about vaccines among adults and the elderly. Physicians treating patients with any disease should use the opportunity to make them aware of vaccines.

Fifth, medical colleges and research institutions should generate evidence on the burden of diseases in the adult population in India.

There are studies which have noted that the introduction of new vaccines in national programmes contributes to increased coverage of all existing vaccines. Therefore, it is likely that expanding coverage of vaccines for adults and the elderly may result in improved coverage with childhood vaccines and reduced vaccine inequities. India’s EPI has made major progress and it is arguably a time for another independent national level review of the UIP in India, engaging key partners and international experts.

In late 2023, India launched a pilot initiative of adult BCG vaccination as part of efforts to ‘end TB’ from India. The COVID-19 vaccination of the adult population has made the public sensitized to the need for and the benefits of adult vaccination. This is a right opportunity to start a new journey of adult vaccination in India. In the 50 years of the EPI, it is time for another expansion of the programme with focus on zero dose children, addressing inequities in vaccine coverage and offering vaccines to adults and the elderly. It is time to make EPI an ‘Essential Program on Immunization’.



Expanded Programme on Immunization (EPI)



- The year 2024 marks a significant milestone for immunisation programmes, both globally and in India.
- It commemorates 50 years since the launch of the Expanded Programme on Immunization (EPI) by the World Health Organization (WHO) in 1974.
- The EPI was introduced as the eradication of smallpox virus was on the horizon, and a need to leverage the then immunisation infrastructure and a trained workforce was recognised to expand the benefit of available vaccines.
- .

The Hindu analysis by saurabh pandey sir



- **Following the announcement, nearly every country across the world initiated its national immunisation programme.**
- **India launched the EPI in 1978, which was later renamed as the Universal Immunization Programme (UIP) in 1985.**

The Hindu analysis by saurabh pandey sir



- In India, this year is also two decades since the country conducted the last nationwide independent Field evaluation of the UIP, in collaboration with international experts.
- This is an opportune moment to assess the progress made and envision the future.
- Globally, and in India, there has been significant progress in terms of the impact of immunisation and vaccines.
- While in 1974, there were vaccines to prevent six diseases, five decades later, there are vaccines against 13 diseases which are universally recommended; and vaccines against 17 additional diseases are recommended for a context-specific situation

Implementing the Street Vendors Act

A decade has passed since the Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act came into effect on May 1, 2014, marking a significant milestone after nearly four decades of legal jurisprudence and the tireless efforts of street vendor movements across India. Celebrated as a progressive legislation, the Act now faces numerous challenges in its implementation. Looking back, the mere enactment of a law did not ensure the protection and security of street vendors in Indian cities; there was much to be desired in its execution.

Provisions of the law
Street vendors, estimated to constitute 2.5% of any city's population, play multifaceted roles in city life. Local vegetable sellers and food vendors are essential providers of daily services. Vending offers many migrants and the urban poor a source of modest yet consistent income. The vendors also make city life affordable for others by providing vital links in the food, nutrition, and goods distribution chain at reasonable prices.
Street vendors are also integral to Indian culture – imagine Mumbai without its *vada pav* or Chennai without its roadside *dosai*. The law was enacted to acknowledge this reality. It aimed to 'protect' and 'regulate' street vending in cities, with State-level rules and schemes, and execution by Urban Local Bodies (ULBs) through by-laws, planning, and regulation. The Act clearly delineates the roles and responsibilities of both vendors and various levels of government. It recognises the positive urban role of vendors and the need for livelihood protection. It commits to accommodating all 'existing' vendors in vending zones and issuing vending certificates. The Act establishes a participatory governance structure through Town Vending Committees (TVCs)



Aravind Unni
is an urban practitioner-researcher focusing on informal workers and urban communities' inclusion in urban planning and cities



Shalini Sinha
is the Asia strategist at the Urban Policies Program, WIEGO (Women in Informal Employment: Globalizing and Organizing). Views are personal

Celebrated as a progressive legislation, the Act now faces numerous challenges in its implementation

and mandates that street vendor representatives must constitute 40% of TVC members, with a sub-representation of 33% of women street vendors. These committees are tasked with ensuring the inclusion of all existing vendors in vending zones. Additionally, the Act outlines mechanisms for addressing grievances and disputes, proposing the establishment of a Grievance Redressal Committee chaired by a civil judge or judicial magistrate. Its provisions set a crucial precedent for inclusive and participatory approaches to address street vending needs in cities, at least in theory.

Three broad challenges
However, the Act has faced three broad challenges. First, at the administrative level, there has been a noticeable increase in harassment and evictions of street vendors, despite the Act's emphasis on their protection and regulation. This is often due to an outdated bureaucratic mindset that views vendors as illegal entities to be cleared. There is also a pervasive lack of awareness and sensitisation about the Act among state authorities, the wider public, and vendors themselves. TVCs often remain under the control of local city authorities, with limited influence from street vendor representatives. And the representation of women vendors in TVCs is mostly tokenistic.
Second, at the governance level, existing urban governance mechanisms are often weak. The Act does not integrate well with the framework established by the 74th Constitutional Amendment Act for urban governance. ULBs lack sufficient powers and capacities. Schemes like the Smart Cities Mission, laden with resources and pushed through as policy priorities from the top-down, mostly focus on infrastructure development and ignore the provisions of the Act for the inclusion of street vendors in city planning.
Third, at the societal level, the

prevailing image of the 'world class city tends to be exclusionary. It marginalises and stigmatises street vendors as obstacles to urban development instead of acknowledging them as legitimate contributors to the urban economy. These challenges are reflected in city designs, urban policies, and public perceptions of neighbourhoods.
The way forward
While the Act is progressive and detailed, its implementation requires support, possibly (and ironically) necessitating top-down direction and management starting from the Ministry of Housing and Urban Affairs. This needs to be decentralised over time to ensure effectiveness in addressing the diverse needs and contexts of street vendors nationwide. PM SVANidhi, a micro-credit facility for street vendors, has been a positive example in that direction. There is a strong need to decentralise interventions, enhance the capacities of ULBs to plan for street vending in cities, and move away from high-handed department-led actions to actual deliberative processes at the TVC level. Urban schemes, city planning guidelines, and policies need to be amended to include street vending.
The Act now faces new challenges such as the impact of climate change on vendors, a surge in the number of vendors, competition from e-commerce, and reduced incomes. The Act's broad welfare provisions must be used creatively to meet the emerging needs of street vendors. The sub-component on street vendors in the National Urban Livelihood Mission needs to take cognisance of the changed realities and facilitate innovative measures for addressing needs. The case of the Street Vendors Act highlights the complex interplay of contestation over space, workers in urban areas, and governance, offering valuable lessons for future lawmaking and implementation.



STREET VENDORS ACT



Street Vendors Act 2014 mandates that town vending committees frame a plan for vending covering elements such as criteria for earmarking no-vending zones, restricted zones, vending zones, and natural markets

GREY AREAS

- No vending plan
- No published charter
- ID cards not provided to all street vendors

The Hindu analysis by saurabh pandey sir

.....

.....

28 TOWN VENDING COMMITTEES NOTIFIED BY GOVT

- Corporations to start identifying hawkers soon
- Hawkers to be given vending certificates to prevent any harassment against them
- Government mulling to give them kiosks

- with garbage disposal and solar light system
- Hawkers displaced in last few years can also apply for space for shops
 - 5% of city's pollution is estimated to be caused by street vendors



The Hindu analysis by saurabh pandey sir



DEMANDS OF STREET VENDORS FEDERATION



- ➔ State Government should frame rules for the implementation of Street Vendors Act 2014
- ➔ Identification of street vending zones
- ➔ Formation of Town Vending Committees in all the local bodies
- ➔ Launching a survey to identify street vendors for provision of ID cards
- ➔ Creating awareness among the revenue, local body officials and police on the Street Vendors Act 2014

The Hindu analysis by saurabh pandey sir



About the redistribution of wealth

What is the debate surrounding the redistribution of wealth that has piqued interest during the ongoing election campaigns? Where does it fit in the constitutional framework? How has the judiciary ruled on the topic from the start?

EXPLAINER

Rangarajan. R

The story so far:

There have been heated exchanges between the ruling government and the Opposition with respect to the redistribution of wealth during the ongoing election campaign. The Supreme Court has also constituted a nine-judge Bench to interpret the Directive Principles of State Policy (DPSP) with respect to ownership and control of material resources.

What does the Constitution provide?

The Preamble to the Constitution aims to secure to all citizens social and economic justice, liberty and equality. Part III of the Constitution lists down the fundamental rights that guarantee liberty and equality while Part IV contains the DPSP. These are principles that the central and State governments should follow to achieve social and economic justice in our country. Unlike the fundamental rights in Part III, the DPSP is not enforceable in court. They are nevertheless fundamental in the governance of the country. Article 39(b) and (c) in Part IV contain principles that are aimed at securing economic justice. They provide that ownership and control of material resources of the society should be distributed to serve the common good and that the operation of the economic system does not result in concentration of wealth to the common detriment.

What is the historical context?

The Constitution originally guaranteed right to property as a fundamental right under Article 19(1)(f). It provided under Article 31 that the state shall pay compensation in case of acquisition of private property. It is pertinent to note that at the time of independence, the main property rights related to agricultural and other land. The government had to acquire the rights in such estates for carrying out land reforms and construction of public assets. Considering the inadequate resources with the government and in order to provide greater flexibility in acquiring land for public welfare, various amendments were carried out curtailing the right to property. Notable among them are exceptions under Articles 31A, 31B and 31C that are briefly explained in Table 1.

The Supreme Court in various cases has interpreted the relationship between fundamental rights and the DPSP. Most of these cases were against constitutional amendments made by the state that curtailed the right to property that was then a fundamental right. In the *Golak Nath* case (1967), the Supreme Court held that fundamental rights cannot be abridged or diluted to implement DPSP. Finally, in the *Kesavananda Bharati* case (1973), a thirteen-judge Bench of the Supreme Court upheld the validity of Article 31C but made it subject to judicial review. In the *Minerva Mills* case (1980), the Supreme Court ruled that the Constitution exists on a harmonious balance between fundamental rights and DPSP.

In 1978, in order to avoid excessive litigation directly in the Supreme Court by the propertied class, the 44th amendment act omitted right to property as a fundamental right and made it a constitutional right under Article 300A. The right to private property continues to be an important constitutional cum legal right. Any law to acquire private property



At the time of independence, the main property rights were related to agricultural and other land. The government had to acquire the rights in such estates for carrying out land reforms and construction of public assets. ISTOCKPHOTO

Exceptions to fundamental rights

Considering the inadequate resources with the government and to provide greater flexibility in acquiring land for public welfare, various amendments were carried out curtailing the right to property. Notable among them are exceptions under Articles 31A, 31B and 31C

Article	Amendment & year	Brief explanation
31A	1st amendment, 1951	Provided that laws made for acquisition of estates etc. shall not be void on the ground that it violated fundamental rights including right to property
31B	1st amendment, 1951	Made laws placed under the Ninth Schedule immune from judicial review on the grounds of violating any fundamental right. In <i>Coelho</i> case (2007), the SC held that laws placed in Ninth Schedule after April 1973 would be subject to judicial review
31C	25th amendment, 1971	Provided primacy to the DPSP under Articles 39(b) and (c). Laws made to fulfil these principles shall not be void on the ground that it violated fundamental rights including right to property

by the state should be only for a public purpose and provide for adequate compensation.

What is the current debate?

Indian governments in the first four decades after independence followed a “socialistic model” of economy. There were many laws made by the Centre and States to acquire land from zamindars and big landlords for public purpose. The economic policies resulted in the nationalisation of banking and insurance, extremely high rates of direct taxes (even up to 97%), estate duty on inheritance, tax on wealth etc. There were also regulations that placed restrictions on growth of private enterprise like The Monopolies and Restrictive Trade Practices Act, 1969 (MRTP Act). The rationale behind these measures during those times was to reduce inequality and redistribute wealth among the poorer sections who constituted majority of the population. However, such measures stifled growth and also resulted in the concealment of income/wealth. Taxes like estate duty and wealth tax generated

revenue that was much less than the cost incurred in administering them.

The nineties saw the country move from a closed economy towards liberalisation, globalisation and privatisation. A new industrial policy was unveiled in July 1991 with the objective of empowering market forces, improving efficiency and rectifying deficiencies in the country’s industrial structure. The MRTP Act was repealed and replaced with the Competition Act, 2002 and income tax rates were reduced considerably. Estate duty was abolished in 1985 and wealth tax in 2016.

The market driven economy has resulted in additional resources for the government that has helped in bringing people out of abject poverty. This economic system, nonetheless, has also resulted in growing inequality. A report by the World Inequality Lab states that the top 10% of the country’s population have a share of 65% and 57% of the wealth and income respectively as of 2022-23. The bottom 50% on the other hand have a meagre share of 6.5% and 15% of the wealth and income respectively.

The manifesto for the current Lok Sabha elections of the Congress, the principal Opposition party, promises various measures for the poorer sections including payment of ₹1 lakh per annum to a woman from every poor family. Rahul Gandhi had also mentioned in his campaign that there would be a financial survey to ascertain the distribution of wealth among the people in the country and address the issue of inequality. The ruling party campaigners led by the Prime Minister have targeted the Opposition on this matter. They claim that the Opposition, if voted to power, would bring back inheritance tax laws that would tax even the poorer sections. The Supreme Court meanwhile has constituted a nine-judge Bench to interpret whether material resources under Article 39(b) include private resources as well.

What can be the way forward?

It is not just in India, but growing inequality is a worldwide problem of a liberalised open-market economic system. However, it is the responsibility of the government to protect the interest of the poorer classes who are most dependant on the state machinery for their livelihood. At the same time past policies of extremely high tax rates, estate duty, wealth tax etc., did not achieve their desired goals. Instead, they only led to concealment of income and wealth. Innovation and growth should not be curtailed but the benefits of growth should reach all sections especially the marginalised. The policies may vary and need to be framed after adequate debate in line with current economic models. The underlying principle to be achieved nevertheless remains the same – economic justice for all as enshrined in our Constitution.

Rangarajan R is a former IAS officer and author of ‘Polity Simplified’. He currently trains civil service aspirants at ‘Officers IAS Academy’. Views expressed are personal.

The Gist

▼
The Preamble to the Constitution aims to secure to all citizens social and economic justice, liberty and equality. Part III of the Constitution lists down the fundamental rights that guarantee liberty and equality while Part IV contains the Directive Principles of State Policy that talks about ownership and control of material resources. These are principles that the central and State governments should follow to achieve social and economic justice in our country.

▼
The Supreme Court in various cases has interpreted the relationship between fundamental rights and the DPSP. In 1978, in order to avoid excessive litigation directly in the Supreme Court by the propertied class, the 44th amendment act omitted the right to property as a fundamental right and made it a constitutional right under Article 300A.

▼
The Supreme Court has now constituted a nine-judge Bench to interpret the Directive Principles of State Policy



Wealth Distribution

- The Supreme Court has also constituted a nine-judge Bench to interpret the Directive Principles of State Policy (DPSP) with respect to ownership and control of material resources.

What does the Constitution provide?

- The Preamble to the Constitution aims to secure to all citizens social and economic justice, liberty and equality.
- Part III of the Constitution lists down the fundamental rights that guarantee liberty and equality while Part IV contains the DPSP.

- These are principles that the central and State governments should follow to achieve social and economic justice in our country.
- Unlike the fundamental rights in Part III, the DPSP is not enforceable in court.
- They are nevertheless fundamental in the governance of the country.
- Article 39(b) and (c) in Part IV contain principles that are aimed at securing economic justice.
- They provide that ownership and control of material resources of the society should be distributed to serve the common good and that the operation of the economic system does not result in concentration of wealth to the common detriment.

The Hindu analysis by saurabh pandey sir



What is the historical context?



- The Constitution originally guaranteed right to property as a fundamental right under Article 19(1)(f).
- It provided under Article 31 that the state shall pay compensation in case of acquisition of private property.
- It is pertinent to note that at the time of independence, the main property rights related to agricultural and other land.
- The government had to acquire the rights in such estates for carrying out land reforms and construction of public assets.
- Considering the inadequate resources with the government and in order to provide greater □ Flexibility in acquiring land for public welfare, various amendments were carried out curtailing the right to property.

The Hindu analysis by saurabh pandey sir

- The Supreme Court in various cases has interpreted the relationship between fundamental rights and the DPSP. Most of these cases were against constitutional amendments made by the state that curtailed the right to property that was then a fundamental right.
- In the Golak Nath case (1967), the Supreme Court held that fundamental rights cannot be abridged or diluted to implement DPSP.
- Finally, in the Kesavananda Bharati case (1973), a thirteen-judge Bench of the Supreme Court upheld the validity of Article 31C but made it subject to judicial review.

- In the Minerva Mills case (1980), the Supreme Court ruled that the Constitution exists on a harmonious balance between fundamental rights and DPSP.
- In 1978, in order to avoid excessive litigation directly in the Supreme Court by the propertied class, the 44th amendment act omitted right to property as a fundamental right and made it a constitutional right under Article 300A.
- The right to private property continues to be an important constitutional cum legal right.
- Any law to acquire private property by the state should be only for a public purpose and provide for adequate compensation.

Exceptions to fundamental rights

Considering the inadequate resources with the government and to provide greater flexibility in acquiring land for public welfare, various amendments were carried out curtailing the right to property. Notable among them are exceptions under Articles 31A, 31B and 31C

Article	Amendment & year	Brief explanation
31A	1st amendment, 1951	Provided that laws made for acquisition of estates etc. shall not be void on the ground that it violated fundamental rights including right to property
31B	1st amendment, 1951	Made laws placed under the Ninth Schedule immune from judicial review on the grounds of violating any fundamental right. In Coelho case (2007), the SC held that laws placed in Ninth Schedule after April 1973 would be subject to judicial review
31C	25th amendment, 1971	Provided primacy to the DPSP under Articles 39(b) and (c). Laws made to fulfil these principles shall not be void on the ground that it violated fundamental rights including right to property

What can be the way forward?

- It is not just in India, but growing inequality is a worldwide problem of a liberalised open-market economic system.
- However, it is the responsibility of the government to protect the interest of the poorer classes who are most dependant on the state machinery for their livelihood.
- At the same time past policies of extremely high tax rates, estate duty, wealth tax etc., did not achieve their desired goals.
- Instead, they only led to concealment of income and wealth.
- Innovation and growth should not be curtailed but the benefits of growth should reach all sections especially the marginalised.
- The policies may vary and need to be framed after adequate debate in line with current economic models.

The Hindu analysis by saurabh pandey sir



Breaking free



Demolition drive: Workers dismantle a Soviet-era monument to the Pereiaslav Agreement on Ukraine-Russia union, in Kyiv on Tuesday. AFP

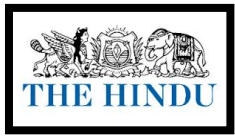


Pereyaslav Agreement,

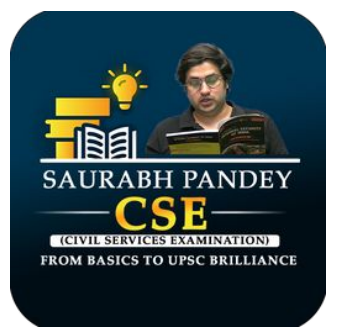
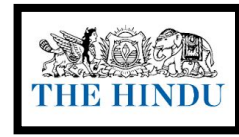


- Pereyaslav Agreement, (Jan. 18 [Jan. 8, Old Style], 1654), act undertaken by the rada (council) of the Cossack army in Ukraine to submit Ukraine to Russian rule, and the acceptance of this act by emissaries of the Russian tsar Alexis; the agreement precipitated a war between Poland and Russia (1654–67).
- The hetman of the Zaporozhian Cossacks, Bohdan Khmelnytsky, had been leading a revolt against Polish rule in Ukraine since 1648.

- In 1651, in the face of a growing threat from Poland and forsaken by his Tatar allies, Khmelnytsky asked the tsar to incorporate Ukraine as an autonomous duchy under Russian protection.
- The Russians were reluctant to enter into such an agreement, and it was not until October 1653 that a Russian zemsky sobor (“assembly of the land”) approved the request and Alexis sent a delegation, headed by V.V. Buturlin, to the Cossacks.



Topics



- Quarks
- Global Plastic treaty
- ILO Report on health and climate
- Mains



By saurabh pandey sir



Particles called quarks hold the key to the final fate of some stars

In neutron stars, the strength with which the core collapses fuses protons and electrons into neutrons. Neutron stars are extremely dense, creating immense pressure that could be forcing the neutrons into a new state of matter. An old open problem asks whether this state could be quark matter

Qudsia Gani

We know that all matter is composed of atoms, and atoms are made of protons and neutrons inside the nucleus and electrons outside. But unlike electrons, protons and neutrons are composite particles because they are further made up of quarks.

Quarks can't exist in isolation. They can only be found in groups of two or three, if not more. Such clumps of quarks are called hadrons. Protons and neutrons are common examples. Physicists have mostly studied quarks based on the behaviour of hadrons, and are also interested in how quarks clump together.

When quarks clump

Two recent findings revealed new insights on this count. One, published on February 20, reported that three-quark clumps are more likely to form than two-quark clumps when a particular type of quark is more densely surrounded by some other particles. According to the international team of researchers that conducted this study, the finding rejects "conventional particle-physics models in which the consolidation of quarks is independent of the particle environment".

Another study, published on March 15, reported observing clumps composed entirely of the heavier quarks. Protons and neutrons are clumps of lighter quarks and are thus more long-lived. Heavy-quark clumps are very short-lived and harder to study, requiring more sophisticated tools and computing power. Yet understanding them is important to complete our understanding of all quarks, and by extension how these elusive particles affect what we know about nuclear fusion and the fate of stars.

In fact, in the particular and unusual case of quark stars, understanding quarks could have a more direct impact.

The tension of every star

A star is a globe of matter that has found a way to strike a balance between two forces. The force of gravity – arising from the star's mass – encourages the star to collapse under its own weight and implode. The nuclear force, expressed in the explosive energy released by fusion reactions at its core, pushes the star to blow up and outwards. In a star, the two forces are equally matched and it shines in the sky.

But once a star runs out of material to fuse, nuclear fusion weakens and gravity starts to gain the upper hand. Eventually, the star will 'die' and implode. Its fate in its afterlife depends on how large and massive it was when it lived, as a result forming a white dwarf, a neutron star or a black hole.

Scientists have estimated that if the Sun were 20-times more massive, it may collapse into a black hole when it dies. If it were only eight-times heavier, it could become a neutron star. But could there be stars that are too heavy to form a neutron star yet not too heavy to form a black hole, and thus form a quark star?

Enter 'quark matter'

In neutron stars, the strength with which the core collapses will fuse all protons and electrons inside into neutrons, thus its name. Physicists understand neutron



An artist's conception of the pulsating neutron star PSR B1257+12, with a planet orbiting it nearby. NASA

stars well – on paper. The problem is they can't run any direct experiments on them in any laboratory on the earth. They also don't know either the masses or the radii of most neutron stars in the universe. So astrophysicists are very interested in studying them.

The matter inside neutron stars is extremely dense. For example, two Suns' worth of mass is packed into a sphere only 25 km wide. This creates an immense pressure that could be forcing the neutrons into a new state of matter.

An old open problem in physics asks whether this state could be quark matter – when there are no longer any neutrons, only quarks.

In December 2023, researchers from the University of Helsinki reported in the journal *Nature Communications* that the insides of most massive neutron stars have an 80-90% chance of being made of quark matter.

The research team combined astrophysical observations with theoretical *ab initio* (from scratch) calculations to develop a model that they ran using a supercomputer, and arrived at this result. However, these astrophysical observations were small in number, meaning the result is not so reliable. Astrophysicists need more observational data to understand quark matter and how exactly it forms.

The need for quarks

A popular way of calculating the bulk properties of any material is to use an equation of state – an equation that, when solved with data about some of a material's physical properties, reveals the values of other properties. For neutron stars, this is the



Once a star runs out of material to fuse, nuclear fusion weakens and gravity gains the upper hand. Eventually, the star will implode. Its fate in its afterlife will depend on how large and massive it was when it lived

Tolman-Oppenheimer-Volkoff equation: it is very complex but it assigns a probability to the presence of quarks within neutron stars.

Physics has a rich tradition of giving quirky names to things physicists find. For example, quarks come in six 'flavours' – three are called charm and strange; quarks themselves have a property called colour charge; and so on. The name 'quark' itself is courtesy physicist Murray Gell-Mann, who named these particles after a line in James Joyce's 1939 masterpiece, *Finnegan's Wake*.

Protons are positively charged and therefore have a magnetic moment (a turning force exerted by a magnetic field) associated with them. But neutrons have a magnetic moment, too, yet they are neutrally charged. So physicists in the 1960s figured neutrons must be made of smaller particles that gave rise to the magnetic moment but whose electric charges cancel themselves out. Gell-Mann called them quarks and their existence was confirmed in the 1970s.

Setting quarks free

There are six types of quarks: up, down, top, bottom, strange, and charm. Each quark can have one of three types of

colour charge. Then there are also antiquarks, their antimatter versions. A quark-antiquark clump is called a meson (they don't annihilate each other because they are of different types, e.g. up + anti-down). Three-quark clumps are called baryons and they form the normal matter surrounding us.

Quarks are further held together by another set of particles called gluons. Because nuclear forces are very strong, quarks are always tightly bound to each other and are not free, even in the vacuum of empty space.

The nuclear force that holds quarks together is explained by a theory called quantum chromodynamics. It predicts that at sufficiently high (by all means extreme) energies, nuclear matter can become 'deconfined' to create a new phase of matter in which quarks don't have to exist in clumps.

Physicists have been able to obtain evidence of deconfinement by smashing lead ions against each other at very high energies in machines like the Large Hadron Collider. In these experiments, a state of matter called a quark-gluon plasma exists for a brief moment; the 'plasma' means the quarks are independent. According to the Big Bang theory, the universe was filled with this plasma before the particles clumped and formed the first blobs of matter.

This clumping process may release energy or modify its surroundings in a way that astrophysicists can look for, and eventually discover a quark star. Until then, the possibility will live on as one of the many open problems of physics.

(Qudsia Gani is an assistant professor in the Department of Physics, Government Degree College Pattan, Baramulla.)



Quarks

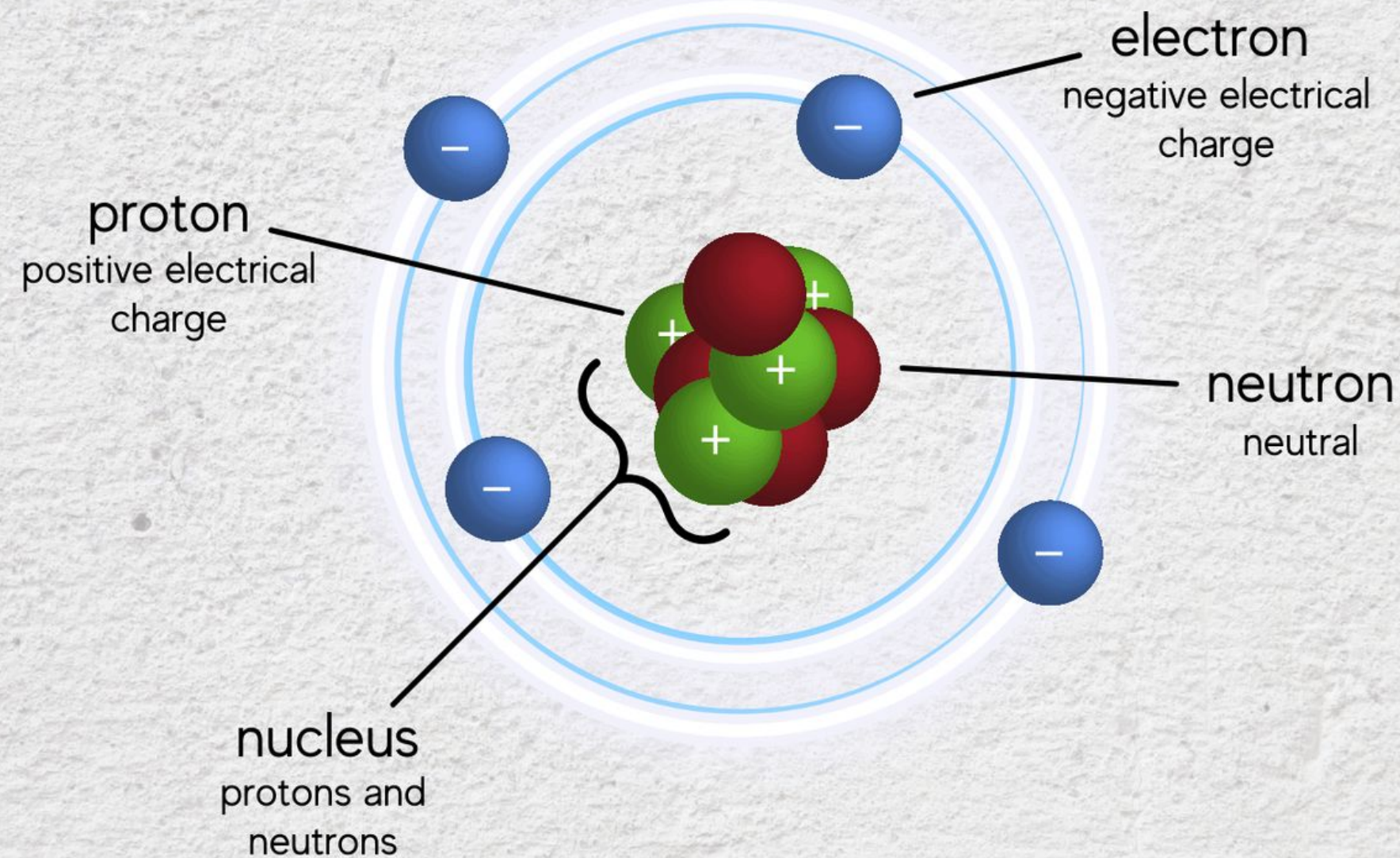


- We know that all matter is composed of atoms, and atoms are made of protons and neutrons inside the nucleus and electrons outside.
- But unlike electrons, protons and neutrons are composite particles because they are further made up of quarks. Quarks can't exist in isolation.
- They can only be found in groups of two or three, if not more. Such clumps of quarks are called hadrons.
- Protons and neutrons are common examples. Physicists have mostly studied quarks based on the behaviour of hadrons, and are also interested in how quarks clump together

The Hindu analysis by saurabh.pandey sir



Parts of an Atom



The Standard Model of Particle Physics

FERMIONS (matter particles)			BOSONS (force carriers)	
QUARKS	u up	c charm	t top	g gluon
	d down	s strange	b bottom	γ photon
	e electron	μ muon	τ tau	Z^0 Z boson
LEPTONS	ν_e electron neutrino	ν_μ muon neutrino	ν_τ tau neutrino	W^\pm W boson
				H Higgs boson

The Hindu analysis by saurabh.pandey sir



- three-quark clumps are more likely to form than two-quark clumps when a particular type of quark is more densely surrounded by some other particles.
- Protons and neutrons are clumps of lighter quarks and are thus more long-lived.
- Heavy-quark clumps are very short-lived and harder to study, requiring more sophisticated tools and computing power

Case of Star

- A star is a globe of matter that has found a way to strike a balance between two forces. The force of gravity — arising from the star's mass — encourages the star to collapse under its own weight and implode.
- The nuclear force, expressed in the explosive energy released by fusion reactions at its core, pushes the star to blow up and outwards.
- In a star, the two forces are equally matched and it shines in the sky.
- But once a star runs out of material to fuse, nuclear fusion weakens and gravity starts to gain the upper hand.

- Eventually, the star will 'die' and implode.
- Its fate in its afterlife depends on how large and massive it was when it lived, as a result forming a white dwarf, a neutron star or a black hole.
- Scientists have estimated that if the Sun were 20-times more massive, it may collapse into a black hole when it dies.
- If it were only eight-times heavier, it could become a neutron star

The Hindu analysis by saurabh.pandey sir



- Eventually, the star will 'die' and implode.
- Its fate in its afterlife depends on how large and massive it was when it lived, as a result forming a white dwarf, a neutron star or a black hole.
- Scientists have estimated that if the Sun were 20-times more massive, it may collapse into a black hole when it dies.
- If it were only eight-times heavier, it could become a neutron star

- The matter inside neutron stars is extremely dense. For example, two Suns' worth of mass is packed into a sphere only 25 km wide.
- This creates an immense pressure that could be forcing the neutrons into a new state of matter.
- An old open problem in physics asks whether this state could be quark matter — when there are no longer any neutrons, only quarks.

- For neutron stars, this is the Tolman-Oppenheimer-Volkoff equation: it is very complex but it assigns a probability to the presence of quarks within neutron stars.
- Physics has a rich tradition of giving quirky names to things physicists find. For example, quarks come in six 'flavours' — three are called charm and strange; quarks themselves have a property called colour charge; and so on.
- The name 'quark' itself is courtesy physicist Murray Gell-Mann, who named these particles after a line in James Joyce's 1939 masterpiece, *Finnegan's Wake*.

- There are six types of quarks: up, down, top, bottom, strange, and charm. Each quark can have one of three types of colour charge.
- Then there are also antiquarks, their antimatter versions.
- A quark-antiquark clump is called a meson (they don't annihilate each other because they are of different types, e.g. up + anti-down).
- Three-quark clumps are called baryons and they form the normal matter surrounding us.

- Quarks are further held together by another set of particles called gluons.
- Because nuclear forces are very strong, quarks are always tightly bound to each other and are not free, even in the vacuum of empty space.
- The nuclear force that holds quarks together is explained by a theory called quantum chromodynamics.
- It predicts that at sufficiently high (by all means extreme) energies, nuclear matter can become 'deconfined' to create a new phase of matter in which quarks don't have to exist in clumps.

The Hindu analysis by saurabh.pandey sir





A public art installation outside a United Nations conference on plastics, in Ottawa, Ontario. AP

Plastic treaty talks conclude in Ottawa with little progress

Jacob Koshy

Activist and environmentalist groups have termed the Global Plastics Treaty negotiations that concluded in Ottawa, Canada, on Tuesday as “disappointing”. Nearly 192 member countries deliberated for nearly a week to iron out a legally binding agreement to “end plastic pollution”. This was the fourth round of talks since countries resolved in 2022 to eliminate plastics and formed an Intergovernmental Negotiating Committee (INC), which consisted of government representatives tasked with drawing up a timeline for countries to not only eliminate plastic use but also halt production.

However the close connection between plastics and the oil economies of prominent countries, the vast manufacturing businesses that revolve around making and supplying different grades of plastics, the near ubiquity of the polymer’s use in a variety of applications and the paucity of affordable, equivalent alternatives constitute the biggest roadblocks to its elimination. Because plastics do not easily degrade organically, they pollute marine and terrestrial ecosystems and have been long characterised as among the toughest environmental contaminants.

“The INC has once again failed to ask the most fundamental question to the success of the future treaty: how do we tackle the unsustainable production of plastics?” said Jacob Kean-Hammerson, Environmental Investigation Agency, United Kingdom and who was present at the talks.

The fourth round of talks was expected to deliver a timeline whereby primary plastic production was to halt. This didn’t happen, though countries agreed to move forward with and come up with more detailed assessments of emissions,

The close connection between plastics and the oil economies of prominent countries constitutes the biggest roadblock to its elimination

production, product design, waste management, problematic and avoidable plastics, financing, and a just transition.

“We came to Ottawa to advance the text and with the hope that members would agree on the inter-sessional work required to make even greater progress ahead of INC-5. We leave Ottawa having achieved both goals and a clear path to landing an ambitious deal in Busan ahead of us,” said Inger Andersen, Executive Director of the UN Environment Programme (UNEP).

“The work, however, is far from over. The plastic pollution crisis continues to engulf the world and we have just a few months left before the end of year deadline agreed upon in 2022,” she noted.

Inter-sessional work is expert meetings that take place between the official INC sessions and expected to catalyse agreement on key issues. The next meeting, expected to be the final one, is scheduled for November 2024 in Busan, South Korea.

“India opposed restrictions on producing so called primary plastic polymers or virgin plastics, arguing that production reductions exceed the scope of UNEA [United Nations Environment Assembly] resolutions. While acknowledging the chemicals used in plastic manufacturing, India highlighted that some are already subject to prohibition or regulation.



Global Plastics Treaty



- Activist and environmentalist groups have termed the Global Plastics Treaty negotiations that concluded in Ottawa, Canada, on Tuesday as “disappointing”.
- Nearly 192 member countries deliberated for nearly a week to iron out a legally binding agreement to “end plastic pollution”.
- This was the fourth round of talks since countries resolved in 2022 to eliminate plastics and formed an Intergovernmental Negotiating Committee (INC), which consisted of government representatives tasked with drawing up a timeline for countries to not only eliminate plastic use but also halt production.

The Hindu analysis by saurabh.pandey sir



End Plastic Pollution: Looking forward



- However the close connection between plastics and the oil economies of prominent countries, the vast manufacturing businesses that revolve around making and supplying different grades of plastics, the near ubiquity of the polymer's use in a variety of applications and the paucity of affordable, equivalent alternatives constitute the biggest roadblocks to its elimination.
- Because plastics do not easily degrade organically, they pollute marine and terrestrial ecosystems and have been long characterised as among the toughest environmental contaminants

- “India opposed restrictions on producing so called primary plastic polymers or virgin plastics, arguing that production reductions exceed the scope of UNEA [United Nations Environment Assembly] resolutions.
- While acknowledging the chemicals used in plastic manufacturing, India highlighted that some are already subject to prohibition or regulation.

The Hindu analysis by saurabh.pandey sir



Analysing labour on a warming plane

The link between labour productivity, human health and climate change gets scant attention, as the focus remains on economic and infrastructure resilience. The International Labour Organization's latest report points to the need to ensure that labour becomes climate proofed

FULL CONTEXT

Kunal Shankar

The story so far:

The International Labour Organization's (ILO) latest report, 'Ensuring safety and health at work in a changing climate', is an urgent call to ensure the future of labour is climate proofed and to address the constantly evolving work environment as the planet warms. The UN body states that well over a third of the world's population, are exposed to excessive heat annually, leading to almost 23 million work-related injuries.

What are the emerging hazards?

The ILO has identified six key impacts of climate change. They are — excessive heat, solar ultraviolet radiation, extreme weather events, workplace air pollution, vector-borne diseases and agrochemicals. These could lead to a range of health issues such as stress, stroke and exhaustion. The ILO mentions agriculture workers, workers in the construction sector, conservancy workers in cities and those employed in transport and tourism as most affected by climate change. It is also important to take note of the global rise in gig employment, which is highly heat-susceptible. Gig workers constitute about 15% of India's total work force, which is projected to grow to about 4.5% by 2030, according to a Nasscom study. In the Indian context, all these segments put together suggest that about 80% of the country's 2023 workforce of 600 million is susceptible to heat-related hazards.

Which sectors are affected?

Agriculture is by far the most heat susceptible sector globally, particularly so in the developing world, where informal farm labourers work with little to no weather protection. The NSSO data of July 2018-June 2019 reveal that almost 90% of Indian farmers own less than two hectares of land, and earn an average monthly income of a little over ₹10,000 with farmers in the bottom three States of Jharkhand, Odisha and West Bengal earning as low as ₹4,895, ₹5,112, and ₹6,762. This leaves little room for them to invest in adapting to a warming planet.

Agriculture is followed by India's sprawling Micro, Small and Medium Enterprises (MSME) sector that employs about 21% of the country's workforce, or more than 123 million workers. The overwhelming informalisation of the sector has meant little to no oversight of worker conditions by State Occupational Safety and Health (OSH) departments, leaving them highly vulnerable to heat hazards. This sector is followed by the building and construction segment which constitutes about 70 million workers, almost 12% of India's workforce. Workers here must cope with the urban heat island effect, as construction is a highly urban-centric economy, with rising growth in cities. Construction workers are also the most prone to physical injuries and air pollution related health hazards, like asthma, as several Indian cities are among the most polluted globally.

What laws address workplace safety?

A range of more than 13 central laws in India including, the Factories Act, 1948, the Workmen Compensation Act, 1923, the Building and Other Construction Workers Act, 1996, the Plantations Labour Act, 1951, the Mines Act, 1952 and the Inter-State Migrant Workmen Act, 1979, regulate working conditions across several sectors. These laws were consolidated and amended in September



Scorching heat: A vendor selling coconut water at a beach in Mumbai on April 29. REUTERS

2020 under one law — the Occupational Safety, Health and Working Conditions Code, 2020 (OSH Code, 2020). While several unions are critical of the new law for watering down safety and inspection standards, the Union government is yet to officially notify its enforcement. This has meant that unions and the judiciary continue to rely on the older laws to seek redress and accountability.

The Indian Factories Act defines a factory as an enterprise with "10 or more" workers, but those registered under this law are less than a quarter of a million based on the latest available data. The Labour Bureau in its 2020 report observes "an increase of 2.48% in the number of total registered factories that is, from 2,22,042 in the beginning of the year to 2,27,510 at the end of the year 2020." This means the overwhelming majority of India's 64 million MSMEs are not registered under this law, and are therefore outside the purview of governmental inspections.

What do they say about heat hazards?

When it comes to dealing with occupational heat, the Factories Act broadly defines "ventilation and temperature" and leaves it to the States to decide optimal standards based on specific industries. However, these regulations were framed more than five decades back. For instance, Maharashtra framed its rules under the law in 1963, while Tamil Nadu did so in 1950. Both these rules mention a maximum wet bulb temperature of 30°C on a shop floor with a height of 1.5 metres and also mention provisioning "adequate air movement of at least 30 meters per minute".

But these rules lack a breakdown of thermal comfort based on the level of activity, nor do they mention air conditioning, or other cooling alternatives. This is not surprising as the

rules were framed much before air conditioning became common as a heat coping method. But in the developing world, air conditioning is still a luxury at homes and a significant expense for businesses. With a warming climate, the government predicts 50% of Indian homes would have ACs by 2037, but we lack these numbers for businesses, indicating an urgent need to update India's Factories Act to incorporate technological changes in provisioning thermal comfort at businesses and add more categories of industries based on evolving production processes. Brazil for instance, mandates a stoppage of work "in cases where the WBGT (Wet Bulb Global Temperature) rises above 29.4°C for low intensity work, 27.3°C for moderate intensity work, 26.0°C for high intensity work, and 24.7°C for very high intensity work," the ILO mentions.

Speaking about extreme heat and instances of friction with top corporate management, S. Kannan, the leader of the recognised union at the BMW assembly plant at Mahindra World City, Chennai (which represents more than 200 of the 350 employees), pointed to an instance at the company where workers demanded additional "lemon juice, buttermilk, and tender coconuts at the canteen" to ensure hydration last year. He claimed that the workers concerns were scoffed at by the management as "petty" issues for "high income earners". Moreover, Mr. Kannan said that unions are pressured to submit not only from the management but from the State's bureaucracy who point to the "difficulty" in getting top class industries to set up shop in Tamil Nadu. They accuse unions of disincentivising MNCs from their expansion plans.

What about other climate hazards?

Amendments are also required to address the handling of effluents and byproducts

disposal, as they could significantly impact human health based on temperature. Hindustan Unilever's thermometer manufacturing plant in Kodaikanal, Tamil Nadu was shut in 2001, as it was found disposing mercury-laced glass waste in the centre of the town.

Frontline reports that the company dumped 7.4 tonnes, leaving townspeople exposed to a highly toxic and vapourable chemical that causes a range of diseases from birth defects to several types of cancer. "This was our main case in the Madras High Court against the company," tells S. Meenakshi, who was among a battery of lawyers representing retrenched workers and townspeople seeking redress for the serious illnesses caused across Kodaikanal that were attributed to Mercury exposure. A charge denied by Unilever, even as it reached an out of court settlement with workers in 2016 after a decades-long battle.

Another significant occupational illness to be addressed in the coming decades would be the possible rise in silicosis cases. Silicosis is a fatal and incurable pulmonary disease caused by what is commonly called "lung dust", the fine particulate matter emitted in the mines of coal, precious gems like quartz and diamonds and stone quarries. India is set to record its highest coal production ever in the financial year 2023-24 and has expanded the number of mines to meet rising power demand, leading to an increase in the probability of silica exposure. In 2016, the Supreme Court ordered the Gujarat government to pay ₹3 lakh as compensation to the families of 238 victims who died of silicosis while working at a quartz mine in Godhra. The Court blamed Gujarat's bureaucracy for "neglecting" to protect the advasi migrant labourers who worked in the mines.

It would have been the job of inspectors under the Factories Act to inspect and enforce the provisioning gears that protect employees from silica exposure. While the TN and Maharashtra rules under the Factories Act elaborate on silica exposure prevention, they do not mandate the use of silica removal technologies at stone quarries or mines. Again, these technologies were not available when these rules were framed. Mr. Kannan says that, "labour conciliation, industrial safety and worker welfare are weak wings of the government. There are several vacancies, both at the inspector level, and at the clerical level, and our main concern is training, sensitisation and the competence of inspectors to conduct specialised inspections." He spoke about instances where inspectors fear the "influence that private sector management, particularly, MNC's wield" with State bureaucrats. However, a retired official from Tamil Nadu's Directorate of Industrial Safety and Health, R. Jayakumar countered the charge of incompetence and unfilled job posts in the department he headed. He stated vacancies might have been temporary. "In fact, when the BOCW Act (Buildings and Construction Workers Act, 1996) was enacted, we formed a new wing and created new posts to look into its implementation," Mr. Jayakumar said, referring to the law that regulates employment in the construction sector. But he admitted that climate change raises concerns about working conditions.

Often the link between labour productivity, human health and climate change gets scant attention, as the focus remains on economic and infrastructure resilience. The ILO report points to the need to ensure a universally accepted regulatory framework to climate-proof work and workers.

THE GIST

▼ The ILO has identified six key impacts of climate change. They are — excessive heat, solar ultraviolet radiation, extreme weather events, workplace air pollution, vector-borne diseases and agrochemicals.

▼ When it comes to dealing with occupational heat, the Factories Act broadly defines "ventilation and temperature" and leaves it to the States to decide optimal standards based on specific industries. However, these regulations were framed more than five decades back.

▼ Amendments are also required to address the handling of effluents and byproducts disposal, as they could significantly impact human health based on temperature.



ILO Report on health and climate change



- The International Labour Organization's (ILO) latest report, 'Ensuring safety and health at work in a changing climate', is an urgent call to ensure the future of labour is climate proofed and to address the constantly evolving work environment as the planet warms.
- The UN body states that well over a third of the world's population, are exposed to excessive heat annually, leading to almost 23 million work-related injuries.

The Hindu analysis by saurabh.pandey sir



Which sectors are affected?

- Agriculture is by far the most heat susceptible sector globally, particularly so in the developing world, where informal farm labourers work with little to no weather protection.
- Agriculture is followed by India's sprawling Micro, Small and Medium Enterprises (MSME) sector that employs about 21% of the country's workforce, or more than 123 million workers.

The Hindu analysis by saurabh.pandey sir



- The overwhelming informalisation of the sector has meant little to no oversight of worker conditions by State Occupational Safety and Health (OSH) departments, leaving them highly vulnerable to heat hazards.
- This sector is followed by the building and construction segment which constitutes about 70 million workers, almost 12% of India's workforce.
- Workers here must cope with the urban heat island effect, as construction is a highly urban-centric economy, with rising growth in cities

The Hindu analysis by saurabh.pandey sir



What laws address workplace safety ?

- A range of more than 13 central laws in India including, the Factories Act, 1948, the Workmen Compensation Act, 1923, the Building and Other Construction Workers Act, 1996, the Plantations Labour Act, 1951, the Mines Act, 1952 and the Inter-State Migrant Workmen Act, 1979, regulate working conditions across several sectors.
- These laws were consolidated and amended in September 2020 under one law — the Occupational Safety, Health and Working Conditions Code, 2020 (OSH Code, 2020).

The Hindu analysis by saurabh.pandey sir



- When it comes to dealing with occupational heat, the Factories Act broadly defines “ventilation and temperature” and leaves it to the States to decide optimal standards based on specific industries.
- However, these regulations were framed more than five decades back. ?
- Amendments are also required to address the handling of effluents and byproducts disposal, as they could significantly impact human health based on temperature.



Topics



- **P versus NP problem**
- **Liquid Nitrogen**
- **Spices board of india**
- **Red sea**
- **Venture capital**
- **Mains**



By saurabh pandey sir



Q. 'Climate change will alter the pace of economic growth'. Discuss (150 words)

Ans.

RBI's Department of Economic and Policy Research has mentioned in its recent report that the climate change in India could cost 2.8% of its economy and will depress the standard of living of nearly half of its population by 2050.

Impact of Climate Change on Economic Growth

1) Agriculture :- As climate change occurs, the weather patterns, rainfall, increase in temperature all leads to decrease in the generation of crops yield.

2) Energy Crisis :- As the temperature keeps on rising the demand for energy increases, (more will be produced via coal based thermal power plants).

Acc. to International Energy Agency - India's primary energy demand will be doubled by 2030.

3) Health Complications :- With increase in heat the incidents of deaths due to diarrhoea, malaria and heat stress have increased by many folds, thus a threat to the working population of the country.

4) Labour Force Exposure :- labours indulged in

working at construction & building sites (12% of India's workforce) faces extreme heat effects due to urban heat island effect at these sites. As a result of which:-

- * No. of working hours are reduced
- * More exposure of heat have negative impact on their over all well being.

(5) Damaged infrastructure :- Due to climate change ^{extreme} weather events takes place, which results into ~~the~~ damaging of the infrastructure of roads, bridges, ports, power plants, thus will directly impact the economic trade activity, connectivity

Way Forward :-

(i) Need to amend laws - to include in → safety and health aspect of the working force to free from adverse effects of the climate change (Recognised as Fundamental Right by SC recently)

(ii) Climate resilient infrastructure & agricultural practices

(iii) More of awareness generating campaigns & initiatives, like National Action Plan on Climate Change

A computer science conundrum that could transform healthcare

While it may sound like a cryptic puzzle reserved for computer science mavens, the implications of the P versus NP problem stretch beyond algorithms and data structures, rippling through diverse fields, including antimicrobial resistance, cancer care, and medical insurance

C. Aravinda

In the 17th century, a Dutch draper named Anton van Leeuwenhoek used a small handmade microscope to peer into a world previously unseen by the human eye. Thus he discovered microorganisms and gave rise to the field of microbiology. It offered solutions to challenges in healthcare that until then had seemed intractable.

Today, we face a new set of complex problems in healthcare that seem more intractable than others before for their inherent complexity and the constraints they threaten to impose on resources.

P versus NP

It so happens that an unsolved problem in computer science, simply called the P versus NP problem, could hold the key to these modern-day conundra. While it may sound like a cryptic puzzle reserved for computer science mavens, its implications stretch beyond algorithms and data structures, rippling through diverse fields including healthcare. But what exactly is this puzzle, and how could its resolution unlock a new era in medical science?

Let's start with a simple arithmetic example. Say you're asked to multiply 17 with 19. With some time, you'd arrive at the answer: 323. This is a 'P' problem; you can solve it reasonably quickly. ('P' stands for polynomial time.) Suppose you're presented with 323 and asked to identify the two prime numbers multiplied to get this. In this case, you will have to take the trial and error route until you arrive at 17 and 19. This is an 'NP' problem: it takes longer to solve, but once you have the solution, you can verify it quickly. ('NP' here is nondeterministic polynomial time.)

Healthcare is filled with complex issues. Consider scheduling in a hospital: assigning doctors and nurses to shifts, booking operating theatres for surgeries, and organising patient appointments. It is an intricate puzzle that requires considering various factors – staff availability, urgency of medical cases, etc. – and potential changes such as emergency cases and cancellations.

The P vs NP question is this: could there be a shortcut to solve 'NP' problems as quickly as 'P' problems? Because the implication is that if P equals NP, we could quickly find the optimal solution to these scheduling problems, thus significantly improving patient care.

The implications of resolving this question are profound and wide-reaching, including for healthcare.

Implications for healthcare

The P vs NP question is a problem in mathematics and computer science, but that does not mean it will be confined there. If an existing problem can be given a faithful mathematical representation and is found to be an 'NP' problem, the shortcut in question could help by turning it into a 'P' problem.

For example, antibiotic resistance is a significant global health concern. If P equals NP, we may have a way to quickly analyse bacterial genomes and predict their resistance patterns, helping doctors prescribe the most effective antibiotics. This would improve patient outcomes and help combat antibiotic resistance, including new antibiotics discoveries for



Healthcare is filled with complex issues like assigning doctors and nurses to shifts, booking operating theatres for surgeries, and organising patient appointments. GETTY IMAGES/STOCKPHOTO

emerging diseases. Of course, patients' adherence will still matter.

Cancer is a complex disease with myriad mutations. Deciding the best treatment plan is an NP problem because it involves considering all possible combinations of drugs and therapies. If P equals NP, we may have an opportunity to swiftly identify the optimal treatment for each individual cancer patient and potentially save many lives. The catch here is that we will still need a large volume of data.

Insurance companies grapple with NP problems when they have to determine premiums and packages based on considering numerous variables like age, health status, lifestyle, and medical history. Having a shortcut to crack the P vs NP problem could help these companies optimise their decision-making and pave the way to fairer and more accurate premiums and conditions. Further, government spending on healthcare can also be utilised with minimal leakage while programmes like Ayushman Bharat can contribute more effectively to achieving universal health coverage.

By solving these complex problems more efficiently, we could potentially dramatically reduce resource constraints and improve health outcomes.

Surprising sources of progress

While the P vs NP problem is a topic of ongoing study in computer science, the consensus among most experts is that P probably does not equal NP, implying that some problems will remain very difficult to crack, even if a solution – once it is found – will be easier to verify. But this has not deterred researchers from exploring this question, and in the pursuit



If P equals NP, we may have a way to quickly analyse bacterial genomes and predict their resistance patterns, helping doctors prescribe the most effective antibiotics. This would improve patient outcomes and combat antibiotic resistance

of which they have unearthed improvements to algorithms and new approaches to dealing with complex problems.

Throughout history, there have been many instances of seemingly insurmountable problems being overcome with innovative thinking. Before the discovery of electricity, for example, candlemakers lit our world. Yet most of them may never have foreseen the revolutionary consequences of Thomas Edison's incandescent bulb, which brought light to more people and for longer hours.

Similarly, following the invention of calculus and expanding the binomial theorem to negative integers and fractions, Isaac Newton considerably improved our understanding of the irrational number pi. Why, the technology giant Apple has been transforming our expectations of what a watch can be expected to do in ways that Swiss watchmakers may never have anticipated.

Not all will be winners

This said, one potential drawback of P being equal to NP, if ever that outcome comes to pass, lies in the realm of cryptography. Many encryption schemes

and algorithms rely on problems that are currently hard to solve, believed to be in the set of 'NP', not 'P' problems. That is, these schemes protect secrets by hiding them behind a problem that is very hard to solve but easy to verify. If P equals NP, these problems will become easy to solve, rendering these encryption schemes vulnerable to attacks and compromising digital security.

This said, healthcare isn't the sole beneficiary of this problem-solving. The barrier that the P vs NP problem stands for encompasses every field where the solution to a problem is blocked by the availability of significant computational resources. So these fields include logistics, finance, and even climate modelling, all of which could experience paradigm shifts if the P vs NP problem is solved in favour of the P = NP outcome.

The Clay Mathematics Institute in Colorado continues to offer a million dollars to anyone who can definitively solve the P vs NP problem. But for anyone who does, a million dollars will pale in comparison to the rewards they stand to collect by revolutionising various human enterprises, potentially driving human progress in unimaginable ways.

As we look to the future, let us remember that problems that seem insurmountable today might not be so tomorrow. As with the candlemakers, the watchmakers, and even Anton van Leeuwenhoek, the solution often comes from where we least expect it. Today's brightest minds grappling with the P vs NP problem may be on the brink of a breakthrough that could redefine healthcare as we know it.

(Dr C. Aravinda is a public health physician and student at IIT Madras pursuing a BS degree in data science.)



P versus NP problem

- The P versus NP problem is to determine whether every language accepted by some nondeterministic algorithm in polynomial time is also accepted by some (deterministic) algorithm in polynomial time.
- An algorithm is said to be solvable in polynomial time if the number of steps required to complete the algorithm for a given input is for some nonnegative integer n , where n is the complexity of the input. To define the problem precisely it is necessary to give a formal model of a computer.

•

The Hindu analysis by saurabh pandey sir



- In computer programming, a nondeterministic algorithm is an algorithm that, even for the same input, can exhibit different behaviors on different runs, as opposed to a deterministic algorithm.
- There are several ways an algorithm may behave differently from run to run

- The standard computer model in computability theory is the Turing machine, introduced by Alan Turing in 1936 [37].
- Although the model was introduced before physical computers were built, it nevertheless continues to be accepted as the proper computer model for the purpose of defining the notion of computable function.
- Informally the class P is the class of decision problems solvable by some algorithm within a number of steps bounded by some fixed polynomial in the length of the input.



Liquid nitrogen being poured from a container into a bowl. [CORY DOCTOROW/FLICKR](#)

Liquid nitrogen in foods draws Tamil Nadu's ire, yet again

R. Sujatha

A week ago, a video of a child screaming went viral on social media. There were visuals of adults spewing white smoke from their mouth and nose. What the child said was garbled but it was soon apparent the child had consumed a food item infused with liquid nitrogen.

Television channels and online media took up the issue. The Tamil Nadu government issued an advisory banning the use of liquid nitrogen in food and warned of stringent action against violators.

In 1991, *The Hindu* reported that a London-based company developed a system to improve the quality and shelf life of food by introducing droplets of liquid nitrogen in the packaging. When nitrogen evaporates, it displaces oxygen in the food pack, preventing microbial action and preserving freshness.

The technique was useful in packing coffee, potato crisps, peanuts and peanut butter, milk products, cheese, and dried potatoes, the article said.

As with every novelty, some chefs also experimented with liquid nitrogen to make food more interesting. In 2016, a few upmarket restaurants and eateries in Chennai and elsewhere used it to entice customers.

But in August 2017, the then Union Environment Minister Harsh Vardhan said in Rajya Sabha the government would investigate the addition of liquid nitrogen

The Tamil Nadu Food Safety Department has issued a circular on the use of liquid nitrogen saying the substance can only be used to preserve packaged food

in food and drinks served in some restaurants.

Six months ago, in Tiruchirappalli, a vendor's shop was sealed after authorities found liquid nitrogen in food, the city's designated food safety officer said.

"Liquid nitrogen, an inert, colourless, odourless cryogenic fluid has traditionally been used in the management of many benign pre-cancers and cancers since the 1960s," Arvind Krishnamurthy, professor and head of surgical oncology at the Adyar Cancer Institute, said. "This form of treatment is generally used to manage cancers wherein conventional surgery is not possible or can be used as an adjunct to conventional surgery."

The procedure involves using the element at a frosty -196 degrees C to freeze and destroy cancer cells. "The treatment is scientifically described as cryotherapy. It can also be used to obtain biopsies from cancer tissues for further molecular analysis. Another application is to use it as cryo-adhesion to remove foreign bodies," he explained.

Cryotherapy has been attempted to treat many cancers, including those of skin, bone, breast, cervical, eye, kidney, liver, lung, and prostate.

"Liquid nitrogen should be handled by trained professionals with proper protective gear, preferably in a controlled lab or industry, as improper handling or consumption of liquid nitrogen can cause severe damage to the skin, mucous membranes, and internal organs," the surgeon said.

A day after the viral video, the Tamil Nadu Food Safety Department cited the Food Safety and Standards Regulations, and the Drug Administration department issued a circular on the use of liquid nitrogen saying the substance can only be used to preserve packaged food.

The department also warned of stringent action, including fines and legal proceedings, if it is used for other purposes.

(sujatha.r@thehindu.co.in)



Liquid Nitrogen

- **.In 1991, The Hindu reported that a London-based company developed a system to improve the quality and shelf life of food by introducing droplets of liquid nitrogen in the packaging.**
- **When nitrogen evaporates, it displaces oxygen in the food pack, preventing microbial action and preserving freshness.**
- **The technique was useful in packing coffee, potato crisps, peanuts and peanut butter, milk products, cheese, and dried potatoes,**

The Hindu analysis by saurabh pandey sir



DIFFERENCE BETWEEN

LIQUID NITROGEN **VS** NITROGEN GAS

- > IT IS MAN-MADE
- > N₂ IN LIQUID PHASE
- > LIQUID STATE
- > TOUCH MAKES MATERIALS BRITTLE
- > HAZARDOUS FOR LIVING TISSUES
- > Preservation of semen, blood samples and other biological samples, freezing food, cattle branding, skin treatment, and cryotherapy

- > MAKING UP 78% OF ATMOSPHERE
- > N₂ IN GASEOUS PHASE
- > GASEOUS PHASE
- > NORMALLY NOT HAZARDOUS
- > NO EFFECT ON MATERIALS
- > Preservation of food products from oxidation, transporting hazardous products, tire tubes, beer kegs

LIN & Nitrogen gas has got inerting properties. Both of them widely used in food packaging, making ammonia, fertilizers, pharma.

- “Liquid nitrogen, an inert, colourless, odourless cryogenic fluid has traditionally been used in the management of many benign pre-cancers and cancers since the 1960s.
- The procedure involves using the element at a frosty -196 degrees C to freeze and destroy cancer cells.
“The treatment is scientifically described as cryotherapy.

Why are Indian spices facing the heat?

Why have countries such as Singapore, Hong Kong and the U.S. announced an investigation into possible contamination of spice mixes sold by MDH and Everest? How has the Spices Board of India responded? What has the U.S. FDA said?

EXPLAINER

Saptaparno Ghosh
Saumya Kalia

The story so far:

At least five countries – including Singapore, Hong Kong and the U.S. – have announced an investigation into possible contamination of spice mixes sold by Indian brands, MDH and Everest. The complaints cite the presence of ethylene oxide (EtO), a toxic chemical used as a food stabiliser, beyond permissible limits. The Spices Board of India in response has initiated mandatory testing of products shipped abroad and is reportedly working with exporters to identify the root cause of contamination.

Which countries have flagged safety of Indian spices?

The domino first shook on April 5, when Hong Kong's Centre for Food Safety suspended the sale of three MDH spice blends (Madras curry powder, Sambhar masala and Curry powder masala) and Everest Fish curry masala. The spice mixes had high levels of ethylene oxide, the regulator said, and advised consumers against purchasing these products. Days later, Singapore ordered a recall of the Everest spice mix, stating that it is unfit for human consumption.

MDH has called allegations over EtO contamination “baseless and unsubstantiated”. “We reassure our buyers and consumers that we do not use ethylene oxide at any stage of storing, processing, or packing our spices,” the company said in a statement. It added that neither the Spices Board nor the Food Safety and Standards Authority of India (FSSAI) have received communication or test reports from Singapore or Hong Kong authorities.

The U.S. Food and Drug Administration (FDA), which had previously rejected food and spice imports from India, told *Reuters* that it is “aware of the reports and is gathering additional information about the situation”. Regulatory bodies in Maldives, New Zealand, Bangladesh and Australia have announced similar plans.

What are the health concerns?

MDH and Everest's spice mixes allegedly contain high levels of EtO, a prohibited pesticide. EtO is a colourless, flammable gas that was originally intended for sterilising medical devices. It is used as a chemical in industrial settings, agriculture, and as a sterilising agent in food products, including spices, dried vegetables and other commodities. The chemical lends life to the spice industry – it reduces microbial contamination, and in turn, extends products' shelf life.

However, this process is not always airtight. The improper and excessive use of EtO may leave behind residues, causing toxic and even carcinogenic compounds to form, thus contaminating the product. One such compound is ethylene glycol, an ingredient which was found in Indian-made cough syrups that were linked to the deaths of more than 300 children in Cameroon, Gambia, Indonesia and Uzbekistan. Long-term exposure to ethylene oxide is associated with cancers including lymphoma and leukaemia, some evidence shows.

Is there a history of rejections in U.S.?

A scrutiny of FDA's import refusal report, for the calendar year 2023, cites at least 30 instances wherein entry was refused because the products appeared to contain salmonella.

Indian spices and herbs rejected by the U.S. FDA in 2023

A scrutiny of FDA's import refusal report, for the calendar year 2023, cites at least 30 instances wherein entry was refused because the products appeared to contain salmonella

Company	Products rejected	Reasons for rejection
Ramdev Food Products Pvt Ltd	Cumin	Appears to contain salmonella, a poisonous and deleterious substance which may render it injurious to health
	Mixed spices and seasoning	Salmonella
	Coriander	Salmonella
	Nutmeg	Salmonella
	Cumin	Salmonella
	Ginger	Salmonella
	Fennel	Artificial colouring, misbranding
Mahashian Di Hatti (MDH)	Paprika	Filthy, putrid, or decomposed substances otherwise unfit for food; and salmonella
	Mixed spices and seasoning	Salmonella
	Mixed spices and seasoning	Misbranding + salmonella
	Capsicums (cayenne chili, hot peppers) spice	Salmonella
	Spices and seasoning, ground, cracked with salt	Salmonella
Everest	Capsicums (cayenne chili, hot peppers) spice	Salmonella
	Spices and seasoning, ground, cracked with salt	Labelling violation of FPLA because of its placement, form and/or contents statement
	Black pepper	Salmonella
MTR Foods Private Limited	Curry powder, ground, cracked without salt	Salmonella
	Spices and seasoning, ground, cracked with salt	Salmonella
	Spices and seasoning, ground, cracked with salt	Labelling violation
Dharampal Satyapal Ltd. (DS Group Catch)	Mixed spices and seasoning	Appears to be misbranded in that the label or labeling fails to bear the required nutrition information; appears to contain a poisonous or deleterious substance which would ordinarily render the article injurious to health
Patanjali Ayurved Ltd.	Natural extract or flavour	Appears to be a new drug within the meaning of Section 201(p) without an approved New Drug Application (NDA)
Nestle India	Spices and seasoning, ground, cracked with salt	Salmonella
Badshah Masala Pvt. Ltd.	Spices and Seasoning, ground, cracked with salt	Labelling violation
Tulsi Foods	Black pepper	Filthy and salmonella
Speciality Indian Food Parks & Exports	Black pepper	Filthy and salmonella

U.S. FDA's Import Refusal Report



ISTOCKPHOTO

food-borne illness. Other than this, there have been at least 11 counts of products being rejected because of misbranding, adulteration, artificial colouring or incorrect labelling. The two causes have existed in combination as well. The report tabulates Ramdev Food Products to have had the maximum rejections in 2023 (about 30), followed by MDH (about 19), MTR (7), Everest (5), makers of Catch: DS Group (2) and Badshah (1).

In fact, in September 2019, a recall of MDH's Sambhar Masala was initiated in the U.S. after FDA discovered the product was contaminated with salmonella. The recall terminated in December 2021. Another such recall involved Everest's Garam Masala and Sambhar Masala, and Maggi's Masala-ae-Magic in June last year.

The U.S. Dept of Agriculture had in February 2022 stated that India and Mexico were the top sources of pathogen-based food import refusals. Their study, from 2002-19, held Indian imports had the maximum number of

pathogen-related violations. With 5,115 refusals – the figure represented 22.9% of overall import refusals for pathogen/toxin related violations.

How has India responded?

On April 25, the Spice Board in India announced a slew of corrective measures including initiating mandatory testing of consignments shipped to Singapore and Hong Kong and gathering technical details and analytical reports from the relevant food and drug agencies. It also sought to propose corrective measures to the concerned exporters and initiate inspections to ensure adherence to relevant standards. A circular dated April 30 contains guidelines to exporters on preventing EtO contamination. The guidelines prescribe norms for testing at raw and final stages, storage of EtO treated products and use of alternate methods curtailing the use of the chemical compounds. The Spices Board issued a similar advisory in September

2021, after the EU observed EtO contamination in certain Indian exports. Furthermore, the FSSAI has directed state regulators to collect samples of major spice brands, including MDH and Everest, to test for EtO.

Activists have called for stringent safety checks of curry powders and spices to detect and control the use of EtO in food products and ensure proper implementation of regulatory norms. A recent CUTS report also recommended updating food safety standards to align with global practices, and improving information flow to food industries so that they better comply with regulations.

Is food safety in India lacking?

Simi T.B., who works with CUTS International, a global advocacy group for consumer welfare told *The Hindu*, notwithstanding stringent food laws in place, that the recent controversies “collectively underscore the persistent nature of food safety challenges across various sectors of the food industry”.

One challenge is operational – India's diverse food landscape, the lack of standardised record-keeping and intentional food fraud may prevent manufacturers from tracing ingredients and assessing potential risks which compromise the safety of the entire food supply chain. Traceability is particularly challenging for small and medium sized businesses with limited resources.

Some are logistic barriers. At least 10 States/Union Territories lack government or private notified food testing labs, as mandated under the Food Safety and Standards Act 2006. These labs are distributed unevenly across regions; have insufficient number of food safety officers; and were found to operate ineffectively due to resource constraints, showed the FSSAI Annual Report of 2021-22. FSSAI's operations often lack transparency, which “hinders efforts to meet safety standards”, build accountability and trust, adds Ms. Simi.

What next?

Delhi-based think tank Global Trade Research Initiative (GTRI) in a recent note held, “With nearly \$700 million worth of exports to critical markets at stake, and potential losses soaring to over half of India's total spice exports due to cascading regulatory actions in many countries, the integrity and future of India's spice trade hang in delicate balance.” According to the think tank, the issue demands urgent attention to uphold the reputation of the entire ecosystem.

Vijoo Krishnan, General Secretary of the All-India Kisan Sabha explained that the chain of events could put other small companies or co-operatives' exports under a cloud of suspicion. Importantly, Mr Krishnan explained that in the event of potential losses, farmers of such crops too could find themselves at the receiving end. “We have instances where companies have not paid appropriate prices to farmers even when they were making profits,” he stated, adding, “Should the companies make losses now, it could be used as a pretext to reduce prices, thus, burdening the farmer.”

GTRI also assessed that if regulators in China follow their peers in Hong Kong, and ASEAN based on that by Singapore, Indian exports could see a “dramatic downturn”. This could affect exports valued at \$2.17 billion – about 51.1% of the country's global spice exports. The paradigm could further worsen if the EU, which it states, “regularly rejects Indian spice consignments over quality issues”, follows suit. The impact could be an additional \$2.5 billion, bringing potential losses to 58.8% of India's global exports.

THE GIST

▼ On April 5, Hong Kong's Centre for Food Safety suspended the sale of three MDH spice blends (Madras curry powder, Sambhar masala and Curry powder masala) and Everest Fish curry masala.

▼ MDH and Everest's spice mixes allegedly contain high levels of EtO, a prohibited pesticide. EtO is a colourless, flammable gas that was originally intended for sterilising medical devices.

▼ GTRI assessed that if regulators in China follow their peers in Hong Kong, Indian exports could see a “dramatic downturn”. This could affect exports valued at \$2.17 billion – about 51.1% of the country's global spice exports.



contamination of spices

- At least ☐ Five countries — including Singapore, Hong Kong and the U.S. — have announced an investigation into possible contamination of spice mixes sold by Indian brands, MDH and Everest.
- The complaints cite the presence of ethylene oxide (EtO), a toxic chemical used as a food stabiliser, beyond permissible limits.
- The Spices Board of India in response has initiated mandatory testing of products shipped abroad and is reportedly working with exporters to identify the root cause of contamination.

The Hindu analysis by saurabh pandey sir



- Ethylene oxide is an organic compound with the formula C_2H_4O .
- It is a cyclic ether and the simplest epoxide: a three-membered ring consisting of one oxygen atom and two carbon atoms.
- Ethylene oxide is a colorless and flammable gas with a faintly sweet odor

SPICES BOARD OF INDIA

- **Spices Board was constituted on 26th February 1987 under the Spices Board Act 1986 (No. 10 of 1986) with the merger of the erstwhile Cardamom Board (1968) and Spices Export Promotion Council (1960).**
- **Spices Board is one of the five Commodity Boards functioning under the Ministry of Commerce & Industry.**
- **It is an autonomous body responsible for the export promotion of the 52 scheduled spices and development of Cardamom (Small & Large).**

Main Functions

- Research, Development and Regulation of domestic marketing of Small & Large Cardamom
- Post-harvest improvement of all spices
- Promotion of organic production, processing and certification of spices
- Development of spices in the North East
- Provision of quality evaluation services
- Export promotion of all spices through support for:-
- Technology upgradation.
- Quality upgradation
- Brand promotion
- Research & product development

The Hindu analysis by saurabh pandey sir



FOR UPSC 2025 /26



Launched

1- Current affairs plus - PIB, YOJANA, Down to earth , physics.org , Major newspapers.

2- Books series - all advanced books in one course

UPCOMING

1- Mains Mentorship program

2- GS-1 ,2,3 and 4

3- Mapping

4- NCERTS

5- Test series for 2025

6- essay

7- Agriculture optional

**DOWNLOAD - Saurabh
pandey cse app**

+91 90579 21649

Maersk raises profit guidance on strong demand and Red Sea conflict

Reuters
COPENHAGEN

Shipping group Maersk raised its full-year profit guidance after reporting first-quarter earnings on Thursday, citing strong demand and longer sailing times to avoid conflict in the Red Sea.

The company, viewed as a barometer of world trade, said that shipping disruptions caused by Houthi militants' attacks on vessels in the Red Sea were expected to last at least until the end of the year, adding that growth in

Maersk posted a third straight quarterly loss in the ocean container shipping division

demand for container shipping had been stronger than forecast.

High volumes

"The container volumes we see today are quite high compared to GDP growth in the world economy," said CEO Vincent Clerc. "At one point or another, we will see a normalisation of volumes," he added.

Maersk and rivals have diverted ships around Africa since December to avoid attacks by the Houthi militants, sending freight rates higher because of the longer sailing times.

'Adjusted networks'

"We have only seen an escalation of the situation in the area and therefore we can see that not only Maersk but all shipping lines have adjusted their networks more or less permanently," Mr. Clerc said.

Maersk now expects full-year underlying EBITDA between \$4 billion and

\$6 billion this year, compared with previous guidance between \$1 billion and \$6 billion.

EBITDA stood at \$1.59 billion in the first three months of the year, compared with \$1.46 billion expected by analysts in an LSEG poll, and \$3.97 billion a year earlier when freight rates were boosted by a pandemic-related boost to demand.

Still, Maersk posted a third straight quarterly loss in its ocean container shipping division, mainly owing to higher costs related to the Red Sea disruptions.





Outlook for venture capital, private equity has improved: TVS Capital

Mini Tejaswi
BENGALURU

The outlook for India's private equity and venture capital market appears positive this year, compared with last year, as 'normalcy' has returned in the lives of investors, said Anuradha Ramachandran, Managing Partner, TVS Capital Funds.

'Excess funding'

Ms. Ramachandran said, there had been excess funding during 2020 and 2021 as both investors and business owners had got carried away. The pandemic had brought about structural changes. Edtech boomed because students could not go to school and



Anuradha Ramachandran

they required digital education, while consumer goods had to be mostly bought online and therefore B2C ventures did well.

"Now, the question is how do you sustain growth when structural disadvantages no longer exist. That is the conundrum both investors and businesses always faced and are still fac-

ing," she added.

'Return to normalcy'

Ms. Ramachandran observed a lot of 'normalisation' had happened among investors and entrepreneurs and conversations were now getting better with realistic expectations from both sides.

"This scenario will boost the growth of the domestic funding market. We hope, from now on, things are going to be easier for both parties," she commented.

Funding winter, set in a couple of years ago after many global funds dialed down their investments in India because of a lack of private fund availability, coupled with the global

economic uncertainty.

"However, India by itself is an attractive market, and we do attract capital in the early stage investments. But in terms of return on capital, our funding markets are yet to gain maturity," she observed.

'Credit averse'

On lending to women, she said, women were credit averse and were very responsible, yet opportunities available for them could be fewer, and that could also be one of the reasons why a lesser number of women became entrepreneurs.

However, "it is encouraging to see some startups having women co-founders," Ms. Ramachandran added.



Venture capital (VC)

- **Venture capital (VC) is a form of private equity and a type of financing for startup companies and small businesses with long-term growth potential.**
- **Venture capitalists provide backing through financing, technological expertise, or managerial experience.**
- **VC firms raise money from limited partners (LPs) to invest in promising startups or even larger venture funds**

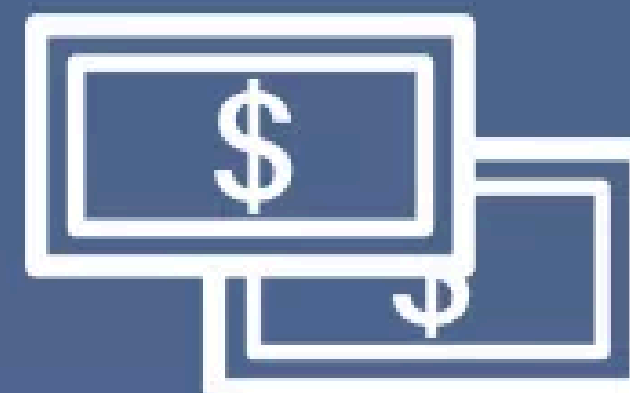
•

PRIVATE EQUITY



VS

VENTURE CAPITAL



- 01 Invest in solid businesses.
- 02 Mostly buy 100% ownership of the companies in which they invest.
- 03 Capital invested in a company or other entity that is not publicly listed or traded.

- 01 Invest in small businesses /start-ups.
- 02 Venture capital firms invest in 50% or less of the equity of the companies.
- 03 Funding given to startups or other young businesses that show potential for long-term growth.

Towards a less poor and more equal country

In March, World Inequality Lab, a global research centre focused on inequality and public policies, published a working paper titled, ‘Income and Wealth Inequality in India, 1922-2023: The Rise of the Billionaire Raj’. The authors – Nitin Kumar Bharti, Lucas Chancel, Thomas Piketty, and Anmol Somanchi – combined data from national income accounts, wealth aggregates, tax tabulations, rich lists, and surveys on income, consumption, and wealth to present their results.

Income and wealth inequality

First, let’s look at income inequality. By 2022-23, the report states, 22.6% of India’s national income went to just the top 1% in the country, the highest in the last 100 years. And just the top 0.1% of the population earned nearly 10% of the national income in India. The share of the top 1% in the national income is among the highest in the world.

In terms of wealth inequality, the share of the top 1% in wealth was 40.1% in 2022-23, the highest level since 1961. The share of wealth among the top 10% increased from 45% in 1961 to 65% in 2022-23. Conversely, the share of the bottom 50% and middle 40% in wealth declined. In short, the rich got richer and the poor got poorer in wealth. “About 10,000 individuals out of 92 million Indian adults own an average of ₹22.6 billion in wealth, 16,763 times the average Indian,” the report states.

India’s wealth inequality is not as extreme as Brazil and South Africa where the top 10% hold 85.6% and 79.7% of the national wealth, respectively. However, its wealth concentration increased threefold between 1961 and 2023. Additionally, as India’s income inequality is among the highest in the world, even higher than South Africa, Brazil and the U.S., it will only add to the wealth inequality.

The report says between 2014-15 and 2022-23 “the rise of top-end inequality has been



Santosh Mehrotra
is a Research Fellow at The IZA Institute of Labour Economics, Bonn



Rakesh Ranjan Kumar
is a Senior Research Fellow at the International Institute for Migration and Development, Kerala

The twin objectives of high economic growth and reduction of inequality can only be achieved with improvements in human development and poverty reduction

particularly pronounced in terms of wealth concentration”. It states that “the ‘Billionaire Raj’ headed by India’s modern bourgeoisie is now more unequal than the British Raj headed by the colonialist forces.” Inequality undermines both growth and reduction of poverty.

Between 1960 and 1980, inequality was dropping. The pattern of growth and its objectives ensured that outcome. However, inequality began increasing with the beginnings of liberalisation in the 1980s, and faster after the 1991 economic reforms in India.

The dynamics of income and wealth inequality are interwoven with the dynamics of economic growth and human development. India’s average income adjusted for inflation and purchasing power differentials were on a par with China and Vietnam until 1975. In the next quarter century, incomes in China and Vietnam increased by 35-50% compared to incomes in India. Post-2000, China’s income started to grow at an astonishing rate and became 2.5 times India’s income. However, growth in China has been broad-based compared to growth in India. In 2022, the share of the top 1% in income in India was nearly 50% higher than that of China. The Chinese economy has been maintaining a higher growth rate over the years with a moderate growth in economic inequality while India’s growth has been moderate coupled with extreme growth in economic inequality. That is why India is a “poor and very unequal country”.

Here, we would like to emphasise that the twin objectives of high economic growth and reduction of inequality can only be achieved with improvements in human development and poverty reduction. This is what China and Vietnam achieved. Additionally, improvements in human development should precede economic growth if economic growth is to be sustained in the long run. At the national level, the

States that sustained high growth over three decades (over 7% GSDP per year) were relatively advanced in human development. These include Kerala, Tamil Nadu, Andhra Pradesh, and Karnataka in the south; Maharashtra and Gujarat in the west; and Punjab and Delhi in the north. States that are relatively backward in the Human Development Index ranking include Jharkhand, Chhattisgarh, Bihar, Madhya Pradesh, Odisha, Uttar Pradesh, and Rajasthan. These States were only able to register a growth rate of less than 5% per annum post-liberalisation.

Human development

The Human Development Report (HDR) 2023-2024 ranked India 134 out of 193 countries. India is now the fifth largest economy but it still ranks lower than Sri Lanka, Bhutan, and Bangladesh in human development. Its economic growth has not translated into growth in human development.

The poor should not have to wait for the benefits of economic growth to trickle down; human development should be given priority in promoting inclusive growth. In the absence of improvement in human development, enhancement of capability and functioning, and poverty reduction, the growth process cannot be inclusive and will only add to inequality. Economic growth therefore does not need to be at a higher pedestal in terms of policy objectives.

As per the HDR 2023-2024, India’s score comes down by 31.1% if we account for economic inequality. The extent of economic inequality is such that it cannot be overcome by the Pradhan Mantri Garib Kalyan Anna Yojana, which provides a few kilograms of free foodgrains to about 81.35 crore beneficiaries. Sops without jobs cannot be the basis for sustained and inclusive growth. As the paper says, “It is unclear how long such inequality levels can sustain without major social and political upheaval”.



Summer staple



End of season: The last of the seasons's flamingos bask under the summer sun in the shallow waters of the Pulicat lake near Chennai. B. JOTHI RAMALINGAM



PULIKAT LAKE



- **Pulicat Lake is the located 60 km north of Chennai city and is the second largest brackish – water lake or lagoon in India.**
- **The river is about 60 km with width varying from 0.2 km to 17.5 km. Salinity values of the lake vary from zero during the monsoon to about 52 ppm during post and pre–monsoon seasons.**
- **It straddles the border of Tamil Nadu and Andhra Pradesh states on the Coromandal Coast in South India. The lake encompasses the Pulicat Lake Bird Sanctuary.**

The Hindu analysis by saurabh pandey sir





- The barrier island of Sriharikota separates the lake from the Bay of Bengal.
- Three major rivers, which feed the lagoon, are the Arani River at the southern tip, the Kalangi River from the northwest and the Swarnamukhi River at the northern end, in addition to some smaller streams.
- The International Union for the Conservation of Nature and Natural Resources (IUCN) declared the Pulicat lagoon system a Ramsar site of international importance and the World Wide Fund for Nature declared it a protected area.

Flamingo

- **The six flamingo species are the greater flamingo, Chilean flamingo, American flamingo, lesser flamingo, Andean flamingo and James's flamingo.**
- **While most flamingos aren't endangered, the Andean flamingo is listed as Vulnerable and the Chilean, lesser and James's flamingos are listed as Near Threatened by the IUCN Red List of Threatened Species.**
- **Some of their biggest threats include habitat loss and severe droughts due to climate change.**

- **Flamingos are instantly recognizable for their bright pink feathers, stilt-like legs and long necks.**
- **It takes several rounds of molting (losing and growing new feathers) for young flamingos to get their characteristic pink color.**
- **Flamingos absorb pigment from foods that are rich in carotenoids, like algae and brine shrimp.**
- **This pigment is then deposited into their feathers as they grow, giving their plumage its famous pink hue. Colour is one of the things flamingos look for when picking a mate because it shows greater access to food.**
- **A bright pink flamingo feather will slowly fade to lighter colors after being shed.**
-

- **Flamingos are instantly recognizable for their bright pink feathers, stilt-like legs and long necks.**
- **It takes several rounds of molting (losing and growing new feathers) for young flamingos to get their characteristic pink color.**
- **Flamingos absorb pigment from foods that are rich in carotenoids, like algae and brine shrimp.**
- **This pigment is then deposited into their feathers as they grow, giving their plumage its famous pink hue. Colour is one of the things flamingos look for when picking a mate because it shows greater access to food.**
- **A bright pink flamingo feather will slowly fade to lighter colors after being shed.**
-

- **For many bird species, it's the males that put grand displays to attract a mate.**
- **Flamingo courtship rituals are more egalitarian with both male and female flamingos taking part in a special dance.**
- **Flamingos are social creatures that live in large groups of varying sizes, sometimes gathering by the thousands.**
- **These elegant groups are known as a “stand” when they are, well, standing around but is fittingly called a “flamboyance” when they're dancing.**

The paradox of India's global rise, its regional decline

One of the deeply perplexing paradoxes of contemporary Indian foreign policy is that a globally rising India is also a regionally declining power. While India's global rise is a function of growth in absolute power, peer accommodation and a conducive 'chaotic' international situation, its waning regional influence is caused by diminishing relative power (*vis-à-vis* China), loss of primacy in South Asia, and fundamental changes in South Asian geopolitics.

India's aggregate power has grown over the past two decades – evident in robust economic growth, military capabilities, and a largely young demography. Its inclusion in key global institutions such as the G-20, as an invitee at G-7 meetings, and active participation in multilateral groups such as the Quad, BRICS, and the Shanghai Cooperation Organisation further highlight its geopolitical significance and its powerful presence globally, even if it is not a member of the United Nations Security Council. There is a lot more peer accommodation of (except from China of course) of India's claims to be a globally significant power. India's global rise is also aided by growing international attention on the Indo-Pacific, a theatre that is pivotal to global strategic stability, where India has a central position, geographically and otherwise.

Extraneous factors

Despite this global rise, paradoxically and worryingly, India's influence is declining in South Asia. When compared to India's influence in the region during the Cold War or in comparison to China's influence in the region today, India's power and influence in the region has sharply declined. This comparative decline, not an absolute one, caused by several extraneous factors, will have an impact on India's global position over time.

Paradoxically, again, some of the factors that have led to the decline of Indian influence in the region are also the reasons behind India's global prominence. Consider the following. The American withdrawal from the region and China filling that power vacuum have been disadvantageous to India. But that is, at the same time, a major reason why the United States and its allies are keen to accommodate India's global interests including in order to push back China in the region. In the case of the Indo-Pacific, while interest in the Indo-Pacific has increased, India's global prominence as an indispensable Indo-Pacific power, New Delhi's focus on the great power balance in the Indo-Pacific may have stretched New Delhi a bit too thin in the continental neighbourhood.

If India's global rise stems from the growth in



Happymon Jacob

teaches at the School of International Studies, Jawaharlal Nehru University, New Delhi and is the founder of Council for Strategic and Defence Research

absolute power and the geopolitical choices made by the leading powers of the contemporary international system, India's regional decline is a product of the dynamics of comparative power, and geopolitical choices made by the region's smaller powers. To that extent, overlooking the balancing acts by the region's smaller powers to focus on the great power balancing might become counterproductive.

The rise of China and what India must do

But the rise of China explains India's regional decline more than anything else. Today, India is more powerful than it has ever been in nearly two centuries. And, yet, it is, comparatively speaking, the weakest it has ever been in history *vis-à-vis* China. Faced with a rising superpower next door for the first time, India is facing stiff geopolitical competition for influence in South Asia. China's rise will, therefore, mean that India may no longer be the most consequential power in the region.

The arrival of China in South Asia, the withdrawal of the U.S. from the region, and India's tilt to the Indo-Pacific have shifted the regional balance of power in Beijing's favour. Sensing this new power equation, South Asia's smaller powers, India's neighbours, are engaged in a range of strategies: balancing, bargaining, hedging and bandwagoning. India's smaller neighbours seem to find China as a useful hedge against India, for the moment at least. It is also important to keep in mind that a great deal of this regional balancing results from shifts in the regional balance of power, not merely from insufficient Indian outreach to the neighbourhood.

While the presence of a rising superpower at its doorstep for the first time is at the heart of this paradox, the growing obsolescence of South Asia as a geopolitical construct adds to India's diminishing hold on the region. For India, meeting the challenge posed by this paradox is essential as China's rise in South Asia will mean that India may no longer be the most consequential power in the region.

To begin with, New Delhi must revisit some of its traditional conceptions of the region, 'modernise' its primacy in South Asia, and take proactive and imaginative policy steps to meet the China challenge in the region.

First of all, we must accept the reality that the region, the neighbours and the region's geopolitics have fundamentally changed over the decade-and-a-half at the least. Not willing to acknowledge there is a problem will only make matters worse.

Second, New Delhi must focus on its strengths rather than trying to match the might of the

People's Republic of China in every respect – the latter is a fool's errand. Fashioning a new engagement with the region that reflects India's traditional strengths and the region's changed realities is essential. Reclaiming the Buddhist heritage is one such example.

Third, India's continental strategy is replete with challenges whereas its maritime space has an abundance of opportunities for enhancing trade, joining minilaterals, and creating new issue-based coalitions, among others. New Delhi must, therefore, use its maritime (Indo-Pacific) advantages to cater to its many continental handicaps. Doing so could involve including India's smaller South Asian neighbours to the Indo-Pacific strategic conversations. Many of them are maritime states but not serious players within the Indo-Pacific project. India and its partners (the U.S., Japan, Australia, the European Union, and others) must find ways of engaging and partnering with Sri Lanka, the Maldives, and Bangladesh as part of their larger Indo-Pacific strategy. In other words, New Delhi should try to wean them away from the China-led regional grand strategy by making them a key part of the Indo-Pacific grand strategy where India and its partners hold significant advantage over China.

Fourth, there is today an openness in New Delhi to view the region through a non-India centric lens. This also means that New Delhi is no longer uneasy about external powers in its neighbourhood as it used to be during the Cold War. As a consequence, there is a desire to join hands with external friendly partners both in the Indian Ocean and South Asia so as to deal with the region's common challenges. This openness in New Delhi, and the desire of the external actors to engage the region, must be utilised to address the difficulties arising out of New Delhi's regional decline.

Tap soft power

Finally, New Delhi should make creative uses of its soft power to retain its influence in the region. One way to do that is to actively encourage informal contacts between political and civil society actors in India and those in other South Asian countries. For instance, there is a need to encourage informal and unofficial conflict management processes in the region especially when and where the Indian state is hesitant about being involved directly in a conflict – Myanmar is a case in point.

The dichotomy between India's global rise and regional decline has profound implications for India's global aspirations. It is a legitimate question to ask whether a country that is unable to maintain primacy in its periphery will be able to be a pivotal power in international politics.

This dichotomy has profound implications for New Delhi's global aspirations



India's Global rise vs regional decline

- One of the deeply perplexing paradoxes of contemporary Indian foreign policy is that a globally rising India is also a regionally declining power.
- While India's global rise is a function of growth in absolute power, peer accommodation and a conducive 'chaotic' international situation, its waning regional influence is caused by diminishing relative power (vis-à-vis China), loss of primacy in South Asia, and fundamental changes in South Asian geopolitics.
- India's aggregate power has grown over the past two decades – evident in robust economic growth, military capabilities, and a largely young demography.

The Hindu analysis by saurabh pandey sir





- Its inclusion in key global institutions such as the G-20, as an invitee at G-7 meetings, and active participation in multilateral groups such as the Quad, BRICS, and the Shanghai Cooperation Organisation further highlight its geopolitical significance and its powerful presence globally, even if it is not a member of the United Nations Security Council.
- India's global rise is also aided by growing international attention on the Indo-Pacific, a theatre that is pivotal to global strategic stability, where India has a central position, geographically and otherwise

Regional decline

- India's influence is declining in South Asia.
- When compared to India's influence in the region during the Cold War or in comparison to China's influence in the region today, India's power and influence in the region has sharply declined.
- . The American withdrawal from the region and China filling that power vacuum have been disadvantageous to India.
- The arrival of China in South Asia, the withdrawal of the U.S. from the region, and India's tilt to the Indo-Pacific have shifted the regional balance of power in Beijing's favour.

-

The Hindu analysis by saurabh pandey sir



- Sensing this new power equation, South Asia's smaller powers, India's neighbours, are engaged in a range of strategies: balancing, bargaining, hedging and bandwagoning. India's smaller neighbours seem to find China as a useful hedge against India, for the moment at least.

Steps needed

- First of all, we must accept the reality that the region, the neighbours and the region's geopolitics have fundamentally changed over the decade-and-a-half at the least.

- Fashioning a new engagement with the region that reflects India's traditional strengths and the region's changed realities is essential.
- Reclaiming the Buddhist heritage is one such example.
- Third, India's continental strategy is replete with challenges whereas its maritime space has an abundance of opportunities for enhancing trade, joining minilaterals, and creating new issue-based coalitions, among others.
- New Delhi must, therefore, use its maritime (Indo-Pacific) advantages to cater to its many continental handicaps.
- Doing so could involve including India's smaller South Asian neighbours to the Indo-Pacific strategic conversations

- Fourth, there is today an openness in New Delhi to view the region through a non-India centric lens.
- This also means that New Delhi is no longer uneasy about external powers in its neighbourhood as it used to be during the Cold War.
- As a consequence, there is a desire to join hands with external friendly partners both in the Indian Ocean and South Asia so as to deal with the region's common challenges.
- Finally, New Delhi should make creative uses of its soft power to retain its influence in the region.

This is the year to get the SDG goals back on track

The United Nations summit on Sustainable Development Goals (SDG), that was held in New York (September 18-19), assessed progress towards achieving the SDGs. The Agenda-2030, which was adopted by the UN General Assembly in 2015, identified 17 SDGs with 169 specific targets to be achieved by 2030. The programme is internationally non-binding, but all countries have committed to work towards these goals as transiting to sustainable development is a common global endeavour.

Slow progress

Progress, according to available reports, is off track. From 2015 to 2019, there were some improvements, although grossly insufficient to achieve the goals. The outbreak of the COVID-19 pandemic and other global crises have virtually halted progress. Apart from slow progress, and little or no attention towards the goals related to the environment and biodiversity (including responsible consumption and production, climate action, life below water, and life on land), it is a matter of great concern that the current practice of pursuing SDGs defies the integrated and indivisible nature of SDGs. We are far from the overarching target of balancing human well-being and a healthy environment. The present trend, if it continues, will lead to accelerated environmental degradation and the purpose of transiting towards sustainability defeated.

Given this emerging scenario, the UN SDG Report, 2023 identified five key areas for urgent action: Commitment of governments to seven years of accelerated, sustained and transformative actions to deliver on the promises of SDGs; concrete, integrated and targeted government policies and actions to eradicate poverty, reduce inequality and to end the war on nature with a focus on advancing the rights of women and girls and empowering the most



Srikumar Chattopadhyay

is a retired scientist and was Head, Resources Analysis Division, Centre for Earth Science Studies, Thiruvananthapuram. He is a former National Fellow of the Gulati Institute for Finance and Taxation, Thiruvananthapuram

2024 is an election year across the world and newly elected governments need to focus on the all-important sustainability issue

vulnerable; strengthening of national and subnational capacity, accountability, and public institutions to deliver accelerated progress; recommitment of the international community to deliver and mobilise resources to assist developing nations, and continued strengthening of the UN development system.

World leaders took cognisance of the situation, reaffirmed their commitments and agreed to step-up efforts to deliver SDGs, our global road map out of the crisis, by 2030. But how far these global pronouncements are operative at the ground level remains a big question.

Results that deserve deliberation

A team of 64 scholars analysed 3,000 studies, mostly peer-reviewed published articles across the world to examine 'Scientific evidence on the political impact of the sustainable development goals' within national and global governance to address pressing challenges of poverty eradication, social justice and environmental protection. The results, which were published in the journal, *Nature Sustainability*, September 2022 issue (under the leadership of Professor Frank Biermann of the Copernicus Institute of Sustainable Development Utrecht University, Utrecht, The Netherlands), deserve wide deliberations, especially in the context of Agenda 2030 implementation.

The authors look at five dimensions: global governance, domestic political systems, the integration and coherence of institutions and policies, the inclusiveness of governance from local to global level, and the protection of ecological integrity. They concluded that 'the SDGs thus far have had mainly discursive effects but also have led to some isolated normative and institutional reforms.

However, effects are often diffuse, and there is little evidence that goal setting at the global level leads directly to political impacts in national and

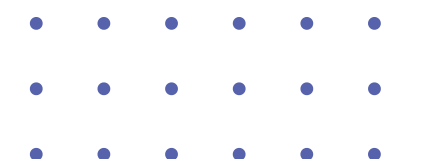
local politics. Overall, our assessment indicates that although there are some limited effects of the SDGs, they are not a transformative force in and of themselves'.

In this context, another UN report, 'Future is Now' (2019), perhaps provides some guidelines for action. It emphasised that 'The true transformative potential of the 2030 Agenda can be realised through a systemic approach that helps identify, manage trade-offs while maximising co-benefits.' By co-benefit the stress is on the activities that, while addressing one SDG, will help address others at the same time. The report suggests adopting locally best suited entry points following regional and national priorities and applying four levers – governance, economy and finance, individual and collective action, and science and technology to propel our actions along the entry points.

Actors from these levers must develop partnership and establish novel collaboration to design and rapidly implement integrated pathways to sustainable development corresponding to the specific needs and priorities of the country. This will ultimately contribute to global transformation. In the prologue to this report, Gro Harlem Brundtland, former Prime Minister of Norway and renowned for the famous Brundtland report, 'Our Common Future', expressed the hope that politicians and policymakers will take note of the suggestions advanced in this report and steer the world towards sustainable development.

An important year

The year 2024 is an election year across the world. At least 64 countries, both developed and developing, accounting for 49% of world population, will go to the polls. Perhaps, it is important for all the newly elected governments to ponder over the sustainability issue and align their national policies accordingly.



SDG'S

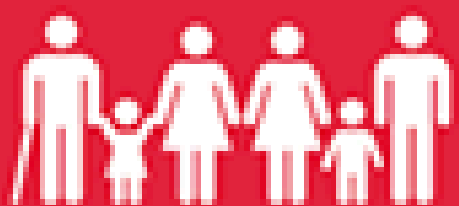


- **The United Nations summit on Sustainable Development Goals (SDG), that was held in New York (September 18-19), assessed progress towards achieving the SDGs.**
- **The Agenda-2030, which was adopted by the UN General Assembly in 2015, identified 17 SDGs with 169 specific targets to be achieved by 2030.**
- **The programme is internationally non-binding, but all countries have committed to work towards these goals as transiting to sustainable development is a common global endeavour**

The Hindu analysis by saurabh pandey sir



1 NO
POVERTY



2 ZERO
HUNGER



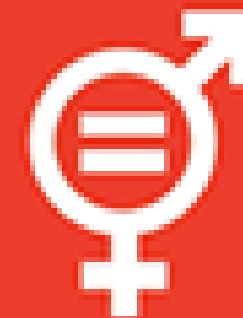
3 GOOD HEALTH
AND WELL-BEING



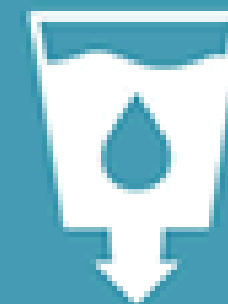
4 QUALITY
EDUCATION



5 GENDER
EQUALITY



6 CLEAN WATER
AND SANITATION



7 AFFORDABLE AND
CLEAN ENERGY



8 DECENT WORK AND
ECONOMIC GROWTH



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



10 REDUCED
INEQUALITIES



11 SUSTAINABLE CITIES
AND COMMUNITIES



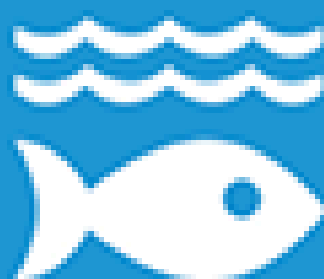
12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



13 CLIMATE
ACTION



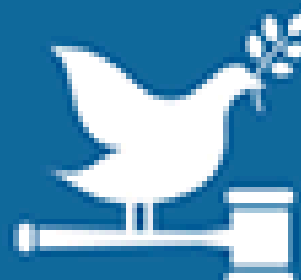
14 LIFE
BELOW WATER



15 LIFE
ON LAND



16 PEACE, JUSTICE
AND STRONG
INSTITUTIONS



17 PARTNERSHIPS
FOR THE GOALS




SUSTAINABLE
DEVELOPMENT
GOALS

- The outbreak of the COVID-19 pandemic and other global crises have virtually halted progress.
- Apart from slow progress, and little or no attention towards the goals related to the environment and biodiversity (including responsible consumption and production, climate action, life below water, and life on land), it is a matter of great concern that the current practice of pursuing SDGs defies the integrated and indivisible nature of SDGs.
- We are far from the overarching target of balancing human well-being and a healthy environment.

- **.The present trend, if it continues, will lead to accelerated environmental degradation and the purpose of transiting towards sustainability defeated.**
- **Given this emerging scenario, the UN SDG Report, 2023 identified five key areas for urgent action: Commitment of governments to seven years of accelerated, sustained and transformative actions to deliver on the promises of SDGs; concrete, integrated and targeted government policies and actions to eradicate poverty, reduce inequality and to end the war on nature with a focus on advancing the rights of women and girls and empowering the most vulnerable**

- ; strengthening of national and subnational capacity, accountability, and public institutions to deliver accelerated progress; recommitment of the international community to deliver and mobilise resources to assist developing nations, and continued strengthening of the UN development system.



The Hindu analysis by saurabh pandey sir



Steps



- The true transformative potential of the 2030 Agenda can be realised through a systemic approach that helps identify, manage trade-offs while maximising co-benefits.'
- By co-benefit the stress is on the activities that, while addressing one SDG, will help address others at the same time.
- Actors from these levers must develop partnership and establish novel collaboration to design and rapidly implement integrated pathways to sustainable development corresponding to the specific needs and priorities of the country

The Hindu analysis by saurabh pandey sir



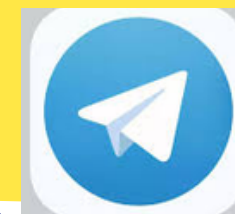
Target Mains 2024/25 - essay topic



Q “The dichotomy between India’s global rise and regional decline has profound implications for India’s global aspirations. Discuss

प्रश्न "भारत के वैश्विक उत्थान और क्षेत्रीय गिरावट के बीच द्वंद्व का भारत की वैश्विक आकांक्षाओं पर गहरा प्रभाव पड़ता है। चर्चा करना

**send your answer - Saurabh pandey
upsc telegram channel**



Topics

- Biases in brain
- Catatumbo lightning
- Okavango delta
- Model code of conduct
- Benefits of bamboo
- Starliner
- Leprosy
- **Hurler syndrome**
- Nitrogen fixation - nitroblast
- Mains



Where does ‘us versus them’ bias in the brain come from?

Modern genetics has established that all humans are equal. But human history is replete with people from one cultural or social group treating those from others as if they are less than human. The basis of this deep-seated tendency continues to be the focus of intense research efforts in psychology and neuroscience

Reeteka Sud

“All animals are equal, but some are more equal than others” – this line from George Orwell’s 1945 classic *Animal Farm* perfectly describes how bias operates in human societies. In a study published in May last year, psychologists explored how people subconsciously evaluate different racial groups. They screened responses from more than 60,000 participants belonging to four groups: ‘white’, ‘blacks’, ‘Hispanics’, and ‘Asians’ (67% of them lived in the U.S.).

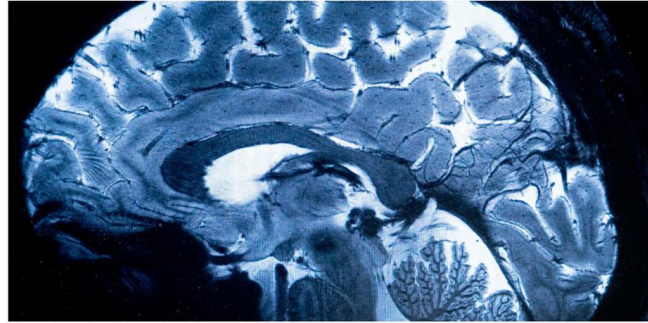
Using a psychological test called an implicit association test (IAT), scientists found stark differences between participants’ explicit statements and their implicit beliefs. While everyone said they believed in the equality of all races, they also harboured implicit biases in favour of socially advantaged groups. This bias was also universal, irrespective of the racial identity of the participants.

The IAT is built on the premise that if two things – words, concepts, events, etc. – have co-occurred in our experience over and over again, we put them two things together very quickly. The test includes a series of quick-fire rounds to sort words related to concepts (e.g. “thin”, “fat”, “white”, “black”, etc.) and assessments (“good” or “bad”) into categories. A participant’s score is based on the time taken to sort words when concepts and assessments are combined. For example, if test subjects combine “white” with “good” faster than they do “white” with “bad”, the test suggests they have an implicit bias favouring white people.

The brain’s shifting criteria

That all humans are equal is a scientific fact established by modern genetics. However, the history of humankind is replete with people from one cultural or social group treating those from others as if they are less than human – a phenomenon called pseudo-speciation. The basis of this deep-seated tendency in people continues to be the focus of intense research efforts in psychology and neuroscience.

Many recent studies have found that our brains process information about in-groups (i.e. “us”) and out-groups (“them”) differently. In particular, a study published on March 18, 2024, in *Frontiers in Psychology* reported that, bizarrely, the criteria our brains use to categorise others as “us” or “them” shift constantly. Researchers asked half of a group of young, white participants to describe how



A better understanding of the human brain in the context of intergroup threats can also shed light on ways to improve reconciliation. ALAIN JOCARD/AFP

they – as white people – differed from black individuals. They asked the other half to describe how they differed from old persons. In this way, the researchers drew the participants’ attention to specific aspects of their own social identity (“white” or “young”) and to perceived differences from the respective outgroups.

Assessing the participant responses with IAT, the researchers found that directing participants’ attention to different facets of their in-group identity was sufficient to change their intergroup bias. That is, the participants’ preferences changed depending on whether their brains used age or race to classify others.

Bias is learned

Neuroimaging studies have corroborated such findings from psychology research, and have clarified that information-processing in the brain is different depending on whether it pertains to “us” or to “them”.

Brain regions that activate in response to the direct experience of pain as well as empathy for the pain of others include parts of the anterior cingulate cortex and insula. The first report showing this selective processing was published more than a decade ago. Participants were shown images of others in distress (e.g. people affected by natural disasters) and non-painful situations (e.g. people out on a picnic). Images of their brains showed lower activation in these brain regions when those in distress belonged to racial groups different from the participants. Since then, several other studies have



Psychologists explored how people subconsciously evaluate different racial groups in a study involving more than 60,000 participants

substantiated these findings. Depending on the context, this differential processing could be harmless, lead to subtle forms of in-group favouritism or, in extreme cases, to intergroup violence.

Bias doesn’t exist at birth. It is a learned response built on cultural associations together with the brain’s biology. Yet preferential bias towards in-group members doesn’t mean an individual will be hostile towards out-group members. Factors that lead to hostility include the notion of associating an out-group with a threat. Uncertain circumstances – such as those we witnessed during the pandemic – can also heighten mistrust towards the outgroup.

The biology behind ‘facts of life’

Neuroimaging studies that have explored the basis of intergroup threats have highlighted the role of a specific brain region called the amygdala. An almond-shaped region situated deep in the brain, the amygdala is central to detecting threats and fear-based learning. Imaging studies have shown the amygdala activates to a greater degree when the source of threat is from an out-group member.

In one 2020 study, psychologists imaged the brains of white, non-Muslim participants as they watched short videos of Muslim males with stereotypical appearances threatening their in-group and found this activated the amygdala more, as expected. This study was unique because it also included videos of reconciliatory statements – and watching them activated a very different neural circuit, involving different parts of the cortex, which are higher brain regions that control impulses and regulate emotions. The amygdala being activated by something perceived as a threat is an automatic part of information processing in the brain. But cortical activation implies more of a cognitive effort.

We need more research to better understand neural processing, particularly the extent to which these results are generalisable. A better understanding of the human brain in the context of intergroup threats can also shed light on ways to improve reconciliation.

Whenever you hear social and/or cultural narratives presented as a “fact of life” – that, say, “they are bad people” – and find yourself getting sucked into it, remember that somewhere behind this statement is a misappropriation of brain biology. Being aware of our own biology can make us more informed, especially when faced with narratives that arouse rather than inform.

(Dr. Reeteka Sud is a neuroscientist by training and a senior scientist at the Center for Brain and Mind, Department of Psychiatry, NIMHANS, Bengaluru.)

THE GIST

In a study, scientists found stark differences between participants’ explicit statements and their implicit beliefs. While everyone said they believed in the equality of all races, they also harboured implicit biases in favour of socially advantaged groups. This bias was universal, irrespective of racial identity

Studies have found that the criteria our brains use to categorise others as ‘us’ or ‘them’ shift constantly

Bias doesn’t exist at birth. It is a learned response built on cultural associations together with the brain’s biology. Factors that lead to hostility include associating an out-group with a threat. Uncertain circumstances can also heighten mistrust towards the outgroup

- **In a study, scientists found stark differences between participants' explicit statements and their implicit beliefs.**
- **While everyone said they believed in the equality of all races, they also harboured implicit biases in favour of socially advantaged groups.**
- **This bias was universal, irrespective of racial identity. Studies have found that the criteria our brains use to categorise others as 'us' or 'them' shift constantly. Bias doesn't exist at birth.**

- **It is a learned response built on cultural associations together with the brain's biology.**
- **Factors that lead to hostility include associating an out-group with a threat.**
- **Uncertain circumstances can also heighten mistrust towards the outgroup**

WHAT IS IT?

Catatumbo lightning: a torrent of current

Arkatapa Basu

Catatumbo lightning is a mesmerising natural phenomenon that occurs over the Catatumbo River in Venezuela, where lightning strikes almost continuously. This phenomenon primarily happens at the mouth of the Catatumbo River, where it meets Lake Maracaibo, the largest lake in Venezuela.

A convergence of several factors give rise to the unique conditions required for Catatumbo lightning. Warm, moist air from the

Caribbean Sea is pushed towards the Andes mountains, where it collides with cooler air descending from the peaks. This collision creates a perfect storm of sorts, as the warmer air is forced to rise rapidly by the shape of the local landscape. And as it does, it cools and condenses, forming towering cumulonimbus clouds.

Meanwhile, the combination of strong winds and temperature differentials generates electrical charges within these clouds. The cumulonimbus clouds — sometimes reaching heights of more than 5 km — load up on static electricity. When the electrical potential within the clouds becomes too great, it discharges in the form of lightning. Catatumbo lightning is distinguished by its frequency and duration: the strikes occur for up to 160 nights in a year, with an



A convergence of several factors give rise to the unique conditions required for Catatumbo lightning. GETTY IMAGES/ISTOCKPHOTO

average of 28 lightning strikes per minute at its peak. Thanks to this constant flow of current, the area has earned the title of “the lightning capital of the world”.



For feedback and suggestions

for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'

- **Catatumbo lightning is a mesmerising natural phenomenon that occurs over the Catatumbo River in Venezuela, where lightning strikes almost continuously.**
- **This phenomenon primarily happens at the mouth of the Catatumbo River, where it meets Lake Maracaibo, the largest lake in Venezuela.**
- **A convergence of several factors give rise to the unique conditions required for Catatumbo lightning.**

- **Warm, moist air from the Caribbean Sea is pushed towards the Andes mountains, where it collides with cooler air descending from the peaks.**
- **This collision creates a perfect storm of sorts, as the warmer air is forced to rise rapidly by the shape of the local landscape.**
- **And as it does, it cools and condenses, forming towering cumulonimbus clouds. Meanwhile, the combination of strong winds and temperature differentials generates electrical charges within these clouds.**

- **The cumulonimbus clouds — sometimes reaching heights of more than 5 km — load up on static electricity.**
- **When the electrical potential within the clouds becomes too great, it discharges in the form of lightning**

BIG SHOT



An aerial view of hippopotamuses stuck in a dry channel in the Okavango Delta, Botswana. A drought across southern Africa has been driven mostly by the El Nino weather pattern, not climate change, scientists have said. Zambia, Zimbabwe and Malawi have declared a national disaster over the severe dry spell that started in January and has devastated the agricultural sector, decimating crops and pastures. AFP

OKAVANGO DELTA



- **An aerial view of hippopotamuses stuck in a dry channel in the Okavango Delta, Botswana.**
- **A drought across southern Africa has been driven mostly by the El Nino weather pattern, not climate change, scientists have said.**
- **Zambia, Zimbabwe and Malawi have declared a national disaster over the severe dry spell that started in January and has devastated the agricultural sector, decimating crops and**

The PM's speeches fall foul of the Model Code of Conduct



The nation is in the grip of the Lok Sabha elections. Political manifestos are in the news, not for their good content, but for what they don't contain. The Prime Minister's recent statement that the Congress wants to take away properties, including gold and *mangalsutra*, from the people and distribute it among members of the minority community reflects the quality of the narrative in the ongoing election. The Prime Minister, who is the leader of the world's largest democracy, and his advisors are expected to know the facts.

The contents of the two manifestos

The Congress in its manifesto titled 'Nyay Patra' has listed out the various issues facing the country and has declared its aims and objectives in dealing with them if voted to power. The manifesto covers diverse topics such as equity; religious and linguistic minorities; senior citizens, persons with disabilities, and LGBTQIA+; health; youth; education; sports, women's empowerment; farmers, workers; art, culture, and heritage; economy; taxation and tax reforms; and defending the Constitution.

Under the head 'wealth', the manifesto says, "Wealth and wealth creation are the goals of any business... The Congress is committed to rapid growth and generation of wealth. We have set a target of doubling the GDP in the next 10 years." Under 'workfare' it says, "Welfare of all is the goal of all work and the creation of wealth. Under a Congress government, the welfare of the poor will be the first charge on all government resources... The Nav Sankalp Economic Policy will aim to build a fair, just and equal-opportunity economy and bring prosperity to all sections of the people." Under 'equity', it says, "The people belonging to the SC, ST and OBC communities have not yet been able to catch up with the rest and are still left behind. While OBC, SC and ST constitute nearly 70 per cent of India's population, their representation in high-ranking professions, services and businesses is disproportionately low... Congress will conduct a nation-wide Socio-Economic and Caste Census to enumerate the castes and sub-castes and their socio-economic conditions. Based on the data, we will strengthen the agenda for affirmative action." Nowhere does it suggest that wealth will be taken from the people and redistributed to others. The Congress is not Robin Hood.

This manifesto echoes the Preamble of the Constitution which resolves "to constitute India into sovereign, socialist, secular, democratic republic and to secure to all its citizens: justice, social, economic and political; liberty of thought, expression, belief, faith and worship; and equality of status and of opportunity. The Supreme Court has declared that the Preamble is the basic structure of the Constitution.

Article 39 of the Constitution, a Directive



Dushyant Dave

is Senior Advocate and former president of the Supreme Court Bar Association

Principle of State Policy, inter alia provides that, "the State shall, in particular, direct its policy towards securing that the citizens, men and women equally, have the right to an adequate means of livelihood; that the ownership and control of the material resources of the community are so distributed as best to subserve the common good; and that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment." Article 38 empowers the State "to secure a social order for the promotion of welfare of the people, and to "strive to minimise the inequalities in income, and endeavour to eliminate inequalities in status, facilities and opportunities". Article 46 provides for the promotion of educational and economic interests of the weaker section of the people and, in particular, of the Scheduled Castes and the Scheduled Tribes.

The Bharatiya Janata Party (BJP) is aggressively pushing the agenda for a uniform civil code, which is also a Directive Principle, under Article 44. If this be so, the Prime Minister and the BJP should not have any reservations, much less objection, to the Congress manifesto. It is unfortunate that a serious document has been turned upside down to misguide the nation.

The BJP's manifesto, 'Sankalp Patra', begins with '10 years of good governance and Vikas'. Under the title Garib Pariwar Jan, it declares that "80+ crore citizens are receiving free rations since 2020 through PM Garib Kalyan Anna Yojana". It also says the party "empowered citizens by transferring ₹34 lakh crore directly to their accounts", "34+ crore citizens are receiving free health insurance of ₹5 lakh under Ayushman Bharat", and "4+ crore families now have pucca houses under the PM Awas Yojana and other initiatives". These declarations coupled with guarantees on other issues, including to continue to provide free rations for the next five years, reflect the BJP's commitment to the goals set out in the Preamble. Therefore, the Prime Minister and the BJP should be the last to accuse the Congress on its commitments in its manifestos.

No law to govern manifesto

In *S. Subramaniam Balaji v. Government of Tamil Nadu & Ors.* (2013), the Supreme Court had bemoaned the absence of a law to govern the contents of the election manifesto and directed the Election Commission of India (ECI) to frame guidelines in consultation with all recognised political parties. The ECI held a meeting on August 12, 2013, with various political parties on the formulation of guidelines on election manifestos. It then issued 'Instructions to political parties on manifestos' on April 24, 2015, outlining 'Guidelines on election manifestos', which says: "Although, the law is obvious that the Congress in the election manifesto cannot be

construed as 'corrupt practice' under Section 123 of the RP (Representation of the People) Act, the reality cannot be ruled out that distribution of freebies of any kind, undoubtedly, influences all people. It states the root of free and fair elections to a large degree".

The Model Code of Conduct (MCC) issued by the ECI on March 16, 2024, expressly provides under the heading 'General Conduct' that "no party or candidate shall include in any activity which may aggravate existing differences or create mutual hatred or cause tension between different castes and communities, religious or linguistic". It also says "criticism of other political parties, when made, shall be confined to their policies and programme, past record and work. Parties and candidates shall refrain from criticism of all aspects of private life, not connected with the public activities of the leaders or workers of other parties. Criticism of other parties or their workers based on unverified allegations or distortion shall be avoided. And "there shall be no appeal to caste or communal feelings for securing votes." It prohibits activities which are "corrupt practices and offences under the election law".

In a series of judgments in 1996, the Supreme Court declared speeches of religious nature to influence voters as corrupt practices, such as statements by Bal Thackeray that "we are fighting this election for the protection of Hinduism. Therefore, we do not care for the votes of the Muslims. This country belongs to Hindus and will remain so". The Supreme Court in 2017 interpreted Section 123 of the Representation of People Act, 1951. Dr Justice Thakur, speaking for the Court, held, "An appeal in the name of religion, race, caste, community or language is impermissible under the Representation of the People Act, 1951 and would constitute a corrupt practice sufficient to annul the election in which such an appeal was made..." So interpreted, religion, race, caste, community or language would not be allowed to play any role in the electoral process and should an appeal be made on any of those considerations, the same would constitute a corrupt practice.

The Prime Minister's tirade against the Opposition and minority community only show that he has no positive issues to persuade them to vote for him. His statements clearly fall foul of the MCC and also amount to corrupt practice as declared by the Supreme Court. The Prime Minister must scrupulously adhere to the MCC in letter and spirit. If he ceases to be the role model, nothing will be left of our great democracy.

Yet, the malaise continues because of the weak rule of law. The holding of free and fair elections is the constitutional mandate of the ECI. It has miserably failed in its duty, only to prove that composition of the ECI as approved by the Supreme Court is defective.

If the Prime Minister ceases to be the role model, nothing will be left of our great democracy

- **Article 46 provides for the promotion of educational and economic interests of the weaker section of the people and, in particular, of the Scheduled Castes and the Scheduled Tribes.**
- **In S. Subramaniam Balaji v. Government of Tamil Nadu & Ors. (2013), the Supreme Court had bemoaned the absence of a law to govern the contents of the election manifesto and directed the Election Commission of India (ECI) to frame guidelines in consultation with all recognised political parties.**

- **The ECI held a meeting on August 12, 2013, with various political parties on the formulation of guidelines on election manifestos.**
- **It then issued ‘Instructions to political parties on manifestos’ on April 24, 2015, outlining ‘Guidelines on election manifestos’, which says: “Although, the law is obvious that the promises in the election manifesto cannot be construed as ‘corrupt practice’ under Section 123 of the RP (Representation of the People) Act, the reality cannot be ruled out that distribution of freebies of any kind, undoubtedly, influences all people.**
- **It states the root of free and fair elections to a large degree”.**

- **The Model Code of Conduct (MCC) issued by the ECI on March 16, 2024, expressly provides under the heading ‘General Conduct’ that “no party or candidate shall include in any activity which may aggravate existing differences or create mutual hatred or cause tension between different castes and communities, religious or linguistic”**

- It also says “criticism of other political parties, when made, shall be conned to their policies and programme, past record and work.
- Parties and candidates shall refrain from criticism of all aspects of private life, not connected with the public activities of the leaders or workers of other parties.
- Criticism of other parties or their workers based on unverified allegations or distortion shall be avoided.
- And “there shall be no appeal to caste or communal feelings for securing votes.”
- It prohibits activities which are “corrupt practices and offences under the election law”.

- In a series of judgments in 1996, the Supreme Court declared speeches of religious nature to influence voters as corrupt practices.
- The Supreme Court in 2017 interpreted Section 123 of the Representation of People Act, 1951. Dr Justice Thakur, speaking for the Court, held, “An appeal in the name of religion, race, caste, community or language is impermissible under the Representation of the People Act, 1951 and would constitute a corrupt practice sufficient to annul the election in which such an appeal was made...”

- **So interpreted, religion, race, caste, community or language would not be allowed to play any role in the electoral process and should an appeal be made on any of those considerations, the same would constitute a corrupt practice**

Kenyan students plant bamboos around school to filter filthy air from trash dump

Associated Press
NAIROBI

Armed with gardening hoes while others cradled bamboo seedlings, students gathered outside their school in Kenya's capital as they hoped the fully grown bamboo would help to filter filthy air from one of Africa's largest trash dumps next door.

More than 100 bamboo plantings dot the ground around Dandora secondary school, which shares a name with the dumpsite that was declared full 23 years ago. Hundreds of trucks still drive in daily to dump more trash.

Allan Sila, 17, said sitting

in his classroom is like studying in a smelly latrine.

Acrid smoke billowing from the burning of trash fills the air every morning, hindering visibility and leaving some students with respiratory issues. "Asthma is a disease that is commonly known," Mr. Sila said.

The school's principal, Eutyclus Maina, recalled being greeted by the smell and smoke when he was posted to the school last year. He knew he had to do something.

"My motivation for initiating the bamboo project in the school was to mitigate the effects of the dumpsite. It really pollutes

the air that we breathe," he said. He said he researched online and came across the use of bamboo. He believes it will help reduce the cases of respiratory infections in the community.

Promoted by UN

The fast-growing bamboo has been promoted by the United Nations and others for its high uptake of carbon dioxide.

Aderiana Mbandi is an air quality research and policy expert at the United Nations Environment Programme (UNEP), based in Nairobi. She said the impact of air pollution is felt in all parts of the body including the brain, and the



A Dandora Secondary school building next to garbage from one of Africa's largest garbage dump in Nairobi, Kenya on April 22. AP

best way to reduce its effects is minimising exposure. The seedlings the students began planting in last August are already

nine feet tall. The giant bamboo variety is expected to reach 40 feet when mature, depending on soil conditions.

Students hope that the bamboo will help transform the school compound into a green haven in the litter-strewn Dandora neighbourhood.

The publicly funded school relies on donations to afford the seedlings that is sold in retail at 400 Kenyan shillings each.

But the school management is determined to keep going until bamboo lines the 900-metre wall that separates the school and the dumpsite.

The Dandora dump occupies about 123 acres of land and receives more than 2,000 tonne of waste daily from around Nairobi, home to 4 million people.

Its stench can be smelled kilometres away.

UNEP, in partnership with the Stockholm Environment Institute, deployed sensors to the Dandora neighbourhood from October to April to monitor pollution levels from the dumpsite.

Out of the 166 days monitored, only 12 had a daily average of excellent air quality according to World Health Organization guidelines.

Other pollutants

Nairobi's air is also polluted by emissions from secondhand cars that make up much of the city's transport. Other pollutants in-

clude smoke from industries that are often located near residential areas.

The Dandora school is also planting trees including jacaranda and grevillea. Student Josiah Nyamwata called them easy to obtain and easy to plant. "The other advantage is that the trees will be helpful in order to boost our air circulation around our school," he said.

The air is not the only challenge faced by the school. Vultures from the dumpsite circling in search of food often create a nuisance to the students at mealtimes forcing them to guard their plates from being snatched.

The fast-growing bamboo has been promoted by the United Nations and others for its high uptake of carbon dioxide.

- **The Bamboos (Bambusoidea) consists of 1439 different species in 116 genera.**
- **It is one of the 12 subfamilies of the grass family (Poaceae) and the only one to diversify in forests. Bamboo is a great plant for individuals concerned with a green environment.**

- **Bamboo is the fastest growing plant on this planet.**
- **It has been recorded growing at an amazing 47.6 inches in a 24 hour period.**
- **Bamboo is a crucial element in the balance of oxygen and carbon dioxide in the atmosphere.**
- **A grove of bamboo release 35% more oxygen than an equivalent stand of trees. Because of this, planting bamboo is a great way to reduce your carbon footprint and help fight global warming.**

- **Bamboo is a viable replacement for wood. It can be harvest in 3-5 years versus 10-20 for most softwoods.**
- **It can out yield pine 6 to 1 in biomass production.**
- **It is also one of the strongest building materials with a tensile strength of 28,000 psi. To help give you an idea how much this is, mild steel measures 23,000 psi.**
- **It is a great soil conservation tool. It greatly reduces erosion with a sum of stem flow rate and canopy intercept of 25%**

FOR UPSC 2025 /26



Launched

1- Current affairs plus - PIB, YOJANA, Down to earth , physics.org , Major newspapers.

2- Books series - all advanced books in one course

UPCOMING

1- Mains Mentorship program

2- GS-1 ,2,3 and 4

3- Mapping

4- NCERTS

5- Test series for 2025

6- essay

7- Agriculture optional

**DOWNLOAD - Saurabh
pandey cse app**

+91 90579 21649

Why is Boeing crewed space test significant?

When was the project announced? What delayed the mission? By how much has the budget been overshoot? How many missions has competitor SpaceX flown to the International Space Station? Why is the crewed space flight important for Boeing?

Vasudevan Mukunth

The story so far:

At 8.04 am IST on May 7, an Atlas V rocket is set to lift off with a team of two veteran astronauts – Barry Wilmore and Sunita Williams – sitting inside a spacecraft called Starliner, built by Boeing, on the capsule's third test flight and the first with astronauts on board. The astronauts will be set for the International Space Station (ISS) in low-earth orbit. If the mission succeeds, the U.S. will for the first time in its history have two spacecraft to launch astronauts to space.

What is the Boeing Starliner?

Starliner is a spacecraft that transports astronauts in space, after being launched there by a rocket. It consists of a crew capsule and a service module. The crew capsule houses the astronauts; like others of its kind, it will be able to survive reentry and return to the ground. The service module consists of the equipment and systems the astronauts need to survive in space, including air and temperature control, water supply, sanitation, etc., plus the engines and fuel required to manoeuvre the spacecraft. The service module won't be reusable.

Starliner is more than 4 metres wide and can

Since 2014, a dark cloud has hung above Boeing over issues with its commercial airliners

house up to seven astronauts. It can be fitted atop an Atlas V rocket, operated by United Launch Alliance, a joint venture between Boeing and Lockheed Martin.

When was Starliner commissioned?

On September 16, 2014, NASA announced it had awarded contracts to SpaceX and Boeing to fly astronauts to the ISS. The "maximum potential values" of the fixed price contracts, based on U.S. Federal Acquisition Regulations, were \$4.2 billion for Boeing and \$2.6 billion for SpaceX.

Boeing was expected to conduct Starliner's first crewed launch in 2017. A slew of delays followed, however, and its first uncrewed orbital test flight happened only in December 2019, when the capsule was launched and expected to dock with the ISS. But a software error left it in the wrong orbit and it returned safely to ground the next day without docking. In May 2022, Boeing repeated the test flight, this time as a full success – docking with the ISS, undocking after four days, and returning to the ground. The May 7 test will repeat this procedure but with astronauts onboard.

Even if the launch happens on time, it will ultimately have been delayed by seven years and with Boeing having overshoot its budget by \$1.4 billion. Boeing identified many technical problems even after the 2022 flight, and then there was the pandemic.

What is Starliner's purpose?

Since being awarded the NASA contracts, SpaceX has flown 13 missions to the ISS onboard its Dragon crew capsule (which can also house seven astronauts). Assuming Starliner's crewed test flight is successful, SpaceX and Boeing will take turns launching astronauts to the ISS – each crew's expedition lasts up to six months – until the ISS is decommissioned next decade. After NASA shut its Space Shuttle programme in 2011 and before SpaceX's Dragon capsule got ready in 2020, only Russia's Soyuz rocket and capsule could ferry astronauts to and from the ISS.

What is at stake for Boeing?

Since 2014, a dark cloud has hung above Boeing over issues with its commercial airliners.

Boeing's 737 Max 8 airline entered into use in 2017, competing with European rival Airbus's A320neo. In October 2018, a Max 8 operated by Lion Air crashed 13 minutes after take off, killing all 189 people on board. In March 2019, a Max 8 Ethiopian Airlines flight crashed six minutes into its flight, killing the 157 onboard. These incidents were the result of troubles with the Max 8's Manoeuvring Characteristics Augmentation System (MCAS).

The 737 Max 8 succeeded the 737 Next Generation vehicle with some design changes. Since pilots had already received simulator training to operate the Next Generation, Boeing designed the MCAS to compensate for these changes and installed it on the Max 8, saying pilots wouldn't need to be trained anew for the latter. But a glitch with MCAS prevented its normal function. And because pilots hadn't been trained for the Max 8, pilot error allowed the glitch to persist in a way that led to crashes.

The legal disputes, compensatory payments, and order cancellations that followed are expected to have cost Boeing more than \$60 billion. A September 2020 U.S. Congressional report also concluded Boeing had cut corners to operationalise its Max 8 aeroplanes, including hiding critical safety information from pilots.

Commercial airlines and spacecraft are different sectors, but in 2015, Boeing consolidated their development together with some other divisions, creating a company called BDS Development. The stated aims included lowering Starliner's development costs. The May 7 test is happening against this extended backdrop, and whose success will give both Boeing and NASA confidence – but whose failure, should that come to pass, will add to the company's many woes.

What is the flight test profile?

Starliner's first crew flight test will be piloted by two veteran astronauts, Mr. Wilmore and Ms. Williams. After being launched by an Atlas V rocket, Starliner will carry them to the ISS, where the duo will stay for eight days. The capsule will return and descend to the ground, probably at a location in New Mexico.

In March, Mr. Wilmore told Ars Technica Boeing's aeroplane division and the Starliner programme "don't cross". He also asked people to step back from expectations that the test will be flawless, that it was being conducted so Boeing could fix any final issues in preparation for commercial operations.



Ready for launch: A Boeing CST-100 Starliner spacecraft is rolled out at the Kennedy Space Center in Cape Canaveral, Florida on April 16. AFP

- **Boeing is finally poised to launch astronauts to the International Space Station for NASA.**
- **Starliner is a spacecraft that transports astronauts in space, after being launched there by a rocket.**
- **It consists of a crew capsule and a service module.**
- **The crew capsule houses the astronauts; like others of its kind, it will be able to survive reentry and return to the ground.**
- **The service module consists of the equipment and systems the astronauts need to survive in space, including air and temperature control, water supply, sanitation, etc., plus the engines and fuel required to manoeuvre the spacecraft. The service module won't be reusable.**

Boeing Starliner



Atlas V
Starliner
Total height:
171 ft (52m)

Service and crew module



Ascent cover



Forward heat shield

Reusable crew module (up to 7 people)



Parachutes deployed
for landing



Landing airbags

Base heat shield

Service module



Thrusters

Diameter: 15 ft (4.56 m)



Launch abort
engines



Solar arrays

What is Starliner's purpose?

Since being awarded the NASA contracts, SpaceX has flown 13 missions to the ISS onboard its Dragon crew capsule (which can also house seven astronauts).

Assuming Starliner's crewed test flight is successful, SpaceX and Boeing will take turns launching astronauts to the ISS — each crew's expedition lasts up to six months — until the ISS is decommissioned next decade.

How is Kejriwal functioning from Tihar Jail?

With the Delhi Chief Minister in jail, how is the administration carrying out its tasks?

**Jaldeep Deo Bhandi,
Rocky Soham Singh**

The story so far: Delhi Chief Minister Arvind Kejriwal has been lodged in Tihar Jail since April 14, after being arrested by the Enforcement Directorate (ED) on charges of corruption and money laundering in the execution of the Delhi government's now scrapped excise policy for 2021-22. On Friday, the Supreme Court forewarned the ED that it may "consider" granting interim bail to Mr. Kejriwal due to the Lok Sabha election, Delhi votes on May 25.

What is the Aam Aadmi Party's strategy? Foreseeing his arrest, the Aam Aadmi Party in December, 2023 ran a "Main Rukhi Kejriwal" drive, an also Kejriwal campaign that asked the people of Delhi if Mr. Kejriwal should continue as the Chief Minister of Delhi from jail if arrested. After his arrest, in an unprecedented decision, AAP decided that Mr. Kejriwal would remain the Chief Minister and that he would run the government from Tihar Jail, proclaiming it as the "will of the people of Delhi".

Mr. Kejriwal's decision has led to a peculiar situation in the capital where various administrative decisions have been stalled. For instance, the election to appoint the Mayor and Deputy Mayor of the Municipal Corporation of Delhi (MCD) scheduled to be held on April 26 was postponed after Lieutenant Governor Vinod Kumar Saxena refused to appoint a presiding officer to conduct the election saying he "did not deem it appropriate to exercise his power as Administrator to appoint the Presiding Officer in [his] absence of instructions from the Chief Minister."

Is the Chief Minister meeting his Ministers? When Mr. Kejriwal was in the custody of the ED from March 24 to April 1, he was sending written instructions to his Ministers on ensuring uninterrupted water supply and medicine as well as messages to the public to be read out by his wife Suratta Kejriwal.

However, since being lodged in Tihar Jail, communication has been reduced to media bites from those going to visit him. The Tihar Jail Manual says that every interview with a prisoner shall take place in the presence of a prison officer, who shall be positioned at a place from where he can see and hear what passes between the prisoner and his interviewer and he shall prevent any article being passed between the two parties. Since April 1, apart from his family and lawyers, Mr. Kejriwal has met AAP General Secretary Manoj Prasad, Punjab and Cabinet Ministers at the Delhi High Court and Punjab counterpart Bhagwant Mann on two occasions. Mr. Prasad said Mr. Kejriwal would meet two Cabinet Ministers every week for 30 minutes each.

How is the government being run? Mr. Kejriwal does not have any portfolios under him and there have been no cabinet meetings since his arrest. There has also not been a session of the Delhi Assembly since then. Individual ministers have been looking after their own departments. The party is currently focused on its election campaign. While deferring the MCD elections, the LG said that the circumstances were "peculiar" and "unprecedented" where the serving Chief Minister "cannot discharge his constitutionally obligated functions".

The Constitution is silent about whether a person can continue as Chief Minister as a remand prisoner. Section 103 of the Representation of People Act of 1951, states that an MLA or MP can be disqualified who is convicted and sentenced to at least two years in prison. Mr. Kejriwal has not yet been convicted in the case.

When can President's Rule be imposed? President's Rule can be imposed in Delhi under Article 239A of the Constitution. Delhi's power structure is characterised by a delicate balance between the elected government and the Central government-appointed LG. If Mr. Kejriwal continues to remain in prison stalling various administrative work, the LG can recommend to the President who can invoke Article 239A citing "failure of constitutional machinery". President's rule under Article 239A was invoked in Delhi only once, in 2004, subsequent to Mr. Kejriwal's resignation 40 days into his first tenure as Chief Minister.

What are the challenges going forward? In a recent order, the High Court censured the AAP government over non supply of educational material and other statutory benefits to eight lakh students in the MCD-run schools. While noting that it is Mr. Kejriwal's prerogative whether to continue as the Chief Minister or resign, the High Court said national and public interest demands that no person who holds this post is incommunicado or absent for a long stretch of time or for an uncertain period time.

When can President's Rule be imposed?



- **President's Rule can be imposed in Delhi under Article 239AB of the Constitution. Delhi's power structure is characterised by a delicate balance between the elected government and the Central government-appointed LG.**
- **If Mr. Kejriwal continues to remain in prison, stalling various administrative work, the LG can recommend to the President who can invoke Article 239AB citing "failure of constitutional machinery".**
- **President's rule under Article 239AB was invoked in Delhi only once, in 2014, subsequent to Mr. Kejriwal's resignation 49 days into his first tenure as Chief Minister.**

Leprosy spread between red squirrels and people: study

The Hindu Bureau

Evidence from archaeological sites in the medieval English city of Winchester shows that English red squirrels once served as an important host for *Mycobacterium leprae* strains that caused leprosy in people according to a study published in the journal *Current Biology*.

Leprosy is one of the oldest recorded diseases in human history and is still

prevalent to this day in Asia, Africa, and South America. “For thousands of years, humans were thought to be the only natural host of *M. leprae* until the discovery of *M. leprae* in several wild animals in recent decades, such as armadillos and, more recently, red squirrels and chimpanzees,” the authors write. While scientists have traced the evolutionary history of the mycobacterium that causes it,

how it may have spread to people from animals in the past was not known beyond some hints that red squirrels in England may have served as a host.

In the new study, the researchers studied 25 human and 12 squirrel samples to look for *M. leprae* at two archaeological sites in Winchester. The city was well known for its leprosarium and connections to the fur trade. In the Middle Ages, squirrel fur was used

to trim and line garments. Many people also raised them as pets.

The researchers sequenced and reconstructed four genomes representing medieval strains of *M. leprae*, including one from a red squirrel. An analysis to understand their relationships found that all of them belonged to a single branch on the *M. leprae* family tree. They also showed a close relationship between the squirrel

strain and a newly constructed one isolated from the remains of a medieval person, says a release. The study found that the medieval squirrel strain is more closely related to human strains from medieval Winchester than to modern squirrel strains from England, indicating that the infection was circulating between people and animals in the Middle Ages in a way that hadn’t been detected before.

“These findings on the natural reservoir of *M. leprae* indicated that *M. leprae* circulates in more wild animals than we suspected, and zoonotic infection may contribute to the epidemic of leprosy. Therefore, it is inevitable that leprosy epidemics can persist for a long time in the future, and we should remain vigilant against the spread of *M. leprae* between humans and wildlife,” they write.

- **Red squirrels once served as an important host for *Mycobacterium leprae* strains that caused leprosy in people .**

LEPROSY

LEPROSY, Also Known as Hansen's Disease (HD), is a Long-Term Infection by the Bacteria *Mycobacterium Leprae* or *Mycobacterium Lepromatosis*



Mycobacterium Leprae



Mycobacterium Lepromatosis

It Usually Takes About 3 TO 5 YEARS for Symptoms to Appear

Some People do not develop Symptoms UNTIL 10 YEARS LATER



Leprosy Primarily Affects the SKIN and the PERIPHERAL NERVES



It May also Strike the EYES and the Thin Tissue Lining the Inside of the NOSE, KIDNEYS, and MALE REPRODUCTIVE ORGANS

FORMS OF LEPROSY

Tuberculoid

Lepromatous

Borderline

COMPLICATIONS

Permanent Damage to the Nerves

Permanent Damage to the Legs

Permanent Damage to the Arms

Permanent Damage to the Nose

Disfiguration of the Face

Muscle Weakness
Inability to Flex

Blindness or Glaucoma

Kidney Failure

Sexual Dysfunction

Red squirrels are a small mammal which falls under a rodent group called Sciuridae (meaning shadow-tailed).

Examples of the squirrel family includes tree squirrels, ground squirrels and flying squirrels.





Genetically corrected stem cells mitigates deformities

A treatment protocol that combines autologous stem cell transplants with gene therapy shows signs of correcting skeletal deformities in eight children with Hurler syndrome, a rare disease that stunts skeletal system growth. Promising results from a phase 1 trial suggest that similar strategies may counteract one of the debilitating complications of this rare disorder, which has no cure. Patients who received autologous stem cells containing the corrected gene displayed close-to-normal skeletal growth patterns.

- **A treatment protocol that combines autologous stem cell transplants with gene therapy shows signs of correcting skeletal deformities in eight children with Hurler syndrome, a rare disease that stunts skeletal system growth.**

- **Hurler syndrome** is a rare autosomal recessive lysosomal storage disorder.
- Affected individuals demonstrate typical coarse facial features including a flat nasal bridge and excessive hair growth.
- Usually manifests as cognitive developmental delay, corneal clouding, cardiac disease, and characteristic musculoskeletal manifestations

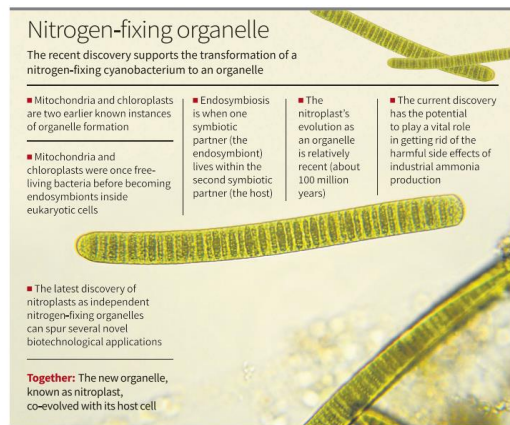
Can the new organelle help engineer plants to fix nitrogen?

The endosymbiotic theory states that organelles like mitochondria and chloroplasts, the sites of cellular respiration and photosynthesis, were once free-living bacteria that were later ingested by the recipient cells

Binay Panda

As proposed by Charles Darwin in the nineteenth century, natural selection, the engine that drives evolution, is how species adapt to their environments. Unlike the Neo-Darwinist consensus, the American evolutionary biologist Lynn Margulis did not believe that random genetic mutations were the sole cause of inherited variation. She came up with a new theory called symbiogenesis. The endosymbiotic theory states that organelles like mitochondria and chloroplasts, the sites of cellular respiration and photosynthesis, were once free-living bacteria that were later ingested by the recipient cells. The theory of symbiogenesis was fiercely challenged, including Margulis's manuscript, which was rejected by 15 academic journals before finally being published in *The Journal of Theoretical Biology* in 1967. It was not until many years later that mitochondria and chloroplasts were accepted as once being free-living bacteria before becoming endosymbionts inside eukaryotic cells.

Two papers published recently, one in the journal *Science* and another in the *Cell*, have generated new interest in the endosymbiotic theory. The discovery concerns nitrogen fixation. Nitrogen is a key component in proteins and DNA of all living organisms. Although nitrogen gas makes up about 78% of the Earth's atmosphere by



volume, plants and animals lack a system that can utilise atmospheric nitrogen. Bacteria and archaea help convert atmospheric nitrogen gas to ammonia by nitrogen fixation to make nitrogen usable for plants. Unlike many free-living nitrogen-fixing bacteria, legumes, a class of plants in the family Fabaceae, bear the nitrogen-fixing bacteria in their root nodules. Ammonia is converted to nitrites and nitrates and then back into atmospheric nitrogen with the help of bacteria to complete the cycle. In marine environments, like on Earth, bacteria and archaea are also involved in ammonification, nitrification, and denitrification. Beyond mitochondria and chloroplasts, the current discovery extends the ear-

lier reports of a nitrogen-fixing cyanobacterium in marine algae and establishes it as a new organelle. The new organelle that the authors call nitroplast co-evolved with its host cell.

In 1998, Jonathan Zehr, at the University of California, Santa Cruz, U.S., discovered a cyanobacterium *Candidatus Atelocyanobacterium thalassa* or UCYN-A in the water of the Pacific Ocean capable of fixing nitrogen. Later, Kyoko Hagiwara at Kochi University, Japan, found the marine algae *Braarudosphaera bigelowii* as the host for UCYN-A and could successfully culture the host cells. Both teams had established UCYN-A as a symbiotic cyanobacterium for marine single-cell eukaryotic algae.

Bona fide organelles

need to satisfy several criteria. First, the organelle must be integrated into the function and overall architecture of the host cell. Second, proteins must be imported to the organelle from the host cell to carry out some of its functions. Third, organelles must be in sync with the host cell's growth. Last, organelles must be inherited in the newly dividing cells during host cell division. All these above criteria were satisfied by nitroplast, as presented by several lines of evidence by the authors. During a symbiont's transformation into an organelle within a eukaryotic cell, its genome becomes frugal, encoding fewer proteins and utilizing the host cell's proteins to perform some of its essential functions. In line with expecta-

tions, nearly half of the nitroplasts' proteins are from the host cell. Although the reports present evidence of establishing nitroplasts as organelles, the loss of some of nitroplasts' genetic material and migration to the host cell nucleus still needs to be established. Unlike mitochondria and chloroplast endosymbiosis, which happened nearly two billion years back, nitroplast's evolution as an organelle is relatively recent (about 100 million years).

The discovery has revolutionary implications, especially in agriculture. Agriculture was transformed in the last century by the discovery of a method for synthesising ammonia from nitrogen and hydrogen in the laboratory. The current discovery has the potential to play a vital role in getting rid of the harmful side effects of industrial ammonia production. Several novel biotechnological applications may use the result of the current discovery of nitroplasts as independent nitrogen-fixing organelles. They are engineering host cells and their nitroplasts with minimal genomes sufficient to grow efficiently and fix nitrogen, making plant cells fix nitrogen by engineering them to include nitroplasts and organelle transformation in plant cells to introduce nitroplast and its host genes to fix nitrogen. Although promising and futuristic, all these are highly challenging and far from reality.

(Binay Panda is a Professor at JNU, New Delhi)

Nitrogen Fixation

Nitrogen fixation is the process of converting atmospheric nitrogen (N_2) into ammonia (NH_3) or other usable nitrogenous compounds.

Bacteria / Archaea



Symbiotic and free-living bacteria fix nitrogen in soil and root nodules.

Lightning



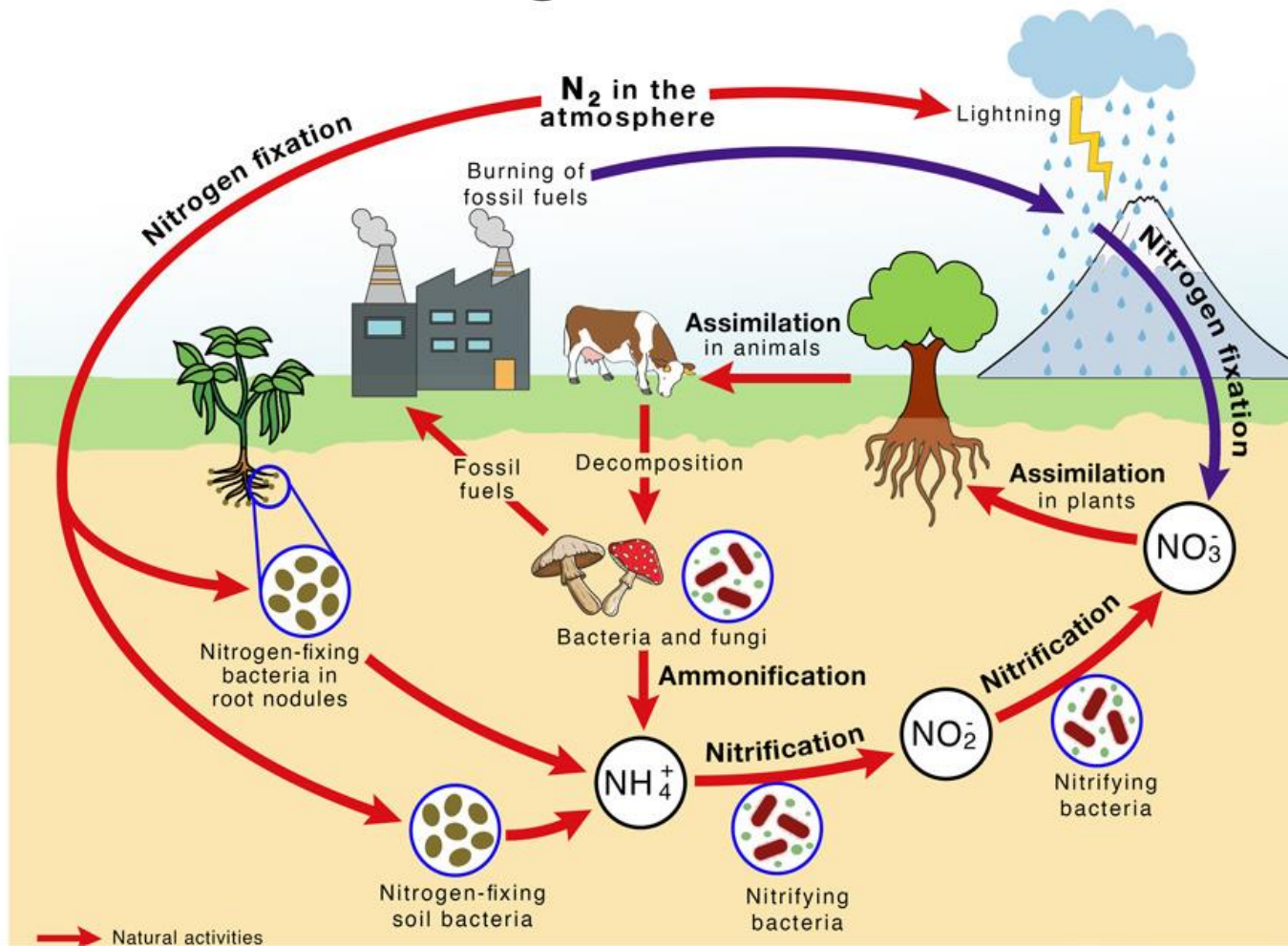
Lightning breaks the $\text{N}\equiv\text{N}$ bond, so nitrogen makes other compounds.

Industrial Processes



The Haber process, Frank-Caro process, and others fix nitrogen.

Nitrogen Fixation



- **The endosymbiotic theory states that organelles like mitochondria and chloroplasts, the sites of cellular respiration and photosynthesis, were once free-living bacteria that were later ingested by the recipient cells.**
- **Nitrogen is a key component in proteins and DNA of all living organisms. Although nitrogen gas makes up about 78% of the Earth's atmosphere by volume, plants and animals lack a system that can utilise atmospheric nitrogen.**
- **Bacteria and archaea help convert atmospheric nitrogen gas to ammonia by nitrogen fixation to make nitrogen usable for plants.**

Nitrogen-fixing organelle

The recent discovery supports the transformation of a nitrogen-fixing cyanobacterium to an organelle

■ Mitochondria and chloroplasts are two earlier known instances of organelle formation

■ Mitochondria and chloroplasts were once free-living bacteria before becoming endosymbionts inside eukaryotic cells

■ Endosymbiosis is when one symbiotic partner (the endosymbiont) lives within the second symbiotic partner (the host)

■ The nitroplast's evolution as an organelle is relatively recent (about 100 million years)

■ The current discovery has the potential to play a vital role in getting rid of the harmful side effects of industrial ammonia production

■ The latest discovery of nitroplasts as independent nitrogen-fixing organelles can spur several novel biotechnological applications

Together: The new organelle, known as nitroplast, co-evolved with its host cell

- In marine environments, like on Earth, bacteria and archaea are also involved in ammonification, nitrification, and denitrification.
- Beyond mitochondria and chloroplasts, the current discovery extends the earlier reports of a nitrogen-fixing cyanobacterium in marine algae and establishes it as a new organelle.
- The new organelle that the authors call nitroplast coevolved with its host cell.

- **Unlike many free living nitrogen-fixing bacteria, legumes, a class of plants in the family Fabaceae, bear the nitrogen-fixing bacteria in their root nodules.**
- **Ammonia is converted to nitrites and nitrates and then back into atmospheric nitrogen with the help of bacteria to complete the cycle.**

- **The discovery has revolutionary implications, especially in agriculture. Agriculture was transformed in the last century by the discovery of a method for synthesising ammonia from nitrogen and hydrogen in the laboratory.**
- **The current discovery has the potential to play a vital role in getting rid of the harmful side effects of industrial ammonia production.**
- **Several novel biotechnological applications may use the result of the current discovery of nitroplasts as independent nitrogen-fixing organelles.**

- **They are engineering host cells and their nitroplasts with minimal genomes sufficient to grow efficiently and fix nitrogen, making plant cells fix nitrogen by engineering them to include nitroplasts and organelle transformation in plant cells to introduce nitroplast and its host genes to fix nitrogen**

Topics -

- **Fusobacterium nucleatum**
- **Orangutan**
- **Online Gaming Industry**
- **Carbon farming**
- **Magnetic resonance imaging (MRI)**
- **The International Union of Forest Research Organizations (IUFRO).**
- **Why flood in Brazil ??**
- **Mains**

Acid-loving bacteria has starring role in colorectal cancer: study

According to a research team's experiments, some genetic factors could be boosting the ability of *Fusobacterium nucleatum* bacteria to associate with cancers of the gut. The team also showed that when mice were infected with this type of *Fusobacterium*, their intestines developed adenomas

Sayantan Datta

The bacteria known as *Fusobacterium nucleatum* live in the human mouth and are rarely found elsewhere. But in cases of cancer of the colon or the rectum, the bacteria are found in tumours in the gut, where they help cancer cells escape from the immune system and spread to other parts of the body.

In a new study, a group of researchers from the Fred Hutchinson Cancer Center in the U.S. has identified a distinct subtype of the bacterium that is found in relatively greater quantities in colorectal cancer (CRC) tumours.

CRC is the seventh most common type of cancer in India, where the number of cases rose by 20% from 2004 to 2014. Worldwide, the overall CRC incidence has declined but, experts wrote in the journal *Science* last year, the incidence of age-adjusted early-onset CRC "has risen at an alarming rate of 2-4% in many countries, with even sharper increases in individuals younger than 30 years".

According to the team's experiments, described in a paper in *Nature* in March, some genetic factors could be boosting *Fusobacterium*'s ability to associate with cancers of the gut.

The team also showed that when mice were infected with this type of *Fusobacterium*, their intestines developed precancerous formations called adenomas.

Experts said the study's findings could be used in future to develop tests to detect CRC early and develop targeted treatment options.

A clade of its own

The researchers began by culturing *Fusobacterium* bacteria collected from 130 human CRC tumours in the laboratory.

Then they mapped the entire genetic composition of the isolated bacteria and found that out of the four known *Fusobacterium nucleatum* subspecies, only *Fusobacterium nucleatum animalis* (*Fna*) was significantly associated with CRC tumours.

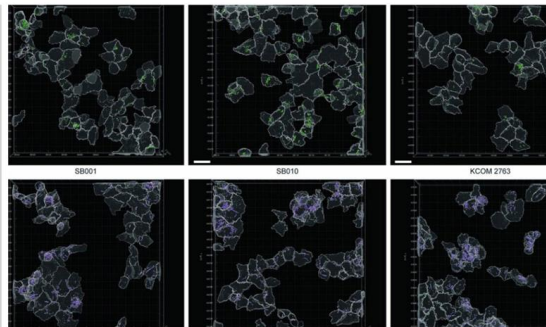
Individual members of the same species have slightly different DNA. Pangenomic analysis helps researchers map all the genes in a species as well as those parts of the genome that some but not all members of the species have.

This part is called the accessory genome. The members of a species can be further subclassified depending on the accessory genomes they have.

In their analysis, the researchers found *Fna* has the smallest core genome (the part that all members of the species have), indicating there could be different subtypes of *Fna*.

In response, they traced the evolutionary history of the bacteria by tracing the changes in its genes. This analysis revealed that *Fna*, instead of being one homogenous group, is composed of bacteria from two different evolutionary lineages.

Scientists call a group of life-forms belonging to one evolutionary lineage a clade. Thus, the researchers had identified two different clades of *Fna*: they called these *Fna* C1 and *Fna* C2. They further found *Fna* C2 bacteria are significantly associated with CRC tumours



Representative *Fna* C1 and *Fna* C2 strains co-cultured with human colon cancer cells. The grid shows the results of computational analysis of confocal imaging. Independent masks for cancer epithelial cells (grey), and intracellular bacterial cells (*Fna* C1 green, *Fna* C2 lavender) were generated. The masks were used to calculate the percent of cancer cells with intracellular *Fna*. The scale bar is 20µm. ZEPEDA-RIVERA, M., MNOT, S.S., BOULZAK, H. ET AL.

and that they have extra genetic factors to help them in this regard.

Colonising the gut

Both physical and genetic differences between the two clades seemed to contribute to *Fna* C2 bacteria's ability to associate with CRC tumours. Physically, the *Fna* C2 bacteria looked longer and thinner than *Fna* C1 bacteria. Such differences can affect how bacteria are able to live in host tissue as well as evade the body's immune system, the authors wrote in their paper.

Genetically, *Fna* C2 bacteria had genes required to munch two compounds for energy in the human gut: ethanolamine and L2-propanediol. These genes were missing in *Fna* C1. So the researchers concluded *Fna* C2 bacteria's ability to associate with CRC tumours was at least partly contingent on them "having increased nutrient scavenging mechanisms and enhanced metabolic potential".

The researchers validated their findings by analysing genomes present in more than 1,200 human stool samples, roughly half of which were from people with CRC while others were from healthy individuals. They found that the *Fna* genes required to metabolise ethanolamine and L2-propanediol were more enriched in stool samples from CRC patients than in samples from people without CRC.

Mouth to gut

Scientists previously believed *Fusobacterium* bacteria could go from the mouth to the gut by infecting the bloodstream when, say, someone brushed their gums too hard or during routine dental procedures. The authors of the new *Nature* paper pitched a new route: that the bacteria could have descended through the gastrointestinal tract to reach the colon.

Bacteria don't usually take this path



Across the world, overall CRC incidence has declined but the incidence of age-adjusted early-onset CRC has risen at an alarming rate of 2-4%.

because they can't survive the highly acidic environment of the stomach. But the researchers found *Fna* C2 could. These bacteria could grow in more acidic conditions than could *Fna* C1 bacteria – and they also had specific genes that could resist the effects of acids. These genes came online when the acidity was comparable to that of stomach acid.

In mice as in humans

Next, the researchers investigated whether *Fna* C2 could induce the development of tumours in the gut. For this, they introduced *Fna* C1 bacteria in the inflamed guts of some mice and *Fna* C2 bacteria in the inflamed guts of others. (These mice are a common animal model used to investigate conditions that also affect humans.) They found a significantly higher incidence of adenomas in the intestines of the mice treated with *Fna* C2 bacteria.

They also noted that the intestines of *Fna* C2-treated mice had different metabolic profiles – changes consistent with previously reported associations between differential metabolite levels and tumour progression.

"Overall, our results demonstrate the ability of *Fna* C2, but not *Fna* C1, to metabolically affect the intestinal milieu towards conditions conducive to CRC," the authors wrote.

Finally, the researchers tested their hypothesis in a cohort of human patients. Working with CRC tissue and

non-cancerous tissues from the same individual, the authors confirmed that *Fna* C2 was the only *Fusobacterium* subtype enriched in CRC tissues. They found similar results in stool samples from those with CRC but not in those from healthy individuals.

Long road to clinical trials

According to Neetu Kalra, a cancer therapeutics researcher at Azim Premji University, Bhopal, "The study presents promising prospects for the advancements of microbial cellular therapies, which involve the use of modified bacterial strains to directly administer treatments into tumours."

Varun Agarwala is an assistant professor at Jio Institute, Mumbai, who also works on faecal transplants for infectious and inflammatory bowel diseases. He called the study "comprehensive" and said "studies like this provide a solid foundation for the broader community to design targeted microbial interventions and diagnostics for CRC."

He added that future research should track the gut and oral microbiome of high-risk individuals and their tumour microbiome after a CRC diagnosis to understand how certain strains of bacteria can cause cancer.

Similarly, Dr. Kalra said studies to check *Fna* C2 bacteria within the "timeline" of *Fna* C2 bacteria: the CRC stage at which the bacteria become associated with the tumours. "If colonisation occurs early," she explained, "it could facilitate early CRC diagnosis".

On the flip side, she also said developing a drug that could selectively target *Fna* C2 bacteria without affecting *Fna* C1 or other gut bacteria "presents a significant challenge".

Sayantan Datta is a science journalist and a faculty member at Krea University. Datta tweets at @qceerprings.)

- **The bacteria known as *Fusobacterium nucleatum* live in the human mouth and are rarely found elsewhere.**
- **But in cases of cancer of the colon or the rectum, the bacteria are found in tumours in the gut, where they help cancer cells escape from the immune system and spread to other parts of the body.**



A male Sumatran orangutan named Rakus is seen two months after self-treating a wound with a medicinal plant in the Sang Raining research site, August 26, 2022. (U11/116)

Orangutan used plant to treat wound, scientists say

Associated Press

An orangutan appeared to treat a wound with medicine from a tropical plant — the latest example of how some animals attempt to soothe their own ills with remedies found in the wild, scientists reported Thursday.

Scientists observed Rakus pluck and chew up leaves of a medicinal plant used by people throughout Southeast Asia to treat pain and inflammation. The adult male orangutan then used his fingers to apply the plant juices to an injury on the right cheek. Afterward, he pressed the chewed plant to cover the open wound like a makeshift bandage, according to a new study in *Scientific Reports*.

Previous research has documented several species of great apes foraging for medicines in forests to heal themselves, but scientists hadn't yet seen an animal treat itself in this way.

"This is the first time that we have observed a wild animal applying a quite potent medicinal plant directly to a wound," said co-author Isabelle Laumer, a biologist at the Max Planck Institute of Animal Behavior in Konstanz, Germany.

The orangutan's intriguing behavior was recorded in 2022 by U11 adult, a co-author and field researcher at the Sang Project in Medan, Indonesia. Photographs show the animal's wound closed within a month without any problems.

Scientists have been observing orangutans in Indonesia's Gunung Leuser

Rakus the orangutan plucked and chewed up leaves of a medicinal plant used by people throughout Southeast Asia. The orangutan then used his fingers to apply the juices to a wound on his cheek.

National Park since 1994, but they hadn't previously seen this behavior.

"It's a single observation," said Emory University biologist Jacob de Ruode, who was not involved in the study. "But often we learn about new behaviours by starting with a single observation."

"Very likely it's self-medication," said de Ruode, adding that the orangutan applied the plant only to the wound and no other body part.

It's possible Rakus learned the technique from other orangutans living outside the park and away from scientists' daily scrutiny, said co-author Caroline Schuppi at Max Planck.

Rakus was born and lived as a juvenile outside the study area. Researchers believe the orangutan got hurt in a fight with another animal. It's not known whether Rakus ever treated other injuries.

Scientists have previously recorded other primates using plants to treat themselves.

Bornean orangutans rubbed themselves with juices from a medicinal plant, possibly to reduce body pains or chase away parasites.

Chimpanzees in multiple locations have been observed chewing on the shoots of bitter tasting plants to soothe their stomachs. Gorillas, chimpanzees and bonobos swallow certain rough leaves whole to get rid of stomach parasites.

"If this behavior exists in some of our closest living relatives, what could that tell us about how medicine first evolved?" said Tara Smitá, president and chief scientific officer of the nonprofit Dan

- **An orangutan appeared to treat a wound with medicine from a tropical plant—the latest example of how some animals attempt to soothe their own ills with remedies found in the wild.**
- **Rakus pluck and chew up leaves of a medicinal plant used by people throughout Southeast Asia to treat pain and inflammation.**
- **The adult male orangutan then used his fingers to apply the plant juices to an injury on the right cheek.**
- **Afterward, he pressed the chewed plant to cover the open wound like a makeshift bandage**

- **observing orangutans in Indonesia's Gunung Leuser National Park .**
- **Bornean orangutans rubbed themselves with juices from a medicinal plant, possibly to reduce body pains or chase away parasites.**
- **Chimpanzees in multiple locations have been observed chewing on the shoots of bitter-tasting plants to soothe their stomachs.**
- **Gorillas, chimpanzees and bonobos swallow certain rough leaves whole to get rid of stomach parasites.**

Getting to a new level in India's online gaming sector



The Prime Minister's vision to establish India as a prominent global gaming hub has received renewed attention as he engaged with seven of the top gamers in the country. Spending a day with them, in April 2024, he discussed the trajectory of the gaming industry and sought to understand the challenges they encounter, particularly on the nuanced distinction between skill gaming and gambling (game of chance) – it could pave the way for a more conducive and forward-looking regulatory environment. The online gaming industry forms a critical part of the Digital India vision and initiative. Some of the key takeaways from the discussion included the opportunity offered by the increasing number of games based on Indian mythology and the scope to encourage the participation of women, besides fostering innovation. The players also highlighted the issue around the perception of gaming as a career in India.

Rapid growth

The online gaming industry in India has seen a rapid expansion of 28% CAGR between FY20 and FY23. Projections indicate further growth to ₹33,243 crore by FY28, with a sustained 15% CAGR. This sector not only attracts significant foreign and domestic investments but also generates substantial direct and indirect employment. Leveraging India's IT prowess, the industry holds natural potential for India. Notably, while the size of the global gaming industry crossed \$300 billion in 2021 – more than the combined markets for the movie and music industry – the online gaming segment in India constitutes 1.1% of the global online gaming revenue. Thus, the potential for growth is enormous.

Not only is online gaming a multi-billion



Amar Patnaik

is a former Member of Parliament, Rajya Sabha, from Odisha and an advocate by profession. He was a CAG bureaucrat

There is much potential in India to shape the future of the gaming industry

opportunity for Indian start-ups but it can also form an important part of 'India Techade' and the goal of a \$1 trillion digital economy. The sector has witnessed an array of positive developments, including the establishment of the Animation, Visual Effects, Gaming, Comic and Extended Reality taskforce by Ministry of Information and Broadcasting, the identification of the Ministry of Electronics and Information Technology as the nodal ministry, the introduction of a series of regulations through the IT (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021, and clarification around the ambiguity concerning tax deduction at source on winnings.

All these measures have provided a sense of clarity and certainty in terms of a policy framework for all online gaming startups. This will go a long way in fostering innovation that is being powered by young Indians.

Issues that need scrutiny

Nevertheless, there are unresolved issues that require the attention of the government to enhance regulatory clarity. Primarily, despite the provision of self-regulatory bodies within the IT Rules of 2021 intended to regulate the industry, the effective implementation of these rules is pending, thus nullifying their intended impact. In an industry driven by innovation and fast-evolving technology, the role of self-regulation is crucial. NITI Aayog's discussion paper with draft guiding principles for the online fantasy gaming sector also proposed a self-regulatory model of governance with a self-regulatory organisation at its helm.

Further, recent revisions in taxation have placed the industry, particularly startups, in a precarious position. During the Goods and Services Tax Council meeting in July 2023, the

Council decided to enforce a tax rate of 28% on the total face value of bets (effective October 1, 2023) regardless of whether the activity is classified as a game of skill or chance. Before this, online gaming firms in India were subjected to an 18% GST rate since the introduction of the indirect tax system in July 2017. While this measure has resulted in an initial uptick in tax revenue for the government, it raises concerns about the industry's sustainability in the long term and its consequential impact on jobs being created in this sector.

Soft power

By remedying these deficiencies, India stands at a distinctive juncture to emerge as a prominent global gaming hub. Another advantage lies in tapping India's rich cultural heritage (stories, legends, and folklore). With an increasing number of games inspired by Indian mythology, there is a unique opportunity to cater to domestic and international audiences.

Furthermore, there is a concerted effort to encourage the participation of women in the gaming industry, fostering diversity and inclusivity. As perceptions about gaming as a viable career option evolve, India stands to benefit from a growing pool of talented individuals driving innovation and pushing boundaries in the gaming landscape.

India stands at the threshold of a transformative era in the gaming industry. By fostering an enabling environment for skill gaming, promoting diversity and inclusion, and capitalising on its rich cultural narratives, India can not only realise its vision of a \$1-trillion digital economy but also shape the future of gaming on a global scale.

The views expressed are personal

- **The online gaming industry in India has seen a rapid expansion of 28% CAGR between FY20 and FY23.**
- **Projections indicate further growth to ₹33,243 crore by FY28, with a sustained 15% CAGR. This sector not only attracts significant foreign and domestic investments but also generates substantial direct and indirect employment.**
- **Leveraging India's IT prowess, the industry holds natural potential for India.**
- **Notably, while the size of the global gaming industry crossed \$300 billion in 2021 — more than the combined markets for the movie and music industry — the online gaming segment in India constitutes 1.1% of the global online gaming revenue.**

- **Thus, the potential for growth is enormous. Not only is online gaming a multi-billion opportunity for Indian start-ups but it can also form an important part of 'India Techade' and the goal of a \$1 trillion digital economy.**
- **The sector has witnessed an array of positive developments, including the establishment of the Animation, Visual Effects, Gaming, Comic and Extended Reality taskforce by Ministry of Information and Broadcasting, the identification of the Ministry of Electronics and Information Technology as the nodal ministry, the introduction of a series of regulations through the IT (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021, and clarification around the ambiguity concerning tax deduction at source on winnings.**

Steps

- despite the provision of self-regulatory bodies within the IT Rules of 2021 intended to regulate the industry, the effective implementation of these rules is pending, thus nullifying their intended impact.
- In an industry driven by innovation and fast-evolving technology, the role of self-regulation is crucial.
- NITI Aayog's discussion paper with draft guiding principles for the online fantasy gaming sector also proposed a self-regulatory model of governance with a self-regulatory organisation at its helm.

- **Further, recent revisions in taxation have placed the industry, particularly startups, in a precarious position.**
- **During the Goods and Services Tax Council meeting in July 2023, the Council decided to enforce a tax rate of 28% on the total face value of bets (effective October 1, 2023) regardless of whether the activity is classified as a game of skill or chance.**

- **Another advantage lies in tapping India's rich cultural heritage (stories, legends, and folklore).**
- **With an increasing number of games inspired by Indian mythology, there is a unique opportunity to cater to domestic and international audiences.**
- **Furthermore, there is a concerted effort to encourage the participation of women in the gaming industry, fostering diversity and inclusivity.**
- **As perceptions about gaming as a viable career option evolve, India stands to benefit from a growing pool of talented individuals driving innovation and pushing boundaries in the gaming landscape**

What is carbon farming?

What are some techniques within carbon farming which can reduce greenhouse gas emissions? What are the challenges in implementing such techniques, especially in developing countries such as India? What are some of the global initiatives?

EXPLAINER

Vinaya Kumar H.M.

Carbon is found in all living organisms and many minerals. It is fundamental to life on earth and plays a crucial role in various processes, including photosynthesis, respiration, and the carbon cycle. Farming is the practice of cultivating land, raising crops, and/or livestock for food, fibre, fuel, or other resources. It encompasses a wide range of activities, from planting and harvesting crops to managing livestock and maintaining agricultural infrastructure. Carbon farming combines these two concepts by implementing regenerative agricultural practices that restore ecosystem health while improving agricultural productivity and soil health, and mitigating climate change by enhancing carbon storage in agricultural landscapes and reducing greenhouse gas emissions. The practice is easy to adopt across various agro-climatic zones. It can also help ameliorate soil degradation, water scarcity, and challenges related to climate variability.

How can carbon farming help?

A simple implementation of carbon farming is rotational grazing. Others include agroforestry, conservation agriculture, integrated nutrient management, agro-ecology, livestock management, and land restoration. Agroforestry practices – including silvopasture and alley cropping – can further diversify farm income by sequestering carbon in trees and shrubs. Conservation agriculture techniques such as zero tillage, crop rotation, cover cropping, and crop residue management (stable retention and composting) can help minimise soil disturbance and enhance organic content, particularly in places with other intense agricultural activities.

Integrated nutrient management practices promote soil fertility and reduce emissions by using organic fertilisers and compost. Agro-ecological approaches such as crop diversification and intercropping have benefits for ecosystem resilience. Livestock management strategies including rotational grazing, optimising feed quality, and managing animal waste can reduce methane emissions and increase the amount of carbon stored away in pasture lands.

What are the challenges to carbon farming?

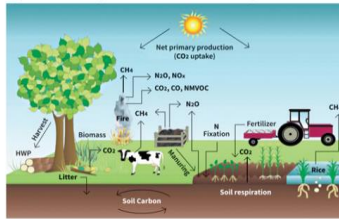
While carbon farming does offer numerous benefits, its effectiveness varies depending on multiple factors: geographical location, soil type, crop selection, water availability, biodiversity, and farm size and scale. Its usefulness also depends on land management practices, sufficient policy support, and community engagement. Regions with long growing seasons, sufficient rainfall, and substantial irrigation are best suited to practise carbon farming because they provide the best conditions in which to sequester carbon, through vegetation growth. In regions with adequate rainfall and fertile soil, the potential for carbon sequestration through practices like agroforestry (integrating trees and shrubs with crops) and conservation agriculture (minimising soil disturbance) may be particularly high.

On the other hand, carbon farming can be challenging in hot and dry areas where the availability of water is limited, and prioritised for drinking and washing.



New ways of farming A worker loads fertilizer into a tank attached to a large drone, preparing to spray it over the rice fields in the Long An province in southern Vietnam's Mekong Delta, on January 23, 2023.

The process of emitting and removing greenhouse gas emissions in managed farmland



Source: Carbon farming – Making agriculture fit for 2030: a study for the European Parliament's committee on Environment, Public Health and Food Safety

needs. Limited water availability can hinder the growth of plants, thus restricting the potential for sequestration through photosynthesis. For example, practices like cover cropping, which require additional vegetation between main crop cycles, may not be viable due to the added water demand. Moreover, selecting which plants to grow also becomes crucial because not all species trap and store carbon in the same amounts or in an equally effective manner. Fast-growing trees and deep-rooted perennial grasses tend to be better at this task – but on the flip side, these types of plants may not be well-suited to arid environments.

Further, the adoption of carbon farming practices may require financial assistance for farmers to overcome the costs of implementing them. In the context of developing countries like India, small-scale farmers may lack the resources to invest in sustainable land management practices and environmental services. In sum, while carbon farming holds promise as a mitigation strategy, addressing these challenges is essential to realise its full potential in combating climate change.

What are some carbon farming schemes worldwide?

In recent years, the practice of carbon trading in the agriculture sector has become important around the world, but especially in the U.S., Australia, New Zealand, and Canada, where voluntary carbon markets have emerged. Initiatives like the Chicago Climate Exchange and the Carbon Farming Initiative in Australia demonstrate efforts to incentivise carbon mitigation activities in agriculture. The processes range from no-till farming (growing crops without disturbing the soil) to reforestation and pollution reduction.

Initiatives like Kenya's Agricultural Carbon Project, which has the World Bank's support, also highlight the potential for carbon farming to address climate mitigation and adaptation and food security challenges in economically developing countries.

The launch of the '1 per 1000' initiative during the COP21 climate talks in 2015 in Paris highlights the particular role of soils in mitigating greenhouse gas emissions. As the oceans and the atmosphere are filled with carbon, and they approach their saturation points, we must manage

the remaining carbon budget of 390 billion tonnes or so wisely.

What are the opportunities in India?

As climate change intensifies, climate-resilient and emission-reducing agricultural practices can benefit from adaptation strategies. Agriculture is crucial in this endeavour.

Grassroots initiatives and pioneering agrarian research in India are demonstrating the viability of organic farming to sequester carbon. In this regard, agro-ecological practices in India could yield significant economic benefits, with the potential to generate \$62 billion in value from approximately 170 million hectares of arable land. This estimate includes an annual payment of around ₹5,000-6,000 per acre for farmers to provide climate services by adopting sustainable agricultural practices.

Regions with extensive agricultural land, such as the Indo-Gangetic plains and the Deccan Plateau, are well-suited to adopt carbon farming whereas the mountainous terrain of the Himalayan region is less so. Coastal areas are prone to salinisation and have limited access to resources, thus limited the adoption of traditional farming practices.

Further, carbon credit systems can incentivise farmers by providing additional income through environmental services. Studies have shown agricultural soils can absorb 1.8 billion tonnes of CO2-equivalent every year over 20-30 years. This capacity can bridge the gap between feasible emissions reductions and the indispensable stabilisation of the climate. So carbon farming could also be a sustainable strategy to mitigate climate change and enhance food security in India.

But scaling it up requires concerted efforts to address several challenges, including limited awareness, inadequate policy support, technological barriers, and an enabling adoption environment. Yet promoting carbon farming is in India's interests – to mitigate climate change while improving soil health, enhancing biodiversity and creating economic opportunities for its adopters.

Vinaya Kumar H.M. is an assistant professor of the Agricultural Extension, Office of the Vice-Chancellor, K. J. Somaiya Institute of Agricultural and Horticultural Sciences, Shivajinagar.

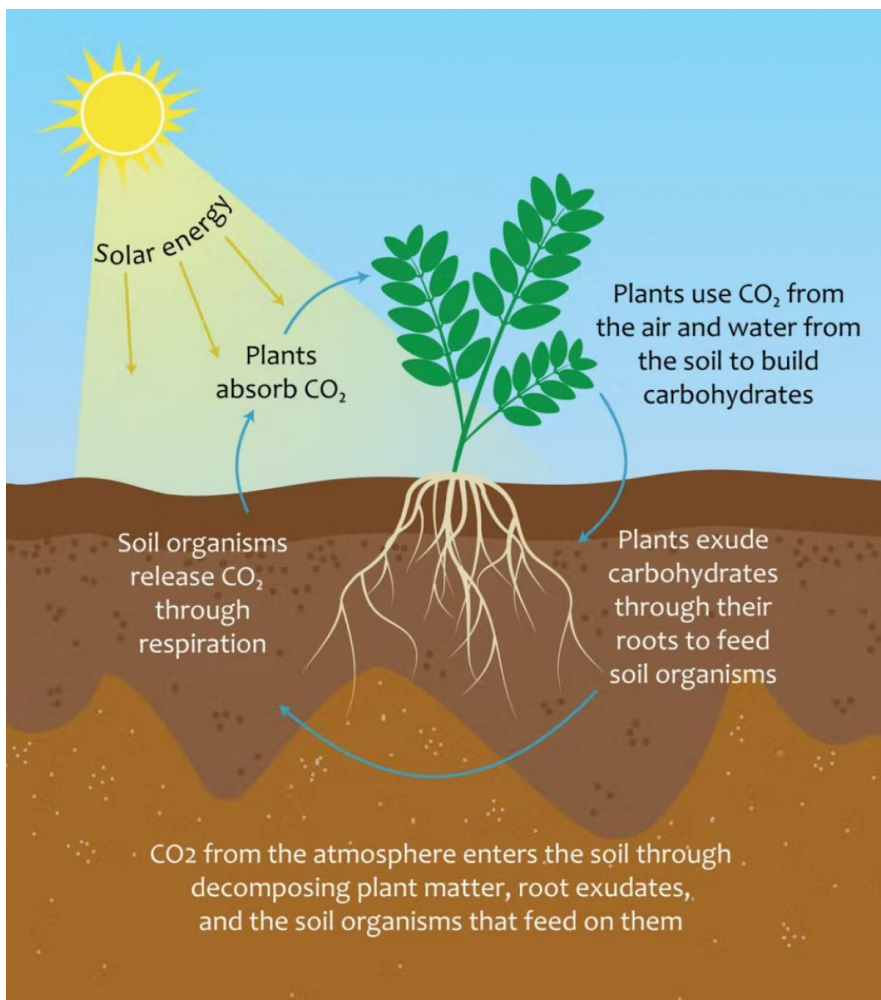
THE GIST

Implementing regenerative agricultural practices that restore ecosystem health while improving agricultural productivity and soil health, and mitigating climate change by enhancing carbon storage in agricultural landscapes and reducing greenhouse gas emissions is carbon farming.

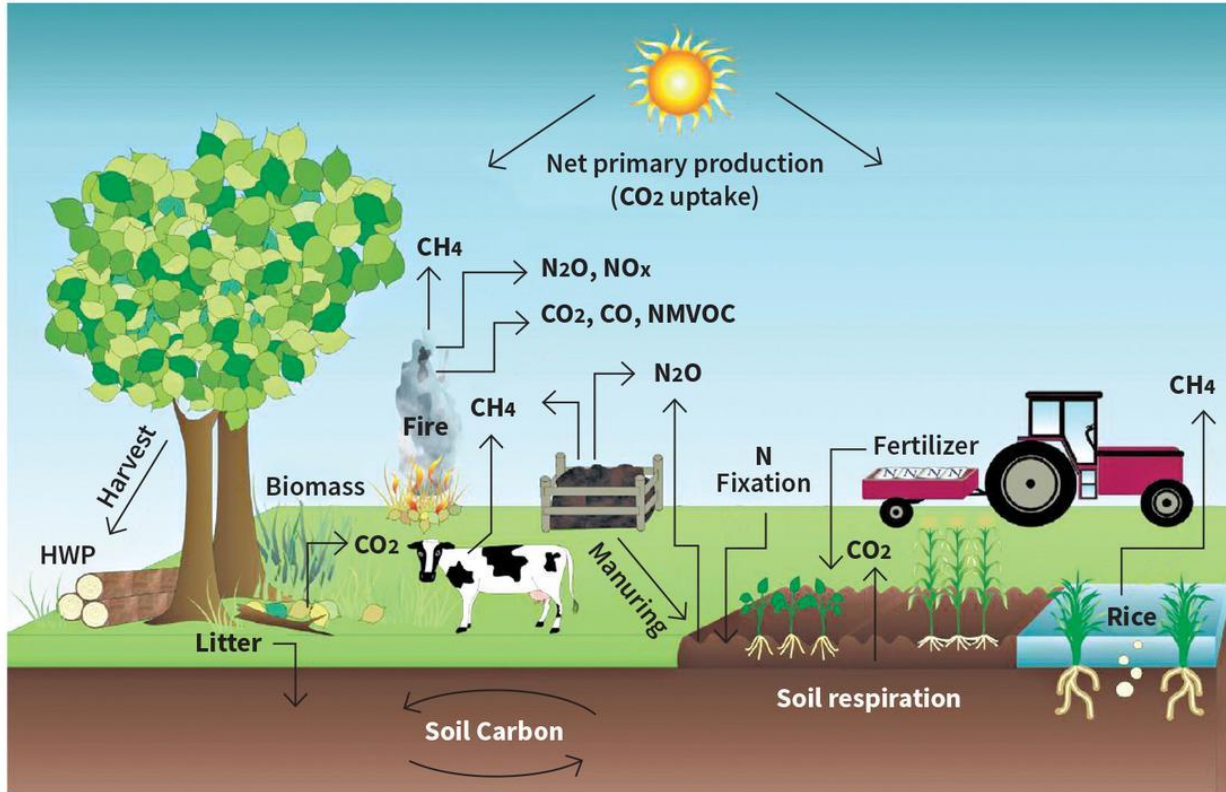
Regions with extensive agricultural land, such as the Indo-Gangetic plains and the Deccan Plateau, are well-suited to adopt carbon farming whereas the mountainous terrain of the Himalayan region is less so.

In recent years, the practice of carbon trading in the agriculture sector has become important around the world, but especially in the U.S., Australia, New Zealand, and Canada.

- **Carbon Farming is a whole farm approach to optimizing carbon capture on working landscapes by implementing practices that are known to improve the rate at which CO₂ is removed from the atmosphere and stored in plant material and/or soil organic matter.**
- **Carbon Farming is a framework for engaging with the agroecosystem processes that drive system change.**
- **Carbon farming explicitly recognizes that it is solar energy that drives farm ecosystem dynamics and that carbon is the carrier of that energy within the farm system.**



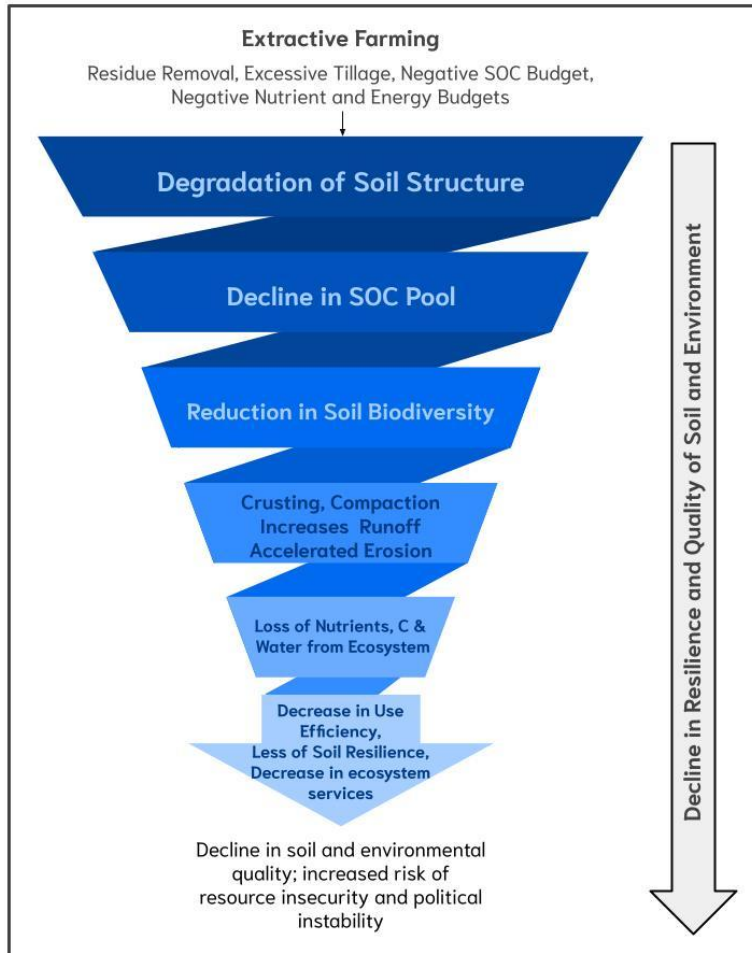
The process of emitting and removing greenhouse gas emissions in managed farmland



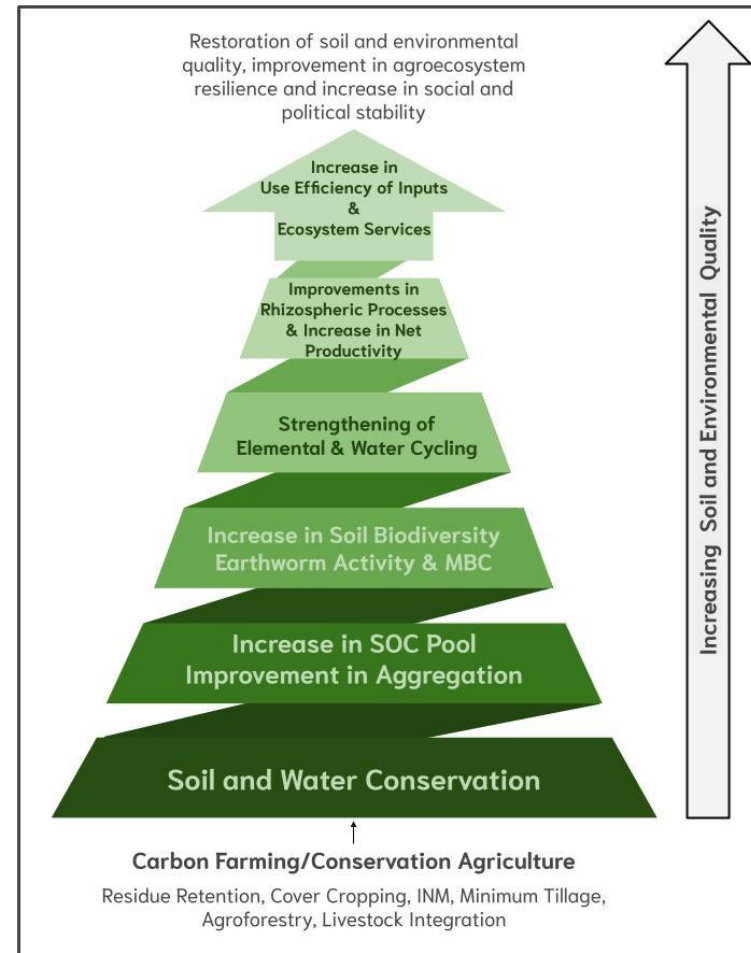
Source: 'Carbon farming – Making agriculture fit for 2030', a study for the European Parliament's committee on Environment, Public Health and Food Safety

- **Carbon farming is synonymous with the term "regenerative agriculture" when that term is explicitly rooted in an understanding of the underlying system dynamics and positive feedback processes that actually make a "regenerative" upward spiral of soil fertility and farm productivity possible, as depicted in the figure below.**

Decreasing Farm System Energy/Carbon



Increasing Farm System Energy/Carbon



Challenges

- **Regions with long growing seasons, sufficient rainfall, and substantial irrigation are best suited to practise carbon farming because they provide the best conditions in which to sequester carbon, through vegetation growth.**
- **In regions with adequate rainfall and fertile soil, the potential for carbon sequestration through practices like agroforestry (integrating trees and shrubs with crops) and conservation agriculture (minimising soil disturbance) may be particularly high.**

- On the other hand, carbon farming can be challenging in hot and dry areas where the availability of water is limited, and prioritised for drinking and washing needs.
- Limited water availability can hinder the growth of plants, thus restricting the potential for sequestration through photosynthesis.

- **Further, the adoption of carbon farming practices may require financial assistance for farmers to overcome the costs of implementing them.**
- **In the context of developing countries like India, small-scale farmers may lack the resources to invest in sustainable land management practices and environmental services.**

Examples

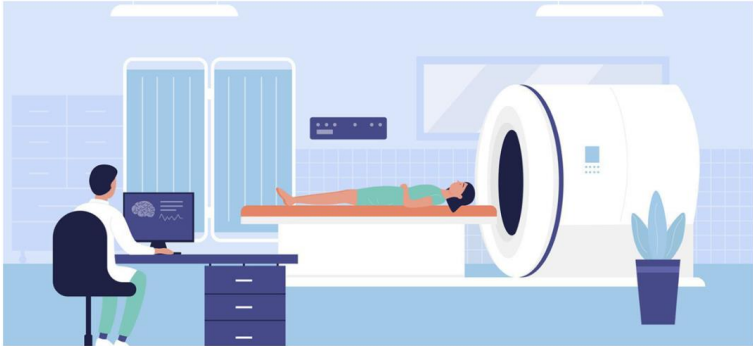
- **Initiatives like Kenya's Agricultural Carbon Project, which has the World Bank's support, also highlight the potential for carbon farming to address climate mitigation and adaptation and food security challenges in economically developing countries.**
- **The launch of the '4 per 1000' initiative during the COP21 climate talks in 2015 in Paris highlights the particular role of sinks in mitigating greenhouse-gas emissions.**

Case of India

- **Grassroots initiatives and pioneering agrarian research in India are demonstrating the viability of organic farming to sequester carbon.**
- **In this regard, agro-ecological practices in India could yield significant economic benefits, with the potential to generate \$63 billion in value from approximately 170 million hectares of arable land.**
- **This estimate includes an annual payment of around ₹5,000-6,000 per acre for farmers to provide climate services by adopting sustainable agricultural practices.**

- **Regions with extensive agricultural land, such as the Indo-Gangetic plains and the Deccan Plateau, are well suited to adopt carbon farming whereas the mountainous terrain of the Himalayan region is less so.**
- **Coastal areas are prone to salinisation and have limited access to resources, thus limited the adoption of traditional farming practices.**
- **Further, carbon credit systems can incentivise farmers by providing additional income through environmental services.**
- **Studies have shown agricultural soils can absorb 3-8 billion tonnes of CO₂-equivalent every year over 20-30 years.**
- **This capacity can bridge the gap between feasible**

- **But scaling it up requires concerted efforts to address several challenges, including limited awareness, inadequate policy support, technological barriers, and an enabling adoption environment.**



GETTY IMAGES

Understanding the science behind magnetic resonance imaging

MRI scans are used to obtain images of soft tissues within the body. It is a non-invasive diagnostic procedure widely used to image the brain, the cardiovascular system, the spinal cord and joints, various muscles, the liver, arteries, etc

Yasudevvan Mukundhan

The story so far:

For those trying to look inside the human body without surgery, magnetic resonance imaging is an indispensable tool. The underlying techniques were worked out in the early 1970s and later in the same decade, Paul Lauterbur and Peter Mansfield refined them to pave the way for their commercial use. For these efforts, they were awarded the Nobel Prize in medicine in 2003, speaking to the significance of the technique and its place in modern medical diagnostics.

What is magnetic resonance imaging?

Magnetic Resonance Imaging (MRI) is used to obtain images of soft tissues within the body. Soft tissue is any tissue that hasn't become harder through calcification. It is a non-invasive diagnostic procedure widely used to image the brain, the cardiovascular system, the spinal cord and joints, various muscles, the liver, arteries, etc.

Its use is particularly important in the observation and treatment of certain cancers, including prostate and rectal cancer, and to track neurological conditions including Alzheimer's, dementia, epilepsy, and stroke.

Researchers have also used MRI scans of changes in blood flow to infer the way the activity of neurons is changing in the brain; in this form, the technique is called functional MRI.

Because of the MRI technique's use of strong magnetic fields, individuals with embedded metallic objects (like shrapnel) and metallic implants, including pacemakers, may not be able to undergo MRI scans. In fact, if they have a credit card in their pocket, the magnetic fields will wipe its magnetic strip!

How does MRI work?

An MRI procedure reveals an image of a body part using the hydrogen atoms in

that part. A hydrogen atom is simply one proton with one electron around it. These atoms are all spinning, with axes pointing in random directions. Hydrogen atoms are abundant in fat and water, which are present almost throughout the body.

An MRI machine has four essential components. The machine itself looks like a giant doughnut. The hole in the centre, called the bore, is where the person whose body is to be scanned is inserted. Inside the doughnut is a powerful superconducting magnet whose job is to produce a powerful and stable magnetic field around the body. Once the body part to be scanned is at the centre of the bore, the magnetic field is switched on.

Each hydrogen atom has a powerful magnetic moment, which means in the presence of a magnetic field, the atom's spin axis will point along the field's direction. The superconducting magnet applies a magnetic field down the centre of the machine, such that the axes of roughly half of the hydrogen atoms in the part to be scanned are pointing one way and the other half are pointing the other way. The matching is almost exact: in around a million atoms, only a handful remain unmatched – that is, a small population of 'excess' atoms pointing one way or the other.

The machine's third component is a device that emits a radiofrequency pulse at the part under the scanner. When the pulse is 'on', only the small population of 'excess' atoms absorbs the radiation and gets excited. When the pulse goes 'off', these atoms emit the absorbed energy and return to their original, lower energy states. The frequency of pulse the 'excess' atoms have to absorb is called the Larmor frequency. Its value depends on the strength of the magnetic field and the type of tissue in which the atoms are present. The fourth and final component, a detector, receives the emissions and converts them to signals, which are sent to a computer that uses them to create two- or three-dimensional images of that

part of the body.

What are the pros of MRI?

After the big, powerful magnetic field comes on, the MRI machine activates three magnets that produce smaller magnetic fields that are weaker than the main field by about 80-times, if not more. These fields also have a gradient, that is, they are not uniform. These fields interfere with the main field at the part to be scanned such that the resulting field highlights very specific portions, which can be the focus of the scan.

By turning the gradient magnets on and off in specific sequences, the MRI machine can thus scan portions that are just a few millimetres wide. The sequences can also be organised such that the machine scans different parts of the individual's body without asking them to move inside the bore.

In fact, because of the way the machine is built and the magnets are organised inside it, an MRI scan can practically image the body from all useful directions and, if required, in very small increments. When the 'excess' atoms emit the energy they'd absorbed to return to their lower energy states, the return happens over a duration called the T1 relaxation time. The hydrogen atoms in water have different values of T1 depending on the tissue in which they're present. An MRI machine exploits this fact to show different tissues in different shades of grey. Clinicians may also inject an individual with a contrast agent – typically a gadolinium-based compound – that lowers the T1 time in some tissues, improving their visibility in an MRI scan.

Finally, researchers have deeply investigated the effects of strong magnetic fields on the body. MRI scans don't pose any threats; once the magnetic fields are taken away, the atoms in the scanned part don't remain affected. There is no long-term harm associated with scans. However, a scan's effects on pregnant women aren't as well-studied, so many

scanning facilities simply refuse such appointments.

What are the cons of MRI?

MRI machines are expensive: depending on the specifications, including the strength of the magnetic fields and the imaging quality, they cost from a few tens of lakh rupees to a few crores. Diagnostic facilities pass this cost on to its patients. Based on the clinical requirements, scans often cost ₹10,000 or more each – a sizeable sum in India, especially for those without insurance, and more so for those required to get multiple MRI scans.

These costs are compounded by the discomfort of using the machine. While it's an advantage that an individual inside the bore doesn't have to move for the machine to scan different parts, the individual is actually expected to lie still for tens of minutes, until the scan is complete. If the individual moves, the resulting image will be distorted and the scan will have to be repeated. The problem is exacerbated if the individual is claustrophobic (although some 'open-bore' MRI machine designs can alleviate this issue).

Generating a magnetic field of strength 1 tesla or more – as the main magnet does – is no mean feat. To do so, a heavy current is passed through coils of wire made of a superconducting material. When the setup is cooled with liquid helium, the wires become superconducting and the current passing through them plus the geometry of the wires produces a strong magnetic field. While the wires don't lose any energy as heat – which a non-superconducting material would – maintaining the setup is energy-intensive, which is expensive.

Further, the switching of such heavy currents within the machine, as the gradient coils are operated in sequence, means the machine produces loud noises when operating.

This can be an additional source of discomfort for the individual.

- **Magnetic resonance imaging (MRI) is a medical imaging technique that uses a magnetic field and computer-generated radio waves to create detailed images of the organs and tissues in your body.**
- **Most MRI machines are large, tube-shaped magnets. When you lie inside an MRI machine, the magnetic field inside works with radio waves and hydrogen atoms in your body to create cross-sectional images — like slices in a loaf of bread.**
- **The MRI machine also can produce 3D images that can be viewed from different angles.**

- **Because of the MRI technique's use of strong magnetic fields, individuals with embedded metallic objects (like shrapnel) and metallic implants, including pacemakers, may not be able to undergo MRI scans.**

Pros:

Imaging modality of choice.

High sensitivity.

Low radiation risk.

Detects small/subtle cortical abnormalities and temporal lobe abnormalities (e.g., mesial temporal sclerosis)

Cons:

Sedation required.

Slow scanning speed.

Limitations in accessibility (less-developed countries).

Comparatively higher cost.

MRI cannot be done in presence of dentures, pacemakers and other metallic implants.

Motion artifacts (esp. with 3 T & 7 T)

Pros:

Used for assessment in emergency conditions.

Fast scanning speed.

Accessibility.

Easy to use.

Comparatively lower cost.

Sedation not required.

Better than MRI for calcified lesions (congenital infections) and neurocutaneous malformations (e.g., Sturge-Weber syndrome, tuberous sclerosis)

Cons:

Risk of radiation exposure.

Low-resolution images.

Low sensitivity (30%).

Limitations in detecting some pathologies of temporal fossa such as mesial temporal sclerosis and small/subtle changes

'Market-based schemes not reducing deforestation, poverty'

Agence France-Presse
PARIS

Market-based approaches to forest conservation like carbon offsets and deforestation-free certification schemes have largely failed to protect trees or alleviate poverty, according to a major scientific review published on Monday.

The global study found that trade and finance-driven initiatives had made "limited" progress halting deforestation and in some cases worsened economic inequality.

Drawn from years of academic and field work, the report compiled by the International Union of Forest Research Organizations (IUFRO), a group of 15,000 scientists in 120 countries, will be presented at a high-

level UN forum starting Monday.

Its authors urged a "radical rethink" of increasingly popular market-based approaches often promoted as effective at saving forests, curbing global warming and raising living standards in developing nations.

"The evidence does not support the claim of win-wins or triple wins for environment, economy and people often made for market mechanisms as a policy response to environmental problems," said contributing author Maria Brockhaus from the University of Helsinki.

"Rather our cases show that poverty and forest loss both are persistent across different regions of the world... where market me-



Little succour: The policy, in some cases, worsened economic inequality. AP

chanisms have been the main policy option for decades," she told AFP by email.

Since the last IUFRO assessment in 2010, the report noted a rise in com-

plex and overlapping market-based schemes "with financial actors and shareholders more often interested in short-term profits than long-term just and sustainable forest

governance".

Its lead author, Constance McDermott from the University of Oxford, said this may not be true of all individual projects "but overall... it's hard to say

they've been a rousing success".

The report said a \$120 million project in the Democratic Republic of Congo had "reinforced entrenched interests" by restricting local people from forests without addressing logging by powerful extractive businesses.

In Malaysia, indigenous groups promised better livelihoods from a foreign-backed plantation venture on their customary land received no benefit, the report said.

"As both cases show, 'wins' are often gained elsewhere, while the burdens of forest loss, enclosures and forestland conversion are carried locally," said Ms. Brockhaus.

In Ghana, deforestation rates had risen despite a

slew of sustainable cocoa standards, corporate pledges, and carbon offset projects, while farmers were earning less today than decades ago, said Ms. McDermott.

Meanwhile green trade policies imposed by wealthy countries—like the EU's ban on imports linked to deforestation—might look good from Brussels but did not consider the knock-on effects, she added.

"There's no accountability. If this doesn't work—or farmers are pushed off their farm as a result—it's not going to hurt the person eating chocolate in the UK or Germany," she said.

'Radical rethink'

Despite recent turmoil, carbon markets are projected to grow into a multi-

billion-dollar industry as corporations increasingly turn to credits to meet their net-zero climate targets.

Credits are purchased from projects, often in developing nations, that reduce or avoid the release of planet-heating emissions, such as protecting CO2-absorbing rainforests or peat swamps.

Kenya's President William Ruto has called Africa's carbon sinks an "unparalleled economic goldmine" that could generate billions of dollars every year.

But there are growing concerns about how much of that revenue poor communities might expect to see, with unscrupulous actors accused of exploitation.

- **The International Union of Forest Research Organizations (IUFRO) is “the” global network for forest science cooperation. It is open to all individuals and organizations dedicated to forest and forest products research and related disciplines.**
- **It is a non-profit, non-governmental and non-discriminatory organization with a tradition dating back to 1892.**
- **The mission of IUFRO is to promote the coordination of and the international cooperation in scientific studies embracing the whole field of research related to forests and trees for the well-being of forests and the people that depend on them.**

- **The scientific activities of IUFRO are spread over a number of Divisions and Task Forces.**
- **Divisions are subdivided into Research Groups and Working Parties and support researchers in collaborative work.**
- **Task Forces are established for a limited period of time to deal with and synthesize scientific information about topical cross-cutting issues that go beyond the scope of any one Division or Research Group.**

- **IUFRO is a non-profit, non-governmental international network of forest scientists, which promotes global cooperation in forest-related research and enhances the understanding of the ecological, economic and social aspects of forests and trees.**
- **IUFRO is "the" global network for forest science cooperation. It unites more than 15,000 scientists in around 630 Member Organizations in almost 120 countries, and is a member of the International Science Council. Scientists cooperate in IUFRO on a voluntary basis**



An aerial view of Porto Alegre, Brazil, during an overfly by Brazil's President Luiz Inacio Lula da Silva of areas affected by floods triggered by torrential storms. Authorities are trying to avoid greater tragedy than the one already caused, where 66 people died in the floods. AFP

- **Record rainfall linked to El Niño has caused unprecedented flooding in the southern Brazilian state of Rio Grande do Sul, with a growing number of casualties and infrastructure and economic losses.**
- **dam at a hydroelectric plant between the cities of Bento Goncalves and Cotipora partially collapsed on May 2 while a bridge was swept away in the town of Feliz. The situation is bad in the state capital Porto Alegre**

El Niño's impact on South America

El Niño's forecasted impacts on precipitation. The phenomenon started mid-2023 and could last at least a year

- Drier than average
- Wetter than average

Rio Grande
do Sul



- According to Brazil's National Institute of Meteorology (**Inmet**), the climate phenomenon El Nino caused above average rain and heat in the country.
- It added that the largest accumulations of rain in the last 30 days occurred in the centre-north of the country, due to the combination of heat and high humidity that contributed to the formation of rain clouds, in addition to the Intertropical Convergence Zone (ITCZ) which contributed with increased instability, causing locally heavy rains in the northern part of Brazil

FOR UPSC 2025 /26



Launched

1- Current affairs plus - PIB, YOJANA, Down to earth , physics.org , Major newspapers.

2- Books series - all advanced books in one course

UPCOMING

1- Mains Mentorship program

2- GS-1 ,2,3 and 4

3- Mapping

4- NCERTS

5- Test series for 2025

6- essay

7- Agriculture optional

**DOWNLOAD - Saurabh
pandey cse app**

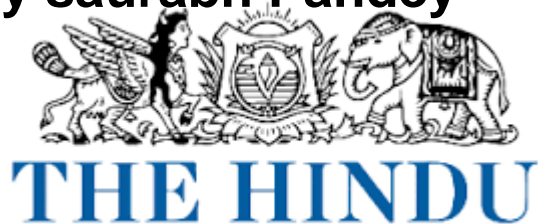
+91 90579 21649

Topics

- West Nile Fever
- Climate change and Mental Health
- Superplasticizers
- Agriculture and global warming
- Global Plastic Treaty
- Inheritance TAX
- MAPPING
- Tourmalet Pass
- Mains



By saurabh Pandey





Kerala on alert as man dies of West Nile fever

Sources say that a 79-year-old man from Thrissur died on May 3; five cases have been reported in Kozhikode and four patients have been discharged in the district and 2 in Malappuram; Health Minister says there is no need to worry; officials have been told to intensify pre-monsoon cleaning drive

The Hindu Bureau
KOZHIKODE

The Kerala government issued an alert in the State on Tuesday against West Nile fever, a mosquito-borne viral infection, after one death and eight cases were reported from Kozhikode, Malappuram and Thrissur districts in recent days.

According to official sources, the death of a 79-year-old man from Vadanappally in Thrissur on May 3 has been attributed to the infection. Five cases have so far been reported in Kozhikode. There are two suspected cases in Malappuram too.

Kozhikode Collector

Snehil Kumar Singh told mediapersons on Tuesday evening that four of the five infected persons had been discharged from the Government Medical College Hospital. One person is still under treatment.

Three of them are natives of Kozhikode city and one each from Koodaranhi and Nanminda. Another suspected patient has been admitted to a private hospital, Mr. Singh added.

Minister's statement

A statement from Health Minister Veena George said the infection had been reported from various districts in the State since 2011 and there was no reason to worry. District Medical Of-



Battling the virus: The Kozhikode Collector says that four infected persons have been discharged from hospital. FILE PHOTO

ficers have been told to intensify pre-monsoon cleaning drives in coordination with the Department of Local Self-Government and the respective

district administration, she added.

The infection was confirmed after samples of blood and cerebrospinal fluid of suspected patients

were examined at the Virus Research and Diagnostic Lab attached to the medical college hospital. They were later sent to the National Institute of Virology, Pune, for official confirmation.

Symptoms of fever

Symptoms of the infection include high fever, headache, neck stiffness, disorientation, stupor, coma, tremors, convulsions, muscle weakness, and paralysis.

Most of the symptoms are similar to that of Japanese encephalitis. However, 80% of the patients need not show any symptoms.

The disease is spread by

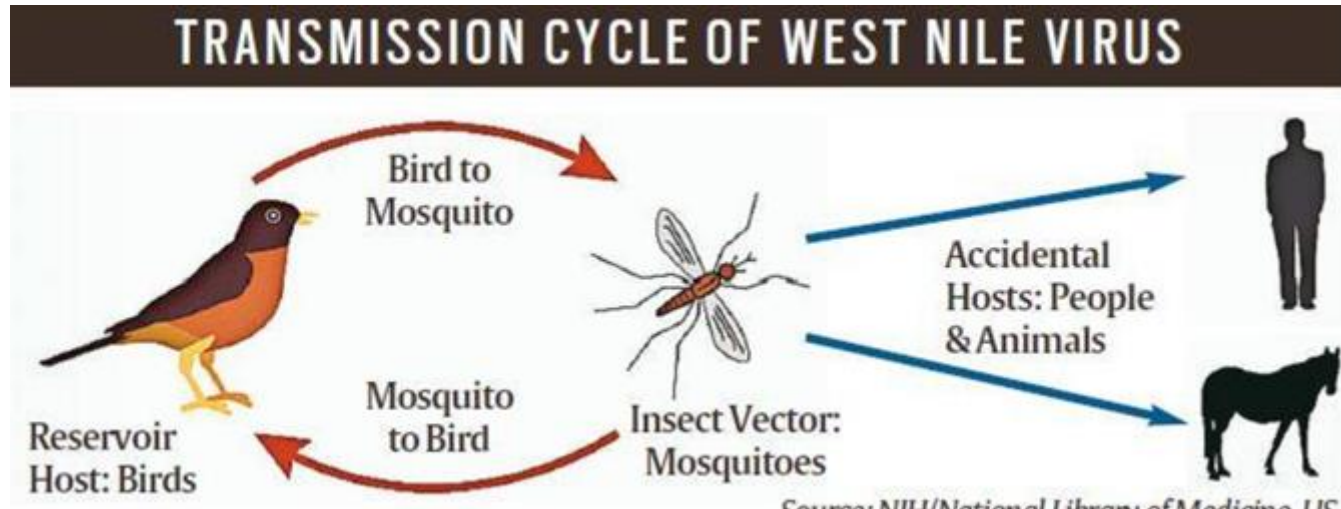
the Culex species of mosquitoes. As per the World Health Organization (WHO), human infection is most often the result of bites from the infected mosquitoes. This happens when they feed on infected birds, which circulate the virus in their blood for a few days.

There has been no human-to-human transmission so far.

The WHO says that the treatment is supportive for patients with neuro-invasive West Nile virus, often involving hospitalisation, intravenous fluids, respiratory support, and prevention of secondary infections. No vaccine is available for humans.

West Nile Fever

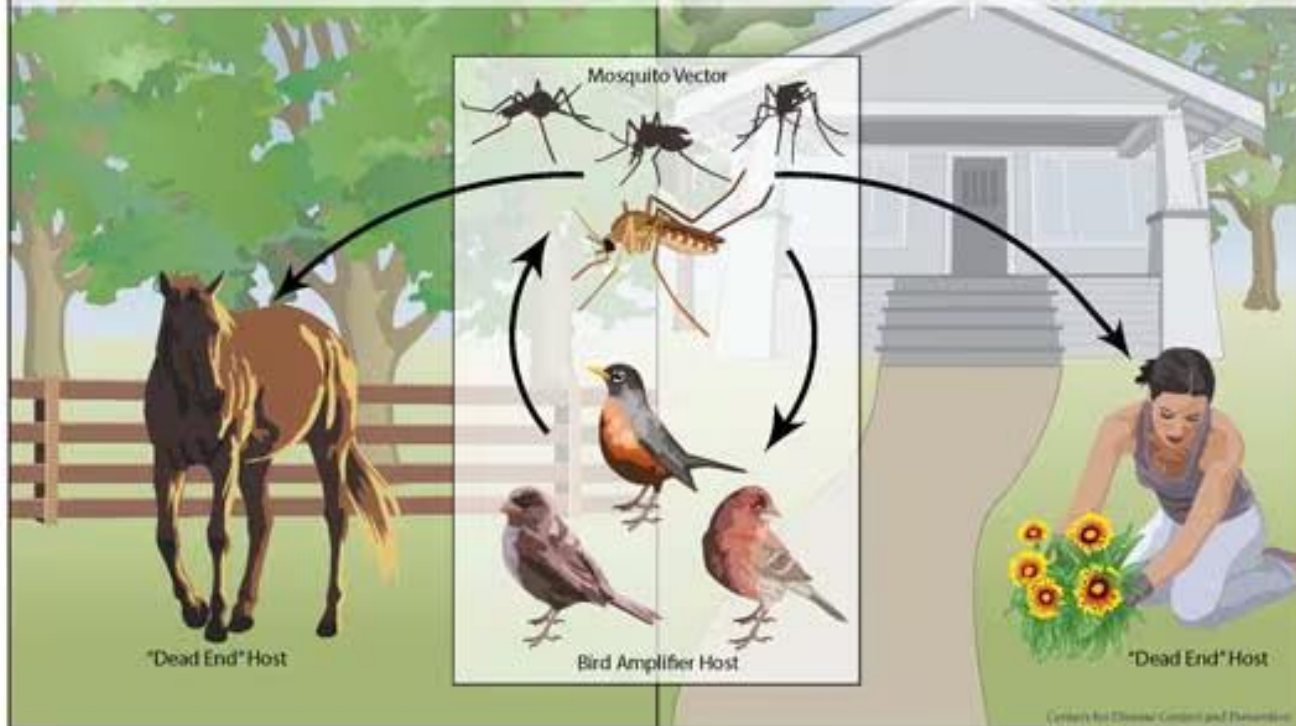
- West Nile virus is most commonly spread to people by the bite of an infected mosquito.
- Mosquitoes become infected when they feed on infected birds. Infected mosquitoes then spread West Nile virus to people and other animals by biting them.



West Nile Virus Transmission Cycle

In nature, West Nile virus cycles between mosquitoes (especially *Culex* species) and birds. Some infected birds, can develop high levels of the virus in their bloodstream and mosquitoes can become infected by biting these infected birds. After about a week, infected mosquitoes can pass the virus to more birds when they bite.

Mosquitoes with West Nile virus also bite and infect people, horses and other mammals. However, humans, horses and other mammals are 'dead end' hosts. This means that they do not develop high levels of virus in their bloodstream, and cannot pass the virus on to other biting mosquitoes.



The unseen effects of climate change on mental health



A defining characteristic of climate change is the ability of its effects to compound rapidly, affecting several walks of human life. Researchers in Canada elucidated one more example of this ability, adding to previous work that has examined its influence on everything from domestic violence to child-trafficking

Arkatapa Basu

The mercury is soaring across India, with many places reporting unusually high temperature readings. It may not be possible to link each heat event to climate change, but we know climate change is bringing such anomalies to more areas, and with greater intensity.

We also know climate change is disproportionately affecting society's most vulnerable members, including those with physical ailments, the elderly, the poor, and the socially and economically marginalised. And we also know climate change has become the basis of a slew of psychological afflictions of its own, including eco-anxiety, eco-paralysis, and solastalgia (a form of emotional or existential distress rendered by environmental changes), together with seeding general concerns in communities worldwide about their livelihoods, future, the future of their children, and their culture.

But let's not forget that climate change's multi-dimensional assault on reality as we know it also potentially includes being able to worsen existing mental health conditions.

A dubious distinction

A study published last year in the journal *GeoHealth* reported that an extreme heat event in the Canadian province of British Columbia in 2021 affected people with schizophrenia more than those with kidney and heart disease. The study's authors, of the British Columbia Centres for Disease Control and Health Canada, also wrote that people with mental health conditions seem to be at a greater risk of succumbing to heat-related deaths. The stakes were found to be even higher for people diagnosed with schizophrenia, anxiety or bipolar disorder.

During the eight-day extreme heat event in 2021, the province of British Columbia experienced temperatures as high as 40 degrees C when the average temperatures have been around 20 degrees C. The region recorded around 740 excess deaths during this heat wave.

To understand who was affected the most during this event, the researchers compared 1,614 deaths recorded over a month in 2021 with 6,524 deaths recorded in the same time period nine years ago. They analysed the data based on 26 medical conditions, including heart disease, schizophrenia, chronic kidney disease, dementia, depression, Parkinson's disease, and osteoporosis.

The scientists wrote that they expected to find people with kidney and heart diseases to be most at risk, but were



A man uses a cardboard box to shield himself from the Sun in Kochi. THULASI KAKKAR

surprised to find that that dubious distinction belonged to people with schizophrenia. In particular, they reported that 8% of the people surveyed in 2021 were previously diagnosed with schizophrenia as opposed to 2.7% of the people surveyed nine years ago. This was a 200% increase from a summer in which heat waves weren't recorded.

To be sure, while people with schizophrenia were found to be at greater risk of heat-related distress than those with kidney and heart diseases, the latter weren't immune: they were at risk as well, just less so.

Dysfunction of the hypothalamus

A closer look at the data revealed that of the 280 people whose deaths were confirmed to be related to heat, 37 people had schizophrenia.

"These results show that people with schizophrenia need extra protection, extra support and extra care," Sarah Henderson, one of the epidemiologists who led the study and the scientific director of Environmental Health Services at the British Columbia Centre for Disease Control, told *Science*.

The researchers believe one of the main reasons people with schizophrenia were more vulnerable to heat stress could be as a result of the dysfunction of the hypothalamus, a structure embedded deep in the human brain. Its main function is to maintain the homeostasis of the body, i.e. to keep the body in a stable condition that ensures it can carry out its normal function. This means it controls the body's temperature, heart rate, hunger, thirst, mood, libido, sleep,



Climate change disproportionately affects society's most vulnerable members, including those with physical ailments, the elderly, the poor, and the socially and economically marginalised

and the regulation of hormones.

Certain antipsychotic medications prescribed to people with schizophrenia have also been found to interfere with the hypothalamus's workings.

One side-effect of such drugs has been a tendency to raise the body's temperature, which when coupled with anomalously high ambient temperatures can rapidly prove fatal.

People with schizophrenia also often have psychotic symptoms such as hallucinations, delusions, disorganised thinking, and memory loss.

They may also suffer from anosognosia: a condition in which they're unable to sense that they're ill.

All this together with comorbidities like diabetes and hypertension can make life very difficult for people with schizophrenia, including potentially interfere with their ability to seek help.

As it happens, marginalisation, lower economic status, and a propensity for loneliness are risk factors for people with schizophrenia, and the same factors can heighten an individual's vulnerability to

heat-related illnesses, as the infamous 1995 Chicago heat event demonstrated.

Yet another tentacle

Scientists have urged that though some antipsychotic medicines' have the potential to interfere with people's experience of anomalous ambient heat, they shouldn't be discontinued or tampered with because these are 'lifesaving therapies'. They have suggested that the risk factors associated with schizophrenia, including social isolation, should be tackled instead with interventions like counselling.

In a statement from the British Columbia Centres for Disease Control, Faydra Aldridge, CEO of the British Columbia Schizophrenia Society, said, "As demonstrated by research, because individuals living with schizophrenia are more susceptible to heat-related illness, it is essential that families and caregivers are aware of the increased risk, identify potential risk factors and take action to help their loved one during a heat wave."

She added that "educating ourselves to recognise symptoms of heat-related illness and take emergency cooling measures will help ensure everyone's safety during heat waves."

One of the defining characteristics of climate change is the nonlinear nature of its effects, i.e. their ability to compound rapidly, affecting several walks of human life both directly and indirectly. The *GeoHealth* study elucidated one more example of this ability, adding to previous work that examined its influence on everything from domestic violence to child-trafficking.

THE GIST

A study found that people with mental health conditions seem to be at a greater risk of succumbing to heat-related deaths. The risk is even higher for people diagnosed with schizophrenia, anxiety or bipolar disorder

Researchers believe one of the main reasons people with schizophrenia were more vulnerable could be dysfunction of the hypothalamus. It controls the body's temperature, heart rate, hunger, thirst, mood, libido, sleep, and regulation of hormones

Antipsychotic medications also interfere with the hypothalamus. One side-effect of such drugs is a tendency to raise body temperature, which when coupled with anomalously high ambient temperatures can rapidly prove fatal

Climate Change and Mental Health



- A study found that people with mental health conditions seem to be at a greater risk of succumbing to heat-related deaths.
- The risk is even higher for people diagnosed with schizophrenia, anxiety or bipolar disorder. Researchers believe one of the main reasons people with schizophrenia were more vulnerable could be dysfunction of the hypothalamus.
- It controls the body's temperature, heart rate, hunger, thirst, mood, libido, sleep, and regulation of hormones. Antipsychotic medications also interfere with the hypothalamus.
- One side-effect of such drugs is a tendency to raise body temperature, which when coupled with anomalously high ambient temperatures can rapidly prove fatal.

Keeping the concrete plastic



Q: What is the role of superplasticizers in concrete?

A1: The water cement (W/C) ratio is an

important factor deciding the durability of concrete. Its impermeability, strength, and durability are directly proportional to this and so this has to be kept small.

In normal cement pastes, when cement particles come into close contact with each other, there is a tendency for the pastes to form large 'flocs' due to attractive forces acting between them. Because of such formation, more water than required is added. This increases the W/C ratio and affects the concrete's properties.

These can be overcome by adding superplasticizers at the appropriate stage of mixing the ingredients of concrete. It helps to reduce inter-particle attraction between cement particles and to disperse the cement particles with less water. These superplasticizers actually form a chain of molecules and are completely absorbed into the system.

V. Sadasivam

A2: Superplasticizers are effective water-reducing admixtures used in making concrete. They are



Construction workers putting finishing touches on freshly poured concrete. GETTY IMAGES

sulphonated melamine formaldehyde condensates or sulphonated naphthalene formaldehyde condensates. These are used to produce 'flowing' concrete in cases where placing in inaccessible locations is required.

They are also used in the production of high strength concrete using normal workability but a very low water/cement ratio so as to reduce the heat of hydration in mass concrete.

R. Sakthi Balachandran



For feedback and suggestions

for 'Science', please write to science@thehindu.co.in with the subject 'Daily page'

Superplasticizers



- Superplasticizers (SPs), also known as high range water reducers, are **additives** used for making high-strength **concrete** or to place **self-compacting concrete**.
- **Plasticizers** are chemical compounds enabling the production of **concrete** with approximately 15% less **water content**. Superplasticizers allow reduction in water content by 30% or more.
- These additives are employed at the level of a few weight percent. Plasticizers and superplasticizers also retard the setting and hardening of concrete.

According to their **dispersing** functionality and action mode, one distinguishes two classes of superplasticizers:

1. **Ionic interactions** (electrostatic repulsion): **lignosulfonates** (first generation of ancient water reducers), **sulfonated synthetic polymers** (**naphthalene**, or **melamine**, **formaldehyde condensates**) (second generation), and;
 2. **Steric effects**: **Polycarboxylates-ether** (PCE) synthetic polymers bearing lateral chains (third generation).
- Superplasticizers are used when well-dispersed **cement** particle suspensions are required to improve the flow characteristics (**rheology**) of concrete.
 - Their addition allows to decrease the **water-to-cement ratio** of concrete or **mortar** without negatively affecting the **workability** of the mixture.

BIG SHOT



Argentina's corn farmers are facing a dangerous new enemy because of global warming: a yellow insect just 4 mm long that thrives in hotter temperatures and is threatening harvests. In this image, leafhoppers are seen on a corn plant on a National Institute of Agricultural Technology experimental field in Cordoba, Argentina. REUTERS

- **Argentina's corn farmers are facing a dangerous new enemy because of global warming: a yellow insect just 4 mm long that thrives in hotter temperatures and is threatening harvests.**
- **, leafhoppers are seen on a corn plant on a National Institute of Agricultural Technology experimental field in Cordoba, Argentina.**

Plastic solution

Plastic pollution cannot stop by treaties,
without investment in alternatives

The Global Plastics Treaty, an ambitious initiative involving at least 175 United Nations member nations to eliminate the use of plastics, concluded its fourth round of negotiations recently. The goal is to finalise a legal document by the end of 2024 with timelines by when countries must agree to curb plastic production, eliminate its uses that create wastage, ban certain chemicals used in its production and set targets for recycling. Unfortunately, an agreement is not in sight. There is yet another round of negotiations scheduled in Busan, South Korea this November. The primary hurdles are economic. Oil producing and refining countries such as Saudi Arabia, the United States, Russia, India and Iran are reluctant about hard deadlines to eliminate plastic production. A coalition of African countries, supported by several European nations, is in favour of a year, around 2040, to ensure that a timeline for reduction is in effect. There is also disagreement on whether contentious elements in the treaty should be decided on by a vote or consensus – the latter implying that every country has a veto. India's opinion, other than being uncomfortable with binding targets, is that a legally binding instrument to end the plastic pollution must also address "... availability, accessibility, affordability of alternatives including cost implications and specifying arrangements... for capacity building and technical assistance, technology transfer, and financial assistance". This language – and India is not the only proponent – is reminiscent of the principle of 'common but differentiated responsibility' enshrined in climate talks. Under this, countries must have a common target but those more privileged must support others and take on stricter targets themselves.

In the year that the plastics treaty was mooted, in 2022, India brought into effect the Plastic Waste Management Amendment Rules (2021) that banned 19 categories of "single-use" plastics. It, however, does not include plastic bottles – even those less than 200 ml – and multi-layered packaging boxes (as in milk cartons). Moreover, even the ban on single-use plastic items is not uniformly enforced nationally, with several outlets continuing to retail these goods. The global distribution of the plastic pollution is unequal with Brazil, China, India and the U.S. responsible for 60% of plastic waste, according to a report by the non-profit EA Earth Action. Much like how transitioning away from fossil fuel invites its own challenges, plastic pollution cannot be ended by merely signing treaties. There needs to be much greater investment in alternative products and making them affordable before realistic targets are decided upon.



Global Plastic Treaty



- **The Global Plastics Treaty, an ambitious initiative involving at least 175 United Nations member nations to eliminate the use of plastics, concluded its fourth round of negotiations recently.**
- **The goal is to finalise a legal document by the end of 2024 with timelines by when countries must agree to curb plastic production, eliminate its uses that create wastage, ban certain chemicals used in its production and set targets for recycling. Unfortunately, an agreement is not in sight.**
- **There is yet another round of negotiations scheduled in Busan, South Korea this November. The primary hurdles are economic..**

- **Oil producing and refining countries such as Saudi Arabia, the United States, Russia, India and Iran are reluctant about hard deadlines to eliminate plastic production.**
- **A coalition of African countries, supported by several European nations, is in favour of a year, around 2040, to ensure that a timeline for reduction is in effect.**
- **There is also disagreement on whether contentious elements in the treaty should be decided on by a vote or consensus — the latter implying that every country has a veto.**

- **India's opinion, other than being uncomfortable with binding targets, is that a legally binding instrument to end the plastic pollution must also address "... availability, accessibility, affordability of alternatives including cost implications and specifying arrangements... for capacity building and technical assistance, technology transfer, and financial assistance".**
- **This language — and India is not the only proponent — is reminiscent of the principle of 'common but differentiated responsibility' enshrined in climate talks**

- In the year that the plastics treaty was mooted, in 2022, India brought into effect the Plastic Waste Management Amendment Rules (2021) that banned 19 categories of “single-use” plastics.
- It, however, does not include plastic bottles — even those less than 200 ml — and multi-layered packaging boxes (as in milk cartons).
- Moreover, even the ban on single-use plastic items is not uniformly enforced nationally, with several outlets continuing to retail these goods.
- The global distribution of the plastic pollution is unequal with Brazil, China, India and the U.S. responsible for 60% of plastic waste

An inheritance tax will help reduce inequality



A remark by Chairman of Indian Overseas Congress Sam Pitroda on implementing an inheritance tax as a tool of wealth redistribution has sparked massive debates. In this article, we present rationale on why high inequality is harmful, and advocate for progressive taxes as a mechanism to reduce inequality.

Primarily, we underscore the need to take a view of citizenship where the poor and the rich can participate equally in democratic decision-making. However, in an unequal society, a handful of dominant individuals can wield a disproportionate amount of power through control of resources. This will likely lead to a few wealthy elites dictating the socioeconomic and political decisions aimed to benefit them at the cost of the majority. The recent electoral bonds scam bears witness to this. The citizenship of wealthy elites would then carry more weight than the majority of the country. This is ethically hazardous.

Why inequality matters

First, inequality harms growth in the medium-to-long run, by hampering firm productivity, reducing labour income, and diverting resources away from rights such as education. Second, in unequal countries, the place of birth holds inordinate power in directing lifetime outcomes. In India, almost a third of the variation in consumption can be explained by the place of residence; the State, and city or village. Third, high inequality is also associated with political polarisation and increased conflict. Fourth, inequality is likely to have a negative multiplier effect on the economy – diminished earnings for the poor lead to reduced consumption and savings and increased indebtedness. This reduces aggregate demand, limits production and investments, and leads to lower growth rates in the future. Using labour bureau data, Jean Drèze and Reetika Khera showed that while real wages of



Advait Moharir

is an independent researcher



Rajendran Narayanan

teaches at Azim Premji University, Bengaluru and is affiliated with LibTech India.

Views are personal

Property of the elite being bequeathed to descendants implies that the descendants do no work to acquire it. There is no economic reason for it to be a freebie for them

agricultural labourers grew by 6.8% between 2004-2014, they declined by 1.3% in the last decade. Using Periodic Labour Force Survey data, a Bahutva Karnataka report shows that 34% of households earned less than the recommended daily minimum wage of ₹375 in 2022-23. Using Reserve Bank of India data, Zico Dasgupta and Srinivas Raghavendra voice concern about the sharp reduction in household savings and increased debt. In contrast to these, the richest 1% holds 40% of India's wealth.

Some commentators argue that some inequality during growth is inevitable, and the priority instead should be towards reducing poverty. However, research by Tianyu Fan and co-authors shows that the gains from India's growth over the last two decades have been skewed towards high-income urban residents. Keeping everything else the same, there is nothing inherently special in the children of the wealthy compared to the children of the poor. The Constitution mandates equality of status and of opportunity. As such the government is obliged to take steps to reduce the disparities arising from accidents of birth.

An inheritance tax

A wealth tax is a recurring tax on all physical and financial assets an individual owns. An inheritance tax differs from a wealth tax in two ways: it is intergenerational and levied once in a lifetime. These taxes are meant to be applied to individuals having high wealth above a threshold. When implemented well, these taxes reduce the concentration of wealth and encourage shifting investments from non-productive to productive activities. Property of the elite being bequeathed to descendants implies that the descendants do no work to acquire it. There is no economic reason for it to be a freebie for them. Some might argue that inheritance tax will disincentivise innovations. But this disregards that innovation is needed to be

competitive today and suggests that innovation is solely to propagate dynastic control of resources which is at odds with democratic ideals. On the contrary, revenue generated from inheritance tax can be used to fund a diversified set of innovations. An advanced country like Japan has up to 55% inheritance tax. A variant of the inheritance tax, called estates duty, was levied in India between 1953-1985 but this was abolished owing to administrative costs. However, the economist Rishabh Kumar shows that this was effective in reducing the top 1% personal wealth share from 16% to 6% between 1966 and 1985.

Another approach is the land value tax (LVT): this taxes the rental value of land, without considering the property built on it. This is borne by the landowner and not the tenants. Unlike labour, land is a natural resource and is unresponsive to changes in taxes, making the LVT an efficient source of revenue. Given the role of land ownership in perpetuating feudal caste relations in rural India and the pervasive politician-builder nexus in urban India, LVT can be a useful redistributive mechanism.

Detractors claim that tax evasion among the wealthy makes these taxes impractical. However, recent research by Natasha Sarin (in the U.S.) projects that sufficient investment in improving tax compliance can yield revenue up to 10 times the investment. Nathaniel Hendren and co-authors show that auditing the top 1% and 0.1% generated three to six times the return on investment.

Economists Jayati Ghosh and Prabhat Patnaik demonstrate that a 2% wealth tax and a 33.3% inheritance tax only on the top 1% in India can raise an additional public expenditure of 10% of the GDP. This can be used to ensure a bouquet of socioeconomic rights for the poor like living wages, right to health, employment, and food. Given technological advancements, these are possible if there is political will.

Inheritance Tax

- **The inheritance tax refers to the tax levied on the value of inheritance received by a beneficiary on the death of a person.**
- **Inheritance tax, or death taxes, or estate duty as it may be called are all taxes which are paid on the estate of the deceased. "This would be collected from the estate prior to distributions to the heirs under the Will or the heirs under intestate succession laws,**

- **Estate duty was introduced in India through Act No. 34 of 1953- the Estate Duty Act of 1953 (Act). The Act categorized estates based on the applicable slabs values with corresponding tax rates.**
- **“The estate duty applied to both immovable and movable properties. The estate duty was applicable only if the inherited portion of the property exceeded the prescribed thresholds set by the Act. This was abolished in 1985,**

Estate Duty was abolished as it faced public opposition due to its steep rates which were as high as 85% for high estate value.

“The imposition of estate duty led to numerous litigations due to varying rates based on estate value. It was also widely criticized and perceived as a double tax alongside wealth tax.



Setting sail: Workers gather at the Aker Solutions' shipyard in Stord, Norway during a ceremony prior to the planned departure of Norway's largest floating-production ship 'Johan Castberg'. During summer of 2024, it will set course for the Johan Castberg field in the Barents Sea, located off the northern coast of Norway. Production at the field, comprising three oil fields viz. Johan Castberg (formerly Skrugard), Havis and Drivis - is scheduled to start in the fourth quarter of 2024 and planned for 30 years, operator Equinor said. AFP

Mapping

- **Norway's largest floating-production ship 'Johan Castberg'.**
- **During summer of 2024, it will set course for the Johan Castberg field in the Barents Sea, located off the northern coast of Norway.**
- **Production at the field, comprising three oil fields viz. Johan Castberg (formerly Skrugard), Havis and Drivis - is scheduled to start in the fourth quarter of 2024 and planned for 30 years,**



Macron hosts Xi in French mountains for further talks

Agence France-Presse

TARBES

French President Emmanuel Macron was on Tuesday hosting Chinese leader Xi Jinping at one of his beloved childhood haunts in the Pyrenees mountains, pressing a message to Beijing not to support Russia's war against Ukraine and to accept fairer trade.

Robust exchanges

The first day of Mr. Xi's state visit to France, his first to Europe since 2019, saw respectful but sometimes robust exchanges between the two men during a succession of talks on Monday.

The peaceful mountain village of Bagnere-de-Bigorre and nearby La Mongie – as well as lunch accompanied by their wives, Peng Liyuan and Brigitte Macron – will allow Mr. Xi and Mr. Macron to explore these issues in relative privacy.

Mr. Macron personally welcomed Mr. Xi when he arrived at Tarbes airport in southwest France and the

leaders headed to a mountain restaurant to dine on local lamb, cheeses and wines.

Europe is concerned that while officially neutral over the Ukraine conflict, Beijing is essentially backing Russia, which is using Chinese machine tools for weapons production.

After a bilateral meeting with Mr. Xi, Mr. Macron welcomed China's "commitments" not to supply arms to Russia, while also expressing concern over possible deliveries of dual-use technology.

'No regime change'

He thanked Mr. Xi for backing his idea of a truce in all conflicts including Ukraine during the Paris Olympics this summer and pointedly added that France was not seeking "regime change" in Russia.

Mr. Xi, who is due to host Russian President Vladimir Putin in China later this month, warned against using the Ukraine crisis "to cast blame, smear a third country and incite a new Cold War".



Emmanuel Macron and Xi Jinping enjoy a drink in a restaurant at the Tourmalet pass, in the Pyrenees mountains on Tuesday. AFP

Tourmalet Pass

- Tourmalet Pass near the Spanish border
- one of the highest paved **mountain passes** in the French **Pyrenees**,
- The Pyrenees are a mountain range straddling the border of **France** and **Spain**.
- They extend nearly 500 km (310 mi) from their union with the **Cantabrian Mountains** to **Cap de Creus** on the **Mediterranean** coast, reaching a maximum altitude of 3,404 metres (11,168 ft) at the peak of **Aneto**



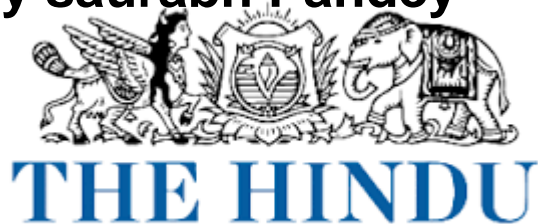
Topics



- Typhoid and Widal test
- Standard time of moon
- Atomic clock
- DPSP and Fundamental rights
- Nagaland - Article 371A and 73rd AA
- Ritacuba Blanco glacier
- Mains



By saurabh Pandey



How the Widal test clouds India's sense of its typhoid problem

Because of the Widal test's propensity for erroneous results, the actual burden of typhoid in India remains obfuscated. A lack of awareness of the proper time at which to collect a blood sample, along with a lack of standardisation of kits and poor quality-control, compound the problem

Yasudhara Rangaswamy
Parth Sharma

More often than not, the experience for patients with a fever is to get tested and treated for a typhoid infection. The test is a rapid blood test called the Widal test. The subsequent treatment usually consists of tablets, typically in urban areas, or injections in rural ones.

Typhoid spreads through contaminated food and water and is caused by *Salmonella typhi* and other related bacteria. Also known as enteric fever, it presents with a high fever, stomach pain, weakness, and other symptoms like nausea, vomiting, diarrhoea or constipation, and a rash. Some people, called carriers, may remain symptom-free and shed the bacteria in their stool for several months to years.

These symptoms mimic those of malaria, dengue, influenza, and typhus, to name a few, each with different treatment modalities. If left untreated, typhoid can be life-threatening. Per the World Health Organisation, 50 lakh people are diagnosed worldwide with typhoid every year and 1.1 lakh die of it. A small 2023 study reported the burden to be 576,173 cases per 100,000 child-years (one child year is one child being followed up for one year) in urban areas and 35 per 100,000 child-years in rural Pune.

How is typhoid fever diagnosed?

The gold standard for diagnosing typhoid – in addition to a detailed medical history and a thorough examination – is to isolate the bacteria from a patient's blood or bone marrow and grow them in the lab. Stool and urine samples can also yield the same but with lower sensitivity.

However, performing culture tests in smaller clinical settings presents practical problems. Cultures are time-consuming and skill- and resource-intensive. Prior antibiotic treatment can also affect the results of cultures – a common issue due to the indiscriminate use of antibiotics in India. Some PCR-based molecular methods are known to be better but are limited by cost, need for specialised infrastructure, skilled personnel, and the inability to retrieve live bacteria for further tests.

Against this backdrop, in India, clinicians use the Widal test extensively to diagnose typhoid in both public and private sectors.

As with other infections, our immune system produces antibodies in the blood against the bacteria, causing enteric fever. The Widal test rapidly detects and quantifies these antibodies. It's a point-of-care test and doesn't need special skills or infrastructure. Developed in the late 1800s by a French physician, it is no longer used in many countries because of its flaws – flaws that are rendered by the scale of the test's use in India to be abusive.

Why is Widal inappropriate?

A single positive Widal test report doesn't necessarily mean a typhoid infection is present, and a negative report doesn't confirm the disease's absence. To diagnose an active infection, clinicians must test at least two serum samples taken at least 7-14 days apart, so that they may detect a change in concentrations of



The gold standard for diagnosing typhoid is to isolate the bacteria from, say, the blood of a patient and grow them in the lab. Representative image.

TESTALIZE/ISTOCK/ALAMY

the antibodies. But getting two samples is rarely feasible and time-consuming.

Second, in areas with high and continuous typhoid burden, certain levels of antibodies against the bacteria may already be present in the blood. Without knowing the baseline cut-off, it isn't possible to correctly interpret the test. A related issue is that different manufacturers of the test specify different cut-off values in their kits' user manuals.

Third, the reagents used in the Widal test to reveal the presence of various antibodies can cross-react with antibodies produced against infections by other bacteria, viruses or parasites, or even in typhoid-vaccinated individuals, leading to false positives. Prior antibiotic therapy can also affect antibody levels and yield a false negative.

Correct diagnosis and appropriate treatment of enteric fever are important because serious complications, like severe intestinal bleeding or perforation, can develop within a few weeks if the disease is mismanaged. False negatives can thus delay diagnosis and lead to fatal outcomes.

Consequences of the test's use

Because of the Widal test's propensity for erroneous results, the actual burden of typhoid in India remains obfuscated. A lack of awareness of the proper time at which to collect a blood sample, along with a lack of standardisation of kits and poor quality-control compound the problem.

Further, a single test costs a couple hundred rupees. Patients in many States



Typhoid spreads through contaminated food and water and is caused by *Salmonella typhi*. Also known as enteric fever, it presents with a high fever, stomach pain and weakness

have also reported being charged Rs 500 to Rs 4,000 per dose of antibiotic injections by local healthcare providers following a typhoid diagnosis based on a single Widal test. Patients in both urban and rural areas have reported selling assets to receive these antibiotics.

The irrational use of antibiotics is a major cause of antimicrobial resistance (AMR). Bacteria have also been known to be able to transmit AMR between strains and species, and they are not limited by geographical borders. This is why the threat of AMR in one country represents the threat of AMR everywhere. Some strains of *Salmonella* are also resistant to multiple drugs. Continued irrational use of the Widal test, which facilitates unnecessary use of antibiotics, will therefore only make it more and more difficult to control this preventable disease while adding to the financial woes of the patients already suffering.

What is the alternative?

We need to discover better point-of-care tests that can replace the Widal test. And until they're available, clinicians can consider using best practice heuristics

that provide a rational diagnosis and subsequent treatment options based on the regional data of effective antibiotics available against the bacteria.

These options should be coupled with ensuring adequate and safe food and water and functional sanitation to address the disease's root cause.

Improving access to better diagnostic tests could also address this problem. Doing a blood or bone marrow culture is often not feasible as it requires laboratory infrastructure that most parts of the country lack. Healthcare workers can instead benefit from a 'hub and spoke' model, with sample collection sites at the periphery and district hospitals and medical colleges as the hubs that process samples. The latter facilities could also serve as research centres that generate regional prevalence and susceptibility data.

Next, we need better surveillance to stay on top of the AMR caused by the overuse of the Widal test. The Indian Council for Medical Research publishes an annual report highlighting the typhoid bacteria's resistance patterns. As per the last report, in 2021, the number of samples tested to report susceptibility ranged from one from the 'East' region to 126 samples from the 'North'.

Finally, as typhoid also has symptom-free carriers, constant environmental vigilance and data-sharing are imperative.

Dr. Yasudhara Rangaswamy is a microbiologist and a rural physician. Dr. Parth Sharma is a public health physician, writer, and researcher.

Typhoid

Typhoid spreads through contaminated food and water and is caused by *Salmonella typhi* and other related bacteria.

FACTS ABOUT TYPHOID FEVER

1

Globally, typhoid causes an estimated 21 million cases and 200,000 deaths every year.



2

Typhoid comes from a bacterium called *Salmonella Typhi*.



3

The disease may spread through contaminated food, water, or through contact with an infected individual.



4

An estimated 70% of the people infected from typhoid come from international traveling.



5

About 3 to 5% of people may still carry the typhoid fever bacteria, even if symptoms go away with treatment.



Principle of Widal test:

- Antibody in the serum produced in the response to *Salmonella* organism, the kit contains antigen suspensions that are killed bacteria and they were stained to enhance the reading of agglutination tests.
- The blue stained antigens are specific to the somatic antigens (O-Ag), while the red stained antigens are specific to the flagella antigens (H-Ag).



Scientist astronaut Harrison H. Schmitt is photographed working inside a bag-like container at Station 6 (base of North Massif) on the moon during the Apollo 17 mission in 1972, here.

NASA working out a time standard for the moon

Sushitra Karthikeyan

In September 2025, NASA's four-member Artemis crew is scheduled to fly around the moon in preparation for the space agency's mission to land on the moon again.

To support such missions, the White House Office of Science and Technology Policy (OSTP) has directed NASA to establish a Coordinated Lunar Time (CLT) to standardise time-telling on the moon.

The CLT will be the standard to measure lunar operations with the earth's UTC Coordinated Universal Time (UTC).

Referring to federal departments like the U.S. Departments of Commerce, Defense, State, and Transportation, the White House has set a deadline of December 31, 2026, for NASA and its international partners to deliver a strategy to implement CLT.

The project falls under the current administration's National Oceanic Science and Technology Strategy.

The idea for the UTC was formulated in the 1960s. Atomic clocks are known for their extreme accuracy. A weighted

The White House's Celestial Time Standardisation policy seeks to assign a time standard to each celestial body and its surrounding space environment

average of hundreds of atomic clocks produces the International Atomic Time (TAI).

Solar time on the other hand is calculated by measuring the earth's rotation relative to the Sun, and is variable in nature.

The UTC was designed to accommodate the difference between solar time and atomic time, and is kept within 0.9 seconds of solar time to follow the earth's rotational variations and within an exact number of seconds of the TAI.

Currently, moon missions follow the time of the country that operates the spacecraft, while clocks on the International Space station run on the UTC. There's currently no standardised time for lunar operations.

The White House's Celestial Time Standardisation policy seeks to assign a time standard to each celestial body and its surrounding space environment,

focusing on the lunar surface and missions operating in lunar space.

It outlines the four features such a standard must possess: "traceability to the UTC", "scalability beyond the earth-based system", "accuracy for precision navigation and science", and "resilience to loss of contact with the earth".

Unlike the earth, however, the moon will have only one time zone and daylight saving will be unnecessary.

Various space agencies around the world are currently planning to establish a permanent human presence on the moon.

A system like the UTC could help coordinate their activities with each other and with their respective ground stations as well as, in future, lay the foundation for a dedicated lunar satellite navigation system by 2030.

The system will function similar to how the Global Positioning System does

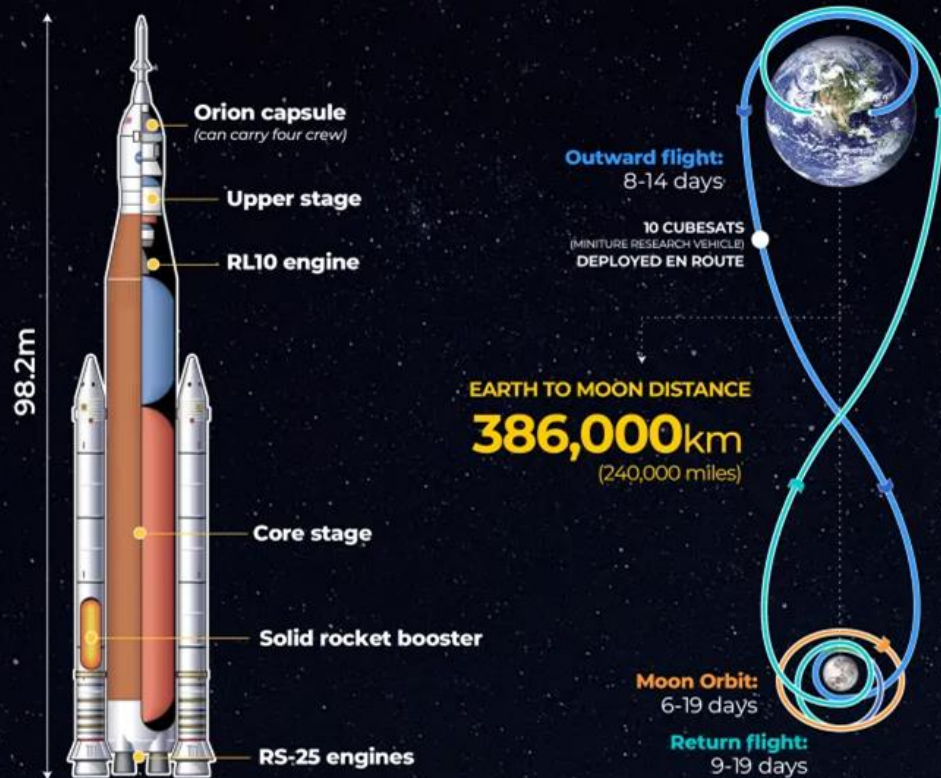
Standard time for moon

- In September 2025, NASA's four-member Artemis crew is scheduled to fly around the moon in preparation for the space agency's mission to land on the moon again.
- To support such missions, the White House Office of Science and Technology Policy (OSTP) has directed NASA to establish a Coordinated Lunar Time (LTC) to standardise time-telling on the moon.
- The LTC will be the standard to measure cislunar operations with the earth's UTC Coordinated Universal Time (UTC).

- **The idea for the UTC was formulated in the 1960s. Atomic clocks are known for their extreme accuracy.**
- **A weighted average of hundreds of atomic clocks produces the International Atomic Time (TAI).**
- **Solar time on the other hand is calculated by measuring the earth's rotation relative to the Sun, and is variable in nature.**
- **The UTC was designed to accommodate the difference between solar time and atomic time,**

NASA's Artemis moon mission

Artemis I is the first stage of NASA's new lunar exploration programme, which has the ultimate goal of establishing a long-term presence on the moon's surface.



Artemis I main flight stages

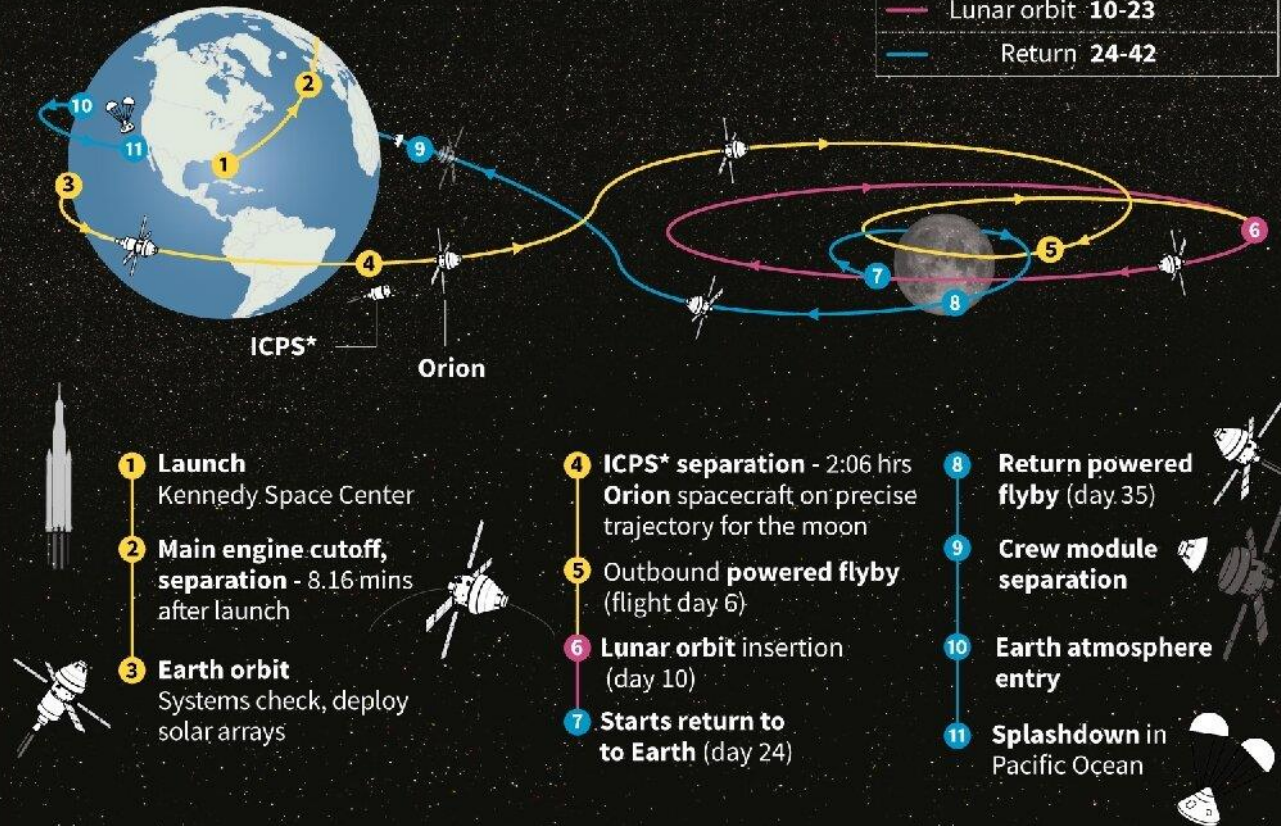
NASA's uncrewed moon mission scheduled to take off August 29

Total duration **42 days**

— Outbound **flight days 2-9**

— Lunar orbit **10-23**

— Return **24-42**



*Interim Cryogenic Propulsion Stage

Source: NASA

Atomic clocks

- **Atoms are composed of a nucleus (consisting of protons and neutrons) surrounded by electrons.**
- **Each element on the periodic table represents an atom with a certain number of protons in its nucleus.**
- **The number of electrons swarming around the nucleus can vary, but they must occupy discrete energy levels, or orbits.**
- **A jolt of energy — in the form of microwaves — can cause an electron to rise to a higher orbit around the nucleus.**
- **The electron must receive exactly the right amount of energy — meaning the microwaves must have a very specific frequency — in order to make this jump.**

- **The energy required to make electrons change orbits is unique in each element and consistent throughout the universe for all atoms of a given element.**
- **For instance, the frequency necessary to make electrons in a carbon atom change energy levels is the same for every carbon atom in the universe.**
- **The Deep Space Atomic Clock uses mercury atoms; a different frequency is necessary to make those electrons change levels, and that frequency will be consistent for all mercury atoms.**

- **“The fact that the energy difference between these orbits is such a precise and stable value is really the key ingredient for atomic clocks,”**
- **“It’s the reason atomic clocks can reach a performance level beyond mechanical clocks.”**

- **Being able to measure this unchangeable frequency in a particular atom offers science a universal, standardized measurement of time.**
(“Frequency” refers to the number of waves that pass a particular point in space in a given unit of time.
- **So, by counting waves, it’s possible to measure time.)**

A chance to settle a constitutional clash



Two questions of seminal importance are at stake in *Property Owners Association vs State of Maharashtra*, in which hearings recently concluded before a nine-judge Bench of the Supreme Court of India. First, what does the term “material resources of the community” used in Article 39(b) of the Constitution denote? Second, are laws made in furtherance of the goal stipulated in Article 39(b) – that is, legislation aimed at securing ownership of resources and distributing them to best subserve the common good – immunised from challenges premised on the fundamental rights to equality and freedom?

The second of these questions brings to sharp focus a clash between Part III of the Constitution, which delineates fundamental rights, and Part IV, which enumerates a set of “Directive Principles of State Policy” (DPSP). The Constitution expressly makes fundamental rights enforceable, while DPSPs are regarded as goals that the state is expected to work towards. The tension between these parts has simmered through India’s history, reaching boiling point in the 1970s when the Constitution was routinely amended, primarily to make certain kinds of legislation exempt from judicial review.

The Supreme Court has from time to time attempted to clarify where the law stands, starting with the verdict of its 13-judge Bench in *Kesavananda Bharati vs State of Kerala* (1973). But the conflict has never really gone away. The uneasy relationship between the two parts has now reared its head again. How the Bench in *Property Owners* answers the reference made to it will have a deep bearing on the Constitution’s future course.

At its inception, the Constitution’s bare text was clear enough. Article 13 declared that any law made in breach of a fundamental right would be void. Article 37, on the other hand, declared that DPSPs will not be “enforceable in any court”. Yet, it said that its precepts would be treated as fundamental in the country’s governance and the State would be obliged to apply them in making laws.

The Court in some of its earliest judgments described the hierarchy. Part III, wrote Chief Justice S.R. Das, in *Mohd. Hanif Quareishi vs State of Bihar* (1958), cannot be reduced to “a mere rope of sand”. He said, “the State should certainly implement the directive principles, but it must do so in such a way that its laws do not take away or abridge the fundamental rights”.

The introduction of Article 31C

This balance came unstuck when the Constitution was amended in 1971. Through the 25th amendment, Parliament, in a bid to place



Subhrit Parthasarathy

is an advocate practising at the Madras High Court

The top court has a chance, in *Property Owners Association vs State of Maharashtra*, to resolve the clash between fundamental rights and Directive Principles of State Policy

some of its laws beyond judicial review, introduced a new provision, Article 31C. This provision stipulated that a law giving effect to clauses (b) and (c) of Article 39 – which respectively entrusted the state to make legislation towards securing the material resources of the community and towards implementing an economic system that does not result in concentration of wealth – could not be declared void on the ground that it violated the rights conferred by Articles 14 or 19. This meant that the laws so made were exempt from any challenge on grounds that they contravened the right to equality under Article 14 or one of the other of the bundle of freedoms contained in Article 19, including the rights to freedom of expression, and to profession, business, and trade.

Consider the consequences: Parliament might believe that the printing press is a material resource of the community. It might then proceed to nationalise the media. The measure, it might say, is made with a view to securing the common good under Article 39(b). As an upshot of the 25th amendment, this law could neither be challenged on the ground that it did not subserve the common good nor could it be found void on the ground that it infringed our right to free speech.

Kesavananda alleviated some of these potentially drastic results. Through a narrow majority of seven to six, with Justice H.R. Khanna’s controlling opinion tipping the balance, the Court found that an amendment which offended the Constitution’s basic structure would be void. Justice Khanna further found that the 25th amendment partially fell afoul of this theory. He held that to the extent that it forbade any examination on whether a law made was in furtherance of Articles 39(b) and (c) it transgressed the principle of judicial review. But he upheld the amendment insofar as it protected such laws from challenges grounded on Articles 14 and 19. Oddly though, the six judges who otherwise formed part of the minority, by holding that Parliament had unlimited power to amend the Constitution, did not engage in any independent analysis on the 25th amendment. This meant that while a majority found a part of Article 31C void, *Kesavananda* offers no clear verdict on whether the amendment – insofar as it exempts certain laws from fundamental rights challenges – otherwise breaches the Constitution’s basic features.

More changes

Despite this, in 1976, through the 42nd amendment, Parliament made further changes to Article 31C. These were even more far-reaching.

They stipulated that a law made in furtherance of any DPSP – and not merely a law made in furtherance of Articles 39(b) and (c) – would enjoy safe harbour.

In *Minerva Mills vs Union of India* (1980), a five-judge Bench declared the amendment unconstitutional. The Court found that while DPSPs provided the ends of governance, fundamental rights constituted the means to such ends. Articles 14, 19 and 21, wrote Chief Justice Y.V. Chandrachud stood between the “heaven of freedom into which Tagore wanted his country to awake and the abyss of unrestricted power”. This amendment, he added, “removed two sides of that golden triangle”.

But what is the precise consequence of this ruling? Does Article 31C now go back to its original form, as contained in the 25th amendment, sans the portions that were struck down by the majority in *Kesavananda*? Or is it in a state of suspended reality, where its validity remains in the balance?

The issue is complicated by another judgment delivered by Justice Y.V. Chandrachud, on behalf of a five-judge Bench in *Waman Rao vs Union of India*. Here, somewhat at odds with his own opinion in *Minerva Mills*, he held that the unamended Article 31C was valid, because it was impossible to conceive how a law made in furtherance of Articles 39(b) and (c) could at all infringe the rights under Articles 14 and 19. This finding is clearly incorrect. As we saw, a law made to purportedly subserve the common good – for example, a nationalising of the printing press – can have grave consequences on our liberty.

In *Property Owners*, the Court will decide on the validity of a law that allows a State government board to acquire complete control over dilapidated buildings, if done with the consent of at least 70% of residents. To resolve this, it will examine whether the law furthers Article 39(b) under which it is purportedly made. But even assuming it answers this in the affirmative, the question still remains: can the statute also be tested on the touchstone of Articles 14 and 19?

An opportunity

Regardless of the judgments in *Waman Rao* and *Sanjeev Coke vs Bharat Coking Coal* (1982), which followed it, to date there is no conclusive analysis from the Supreme Court on Article 31C, in the form introduced by the 25th amendment, and its adherence to the Constitution’s basic structure. This has meant that fundamental rights and DPSPs have been in perennial conflict. The Court has a chance in *Property Owners* to resolve this clash and, in the process, provide a fillip to the Constitution’s most cherished guarantees.

- **First, what does the term “material resources of the community” used in Article 39(b) of the Constitution denote?**
- **Second, are laws made in furtherance of the goal stipulated in Article 39(b) — that is, legislation aimed at securing ownership of resources and distributing them to best subserve the common good — immunised from challenges premised on the fundamental rights to equality and freedom?**
- **The second of these questions brings to sharp focus a clash between Part III of the Constitution, which delineates fundamental rights, and Part IV, which enumerates a set of “Directive Principles of State Policy” (DPSP).**
- **The Constitution expressly makes fundamental rights enforceable, while DPSPs are regarded as goals that the state is expected to work towards**

- **Article 13 declared that any law made in breach of a fundamental right would be void. Article 37, on the other hand, declared that DPSPs will not be “enforceable in any court.**
- **Through the 25th amendment, Parliament, in a bid to place some of its laws beyond judicial review, introduced a new provision, Article 31C.**
- **This provision stipulated that a law giving effect to clauses (b) and (c) of Article 39 — which respectively entreated the state to make legislation towards securing the material resources of the community and towards implementing an economic system that does not result in concentration of wealth — could not be declared void on the ground that it violated the rights conferred by Articles 14 or 19.**

- **This meant that the laws so made were exempt from any challenge on grounds that they contravened the right to equality under Article 14 or one of the other of the bundle of freedoms contained in Article 19, including the rights to freedom of expression, and to profession, business, and trade.**
- **Kesavananda alleviated some of these potentially drastic results.**
- **Through a narrow majority of seven to six, with Justice H.R. Khanna's controlling opinion tipping the balance, the Court found that an amendment which offended the Constitution's basic structure would be void.**

Justice Khanna further found that the 25th amendment partially fell afoul of this theory.

He held that to the extent that it forbade any examination on whether a law made was in furtherance of Articles 39(b) and (c) it transgressed the principle of judicial review.

But he upheld the amendment insofar as it protected such laws from challenges grounded on Articles 14 and 19.

42nd amendment, Parliament made further changes to Article 31C. These were even more far-reaching.

They stipulated that a law made in furtherance of any DPSP — and not merely a law made in furtherance of Articles 39(b) and (c) — would enjoy safe harbour. In *Minerva Mills vs Union of India* (1980), a five-judge Bench declared the amendment unconstitutional.

The Court found that while DPSPs provided the ends of governance, fundamental rights constituted the means to such ends. Articles 14, 19 and 21, wrote Chief Justice Y.V. Chandrachud stood between the “heaven of freedom into which Tagore wanted his country to awake and the abyss of unrestricted power”.

This amendment, he added, “removed two sides of that golden triangle”.

- **justice Y.V. Chandrachud, on behalf of a five-judge Bench in Waman Rao vs Union of India.**
- **Here, somewhat at odds with his own opinion in Minerva Mills, he held that the unamended Article 31C was valid, because it was impossible to conceive how a law made in furtherance of Articles 39(b) and (c) could at all infringe the rights under Articles 14 and 19.**

- **In Property Owners, the Court will decide on the validity of a law that allows a State government board to acquire complete control over dilapidated buildings, if done with the consent of at least 70% of residents.**
- **To resolve this, it will examine whether the law furthers Article 39(b) under which it is purportedly made.**

- **Nagaland has been the only State where 33% of the seats or wards in the ULBs have not been reserved for women as mandated by clause IV of the 74th Amendment to the Constitution of India because of opposition from the Naga hohos (traditional apex tribal bodies) who argued that such a quota would violate the special provisions granted by Article 371A of the Constitution to Nagaland.**

- **The tribal bodies were initially opposed to reservation as Naga women have traditionally not been part of the decision-making bodies while pointing out Article 371A insulates the religious and social practices of the Nagas from any Act of Parliament.**

Columbia's missing snow



A tourist explores the Ritacuba Blanco glacier at Colombia's El Cocuy National Natural Park. The glacier, one of Colombia's highest peaks, should be covered by a blanket of homogeneous snow. But a brutal El Niño phenomenon melted it and exposed gigantic crevasses. AFP

- **the Ritacuba Blanco glacier at Colombia's El Cocuy National Natural Park.**
- **The glacier, one of Colombia's highest peaks, should be covered by a blanket of homogeneous snow.**
- **But a brutal El Niño phenomenon melted it and exposed gigantic crevasses.**

Topics

- FLiRT
- Bletchley Declaration
- INTERPOL NOTICES
- Gangavaram port
- Green steel
- Fuggin
- Mains



By saurabh Pandey



All about FLiRT, the new COVID-19 variants

Saumya Kalia

The COVID-19 cycle is active again with new variants in circulation. KP.2 and KP1.1, are dubbed 'FLiRT' variants, and are descendants of the Omicron JN.1 which spread globally over the winter last year.

The downstream variants are linked to new cases and a small surge in hospitalisation in the U.S., according to the Infectious Disease Society of America (IDSA). FLiRT cases have also soared in the U.K., South Korea and New Zealand, renewing fears of a fresh COVID-19 wave.

The Indian SARS-CoV-2 Genomics Consortium (INSACOG) has detected 238 cases of KP.2 and 30 cases of KP1.1 circulating in India, as of May 6. The new variants appear to outstrip their ancestor and other Omicron variants. KP.2, the more dominant strain of the two, in particular, is believed to leap past immunity built up from vaccines and previous



KP.2 has been detected predominantly in Maharashtra, Odisha, Goa and West Bengal; KP1.1 in West Bengal, Maharashtra and Gujarat; KP.3 in Uttarakhand. GETTY IMAGES

infections.

However, the periodic COVID-19 spikes are routine and to be expected as "COVID-19 will continue to morph into, not an endemic, but a cyclical disease", says Rajeev Jayadevan, co-chairman of the National Indian Medical Association (IMA) Covid Task Force in Kerala. The FLiRT variants reframe COVID-19 management as a longer affair, one that demands sustained surveillance, customising precautions and ensuring universal protection for

the vulnerable.

The FLiRT variants

KP.2 and KP1.1 sublineages are descendants of the JN.1 variant of the SARS-CoV-2 virus with two new added spike mutations. They are nicknamed the FLiRT group of variants; the acronym indicates two specific mutations, which when they occur together, end up conferring greater invasive properties to the virus. The U.S. Centre for Disease Control and Protection says KP.2 accounts for ap-

proximately 25% of new cases as of April 27.

In India, "we can confirm that COVID-19 cases are rising, and KP.2 is a commonly found variant," says Dr. Jayadevan. According to INSACOG, KP.2 has been detected predominantly in Maharashtra, Odisha, Goa and West Bengal; KP1.1 in West Bengal, Maharashtra and Gujarat; KP.3 in Uttarakhand. This is not to say that the variants are not circulating in other regions, but the proactive tracking in these states have identified JN.1's descendants. The symptoms of the new variant are similar to those of other Omicron subvariants: sore throat, cough, nausea, congestion, fatigue, headache, muscle or body ache, loss of taste or smell.

Immune evasive

Researchers at the Kei Sato lab in Japan showed the KP.2 variant had an "increased immune resistance ability... more than previous variants including JN.1". Their preliminary

evidence found that KP.2 was able to escape the immune protection derived not only from the most updated vaccine (the monovalent XBB.1.5 vaccine) but also from the breakthrough infection with JN.1 afterwards. KP.2 has "profound immune evasive properties", notes Dr. Jayadevan. The research, published on the pre-print server *bioRxiv*, showed the variant is thus able to leap over the most recently built immunity fence. More research is needed to understand how deeply and permanently the new mutations evade the immune system, researchers note.

Although immunisation with up-to-date SARS-CoV-2 vaccine produces antibodies recognising JN.1, experience indicates vaccination done earlier is still effective in preventing severe COVID-19 from newer variants. The European Medicine Agency recently recommended "updating COVID-19 vaccines to target the new variant JN.1"

before another round of vaccinations is undertaken. Meanwhile, AstraZeneca on May 7 said it has initiated the worldwide withdrawal of its COVID-19 vaccine due to a "surplus of available updated vaccines" since the pandemic.

In India, experts have also detected a new surge of cases since early April, with approximately one in six tests turning positive, compared to zero in March. With limited testing, however, the exact prevalence and geographic spread are unknown. It is too early to say if all the new COVID-19 cases or hospitalisations are due to KP.2 or KP1.1 in India, explains Dr. Jayadevan. Moreover, increased transmissibility does not necessarily mean the new variants will cause more severe COVID-19 illnesses. Precautions and prescriptions remain similar: maintain hygiene, wear masks in crowded places, stay home if unwell, and vaccinate.

(saumya.k@thehindu.co.in)

FLiRT -Mutation , variants and strain



- The COVID-19 cycle is active again with new variants in circulation. KP.2 and KP1.1, are dubbed 'FLiRT' variants, and are descendants of the Omicron JN.1 which spread globally over the winter last year.
- When a virus replicates, it doesn't always manage to produce an exact copy of itself. This means that, over time, the virus may start to differ slightly in terms of its genetic sequence.
- Any change to the viral genetic sequence during this process is known as a mutation, and viruses with new mutations are sometimes called variants. Variants can differ by one or multiple mutations.
- When a new variant has different functional properties to the original virus and becomes established in a population, it is sometimes referred to as a new strain of the virus

INSACOG



- **The Indian SARS-CoV-2 Genomics Consortium (INSACOG), jointly initiated by the Union Health Ministry of Health, and Department of Biotechnology (DBT) with Council for Scientific & Industrial Research (CSIR) and Indian Council of Medical Research (ICMR), is a consortium of 54 laboratories to monitor the genomic variations in the SARS-CoV-2.**
- **INSACOG is a multi-laboratory, multi-agency, Pan-India network to monitor genomic variations in the SARS-CoV-2 by a sentinel sequencing effort which is facilitated by the National Centre for Disease Control (NCDC), Delhi involving the Central Surveillance Unit (CSU) under Integrated Disease Surveillance Programme (IDSP).**
- **The data from the genome sequencing laboratories is being analyzed as per the field data trends to study the linkages (if any) between the genomic variants and epidemiological trends**

An AI-infused world needs matching cybersecurity

Last year, an incident of a frantic mother who had received an ominous call from “kidnappers” who had ‘kidnapped’ her daughter, raised an alarm in the U.S. Senate about the detrimental impact of artificial intelligence. The news took the nation by a storm as the said “kidnappers” and the daughter’s voice were nothing but hackers utilising generative AI to extort money. With such instances on the rise, the human perception of what is real and what is merely generative AI is slowly eroding.

Sophisticated cyber threats

While it is true that generative AI has exceptionally transformed how we operate, with its integration into sectors such as education, banking, health care, and manufacturing, it has also transformed the paradigm of cyber-risks and safety as we know it. With the generative AI industry projected to increase global GDP by as much as \$7 to \$10 trillion, the development of generative AI solutions (such as ChatGPT in November 2022) has spurred a vicious cycle of advantages and disadvantages. According to a recently published report, there has been a 1,265% increase in phishing incidents/emails, along with a 967% increase in credential phishing since the fourth quarter of 2022 arising from the exacerbated utilisation/manipulation of generative AI.

With sophisticated cyber threats on the rise, organisations and individuals are susceptible to the novel avenues of cyber-attacks, pushing firms to adapt to ever-evolving technology. As per a study conducted by Deep Instinct, around 75% of professionals witnessed an upsurge in cyberattacks in the past year alone, while 85% of the surveyed respondents have attributed the increased risk to generative AI.

It becomes imperative now, more than ever, to develop solutions through collaborative avenues to safeguard confidential information, identities, and even human rights.

As generative AI continues to mature, newer, more complex threats have arisen: through cognitive behavioural manipulation, critically



Charu Kapoor

is Country Director,
NIIT Foundation

With increasing misuse of generative AI, ensuring that consumers can navigate digital spaces safely has become crucial

dangerous incidents have surfaced, with voice-activation toys and gadgets that encourage dangerous behaviours in children and/or posing a grave threat to one’s privacy and security. Simultaneously, remote and real-time biometric identification systems (such as facial recognition) have further jeopardised the right to privacy and massively endangered individuals on several occasions in recent times.

While generative AI has significantly impacted productivity across the industrial realm with 70% of professionals reporting increased productivity, increasing manipulation via generative AI (specifically over the past couple of years) has resulted in the spiralling vulnerability of organisations to attacks, with most organisations citing undetectable phishing attacks (37%), an increase in the volume of attacks (33%), and growing privacy concerns (39%) as the biggest challenges.

The recent identification, by several cybersecurity conglomerates, of complex hacker groups using generative AI solutions has raised an alarm – with AI models being leveraged for translating and identifying coding errors to maximise the impact of cyberattacks.

With such multifaceted cyberattacks on the rise, robust initiatives have become necessary. While stringent ethical and legislative frameworks are underway to combat growing cybercrimes due to AI, loopholes and a lack of industrial understanding/comprehension in regulating generative AI persist.

The Bletchley Declaration

Considering the growing concerns amidst increasing misuse of generative AI, it becomes imperative to safeguard consumers against the challenges posed by such advanced technologies, allowing them to navigate digital spaces safely.

World leaders, too, have initiated collaborative efforts to understand the potential catastrophic harm caused by the detrimental utilisation of AI, as seen in the recent signing of the Bletchley Declaration at the AI Safety Summit. The countries that signed the agreement include

China, the European Union, France, Germany, India, the United Arab Emirates, the United Kingdom and the United States.

At the institutional level, stern policy-led efforts are pivotal to bolstering the stance against increasing challenges via solutions such as enhancing the stance for watermarking to identify AI-generated content. This could aid in reducing cyber threats from AI-generated content, warning consumers to take appropriate actions. Further, a collaborative effort between institutional and industrial stakeholders could necessitate the process of improving and implementing a realistic, practical, and effective framework, with the inclusion of feedback from the public to further strengthen the drafting of these regulations.

Foster digital awareness

At the corporate level, greater emphasis is required to accommodate digital awareness via occupational media and digital literacy training sessions, fostering robust digital fluency in the workspace while identifying and tackling gaps in digital knowledge among employees. This could further equip the workforce to efficiently navigate the digital landscape, identify credibility, and verify the sources for authentication.

However, for a truly holistic approach to cybersecurity in an AI-driven world, we cannot overlook the crucial role of non-governmental organisations and other outreach organisations that introduce individuals to the wonders of the digital world, and simultaneously equip them with the essential tools of cyber literacy. By fostering a digitally savvy citizenry from the ground up, we can build a more robust defence against the evolving threats in this AI-driven digital landscape.

As we move towards developing more sophisticated systems and technologies, collaborative efforts are paramount to harbour a sense of security, enabling individuals and organisations to further empower communities to safeguard their personal interests and identities.

Bletchley Declaration



- the world's first AI Security Summit was hosted within the UK. Representatives from 28 nations, including the USA, China, France and Japan, all convened in Bletchley Park to discuss the implications of the rapid advancement of highly capable general purpose AI models known as 'Frontier AI'.
- The declaration commences with two key acknowledgements. Firstly, emphasis is put on the significant global opportunities and challenges presented by AI.
- Secondly, it recognizes that the AI phenomenon is no longer a futuristic concept, as it is already deployed in various aspects of our daily lives

- **The statement elaborates on the dual nature of AI – representing disruptive potential and offering transformative opportunities, but also posing major risks regarding human rights, fairness, transparency, safety, accountability, ethics, and bias mitigation.**
- **Particular focus is devoted to the safety risks that highly capable AI models entail.**
- **The declaration recognizes the paramount importance of international cooperation to address these risks effectively.**
- **In light of such, the statement calls for collaboration across nations, international organizations, businesses, civil societies, and academia.**

Why did Interpol issue a blue corner notice against Prajwal?

How is a blue corner Interpol notice different from a red corner notice? What does it mean for the SIT probe in the Prajwal Revanna sexual assault case? How does Interpol alert member countries about fugitives?

Sumeda

The story so far:

Amid a political storm in Karnataka over grave allegations of sexual abuse against Prajwal Revanna, sitting Hassan MP and grandson of former Prime Minister H.D. Deve Gowda, the International Criminal Police Organisation, commonly known as Interpol, has issued a blue corner notice against the absconding politician. The MP has been on the run since late last month following the leak of thousands of explicit video clips that allegedly show the 33-year-old sexually abusing multiple women, prompting the JD(S) to suspend him.

How does the Interpol alert countries?
The Interpol is an inter-governmental law

enforcement organisation which assists and facilitates cooperation between national law forces in 196 member countries to combat transnational crimes. The organisation shares information regarding crimes and wanted criminals globally, and provides technical, operational, and investigative support to locate fugitives.

It manages a database of critical data about wanted criminals, which member countries can use to trace such individuals.

The agency has a National Central Bureau in all member countries which is a single point of contact between law enforcement agencies of that country and Interpol.

The Central Bureau of Investigation (CBI) is officially designated as the nodal agency for India.

The agency uses

a 'colour-coded' system to alert and share requests for crime-related information among member countries and global organisations. Notably, member countries are not bound by international law to abide by Interpol notices as they are entirely discretionary.

Why did Interpol issue a blue corner notice against Prajwal Revanna?

The international organisation issues a blue corner notice when the case is related to missing persons. Also called an "enquiry notice," such an alert is sent for additional information from member states about a person, to verify their identity, location, or criminal record concerning a criminal investigation.

It is different from a red corner notice, considering that the purpose of a blue notice is information about a person of interest in an investigation, while the

former is generally issued against a person wanted for extradition, or serve a sentence based on a court decision, or a similar lawful action.

Interpol issued a blue corner notice against Mr. Revanna after the Special Investigation Team (SIT) formed by the Karnataka government sought the help of the CBI for further inquiry.

The SIT first issued a look out circular against the Hassan MP after he failed to appear before the panel.

The request came days after the Hassan MP remained untraceable. As per reports, the MP left for Munich, Germany using his diplomatic passport a day after his constituency went to the polls in the second phase of the Lok Sabha elections on April 26, and hours before the SIT was constituted.

Mr. Revanna's advocate sought seven days for his client to present himself before the panel.

The investigating team, however, ruled out the possibility and moved for a blue corner alert against Mr. Revanna, considering that the investigation is in the early stages and the police are yet to file criminal charges.

The SIT officials told Karnataka Chief Minister Siddaramaiah that they intend to arrest the accused to expedite the investigation as soon as they receive information about his whereabouts.

THE GIST

Prajwal Revanna, sitting MP and grandson of former Prime Minister H.D. Deve Gowda, is accused of sexual abuse, prompting his suspension from JD(S).

Interpol has issued a blue corner notice against him. Blue corner notices are issued for missing persons to gather information about their identity, location, or criminal record for ongoing investigations.

The Special Investigation Team formed by the Karnataka government sought CBI's help in the case, leading to the issuance of the blue corner notice.

TYPES OF INTERPOL NOTICES



RED NOTICE: To seek the location and arrest of wanted persons with a view to extradition or similar lawful action.



YELLOW NOTICE: To help locate missing persons, often minors, or to help identify persons who are unable to identify themselves.



BLUE NOTICE: To collect additional information about a person's identity, location or activities in relation to a crime.



BLACK NOTICE: To seek information on unidentified bodies.



GREEN NOTICE: To provide warnings and intelligence about persons who have committed criminal offences and are likely to repeat these crimes in other countries.



ORANGE NOTICE: To warn of an event, a person, an object or a process representing a serious and imminent threat to public safety.



INTERPOL-UN SECURITY COUNCIL SPECIAL NOTICE: Issued for groups and individuals who are the targets of UN Security Council sanctions committees.



PURPLE NOTICE: To seek or provide information on modus operandi, objects, devices and concealment methods used by criminals.

RINL's operational woes worsen; strike at Gangavaram Port leaves coal supply stranded



Abhishek Law

NEW DELHI

RINL (Rashtriya Ispat Nigam Ltd.), the State-owned steel major and one of the rare long-steel makers in the country, is in a tight corner, grappling with severe operational constraints.

Raw material shortages have slashed its production capacity by 60% and only one of its three blast furnaces is currently operating.

The ongoing strike at Adani-owned Gangavaram Port has further exacerbated the company's struggles, leaving crucial coking coal and limestone worth ₹650 crore stranded. Coal and limestone are key steel-making feedstock.

'Stocks fast dwindling'

Despite attempts to secure commodity loans and explore alternative ports, current stocks are dwindling fast and are currently "at a few days".

With the spectre of co-



Lifeline in jeopardy: The average daily requirement of coal is about 12,000 tonne for normal production. THE HINDU

lossal debt looming large, borrowing for additional raw materials is "not an immediate option".

The Ministry had earlier ruled out a recapitalisation of RINL, and the steel-maker is on the Centre's disinvestment radar.

"If the situation is not resolved, there will be an imminent shutdown that threatens extensive damage and exorbitant restoration costs," a Steel Ministry official told *businessline*.

RINL has approached

the Andhra government for intervention and has also taken legal action to get its raw materials supply on track. The Steel Ministry has reportedly been apprised, too.

Curtailed operations

Operations are forcefully curtailed, dramatically reducing coke oven pushings and hot-metal production.

The coke oven pushings per day were brought down to 140, down 56% from 320 pushings, and

Steel Ministry had earlier ruled out recapitalisation of RINL and it is on disinvestment radar

the hot-metal production was brought down to 5,600 tonne per day from about 14,000 tonne a day.

Coal awaiting evacuation at Gangavaram includes 142,000 tonne of hard coking coal, 90,000 tonne of pulverised coal injection and about 82,000 tonne of limestone.

The typical blend of coking coal is about 50-70% hard coking coal, 30-40% soft coking coal and another 10-20% indigenous coking coal.

The average daily requirement of coal was about 12,000 tonne for normal production, which included about 8,000 tonne of hard coking coal (HCC), 2,500 tonne of soft coking coal (SCC) and 1,500 tonne of indigenous coal.

"The absence of coking coal jeopardizes equipment and safety, risking gas leakages and blasts," the Ministry official said.

In 2014, RINL entered into a 15-year contract with Adani Gangavaram Port Ltd (AGPL), formerly GPL (Gangavaram Port Ltd.), to facilitate the handling of imported raw materials.

Logistics wall

The disruption at AGPL has halted coal transfer, leaving more than 314,000 tonne stranded, while vessels carrying soft coking coal are diverted, exacerbating the scarcity.

Alternative berthing arrangements at Vizag Port bring along logistics issues, including elongating coal transfer times.

A 20-minute transfer time from Gangavaram port to the plant through a conveyor belt now increases to "at least 24 hours" in view of the availability of rakes, berthing spaces, etc.

(The writer is with *The Hindu businessline*)

Gangavaram Port

- Gangavaram Port is a **port** located in **Visakhapatnam, Andhra Pradesh**. Inaugurated in July 2009, it has a depth of 21m.
- It is managed by Gangavaram Port Ltd.
- The Gangavaram Port Ltd. plans to build conveyors for taking imported raw materials directly to the Vizag Steel plant, in order to reduce the railway transportation costs.

Green steel needs tiered incentives to become a reality in Asia: Russell

Steel is the biggest industrial contributor to global carbon emissions, accounting for around 8% of the world's total, making efforts to decarbonise the sector vital to meeting net-zero ambitions; the important question is how to introduce incentives to decarbonise the sector to achieve net-zero steel

COMMENT

Clyde Russell
SINGAPORE

It's time for a reality check about decarbonising Asia's vast and growing steel sector. Reducing the carbon footprint is possible, but only in stages, and over a far longer than ideal time period, and only if incentives to do so are available.

Steel is the biggest industrial contributor to global carbon emissions, accounting for around 8% of the world's total, making efforts to decarbonise the sector vital to meeting net-zero ambitions.

Asia's iron ore and steel industry gathered this week in Singapore and delivered both encouraging and disconcerting news about efforts to decarbonise steel production.

The good news is that virtually every player in the market, from iron ore miners through to steel mills is taking the issue seriously, and more than that, actually putting time, effort and capital toward solutions.

'Pipe dream'

The bad news is that meeting net-zero emissions by 2050 in Asia appears largely a pipe dream with the current and likely available technology.

A further looming and



Sops crucial: There needs to be price incentive to decarbonise steel. REUTERS

massive obstacle is the current pricing structure for steel, given that as yet there is no real premium for producing low-carbon metal in Asia and little sign that is on the horizon.

The current situation is one where iron ore miners and steel mills are largely undertaking decarbonisation efforts as part of voluntary commitments to reduce carbon emissions.

Investor pressure

These commitments are mostly the result of bending to pressure from shareholders, some governments and the general public to be seen to be doing something to mitigate the expected adverse im-



If a steel mill could lower emissions by a third, it could be rewarded with a carbon credit, or avoid paying a carbon tax of a set amount per tonne of emissions reduced

pact of climate change.

This is all well and good, but it means that any costs incurred in decarbonising are effectively stripped from a company's bottom line as there is no financial reward in Asia for producing green, or even slightly less dirty, steel.

The question is how to

ton of emissions reduced.

For the sake of example let's assume this first third reduction is worth \$60 a ton, which is roughly the price of a carbon credit in the European Union.

Now, assume the steel mill can cut emissions by a further third, but only by investing in new processes, such as using direct reduced iron (DRI), or its shippable equivalent hot briquetted iron (HBI) in an electric arc furnace (EAF).

This reduction could be rewarded with a higher price on carbon, say \$120 a tonne. The final steps to completely decarbonise steel production by using green hydrogen to produce the HBI, green electricity to run EAFs, and using sustainable shipping fuel such as methanol to transport materials, could attract an even bigger carbon credit to offset the vast capital that needs to be deployed to get there.

Incentives crucial

One thing became clear from the presentations at the Green Steel Forum this week in Singapore, is that without incentives only the first, and relatively easy steps to decarbonise will become reality.

These involve maximising the efficiency of BOFs, increasing the use of higher grade iron ore and agglomerates such as DRI and HBI, boosting the use of recycled steel in EAFs

and decarbonising mining iron ore by limiting the use of diesel power generation at remote mines and electrifying vehicles and trains.

The problem is that all these efforts will likely cut only about 20% of steel's global emissions.

The next steps involve doing things like using natural gas to turn low-grade iron ore into DRI and HBI for use in more advanced BOFs or even EAFs, and then switching this process to green hydrogen.

Higher costs?

But it's here where costs become real, and where shareholders are likely to ask what's in it for them.

Ultimately, for steel to decarbonise beyond the low-hanging fruit, there needs to be a price incentive, and the market by itself is unlikely to provide this, given cost is likely to trump climate concerns for the vast majority of consumers.

This means regulations such as carbon taxes or credits need to be implemented, and likely coordinated across numerous countries, but especially the top iron-ore exporters, Australia, Brazil and South Africa, as well as China, which produces half of the world's steel, as well as emerging major producers such as India.

(The opinions expressed here are those of the author, a columnist for Reuters)

Green steel

- **Steel manufacturing produces more CO₂ than any other heavy industry, comprising around 8% of total global emissions.**
- **Efforts are under way to move steel production away from coal-fired furnaces to ones powered by electricity or hydrogen.**
- **But producing green steel is an expensive process - and the industry needs to scale up rapidly to hit net-zero targets**

What is green steel?

- Essentially, green steel is the manufacturing of steel without the use of fossil fuels.
- So-called “green hydrogen” is one solution that could help reduce the steel industry’s carbon footprint.
- “When burned, hydrogen emits only water.
- And if that hydrogen is produced via electrolysis using just water and renewable electricity, **then it is completely free of CO₂ emissions**,

China's aircraft carrier *Fujian* completes 8-day sea trial

Dinakar Peri

NEW DELHI

China's third aircraft carrier, *Fujian*, has successfully completed its eight-day maiden sea trials. *Fujian* is an 80,000-tonne supercarrier with electromagnetic catapults for launching aircraft, making China the second country after the U.S. to field a supercarrier with this technology.

"During the sea trial, the aircraft carrier tested its propulsion, electrical systems, and other equipment, and achieved the expected results. In the next stage, People's Liberation Army Navy Ship (PLANS)

Fujian will conduct follow-up tests according to established plans," according to *China Military Online*, the English language news website of the Chinese People's Liberation Army (PLA). The aircraft carrier set sail for trials from Jiangnan Shipyard in Shanghai on May 01.

The developments will be watched very closely by India and other countries in the region which are also planning to build aircraft carriers as Beijing rapidly expands its maritime power and presence.

Named after East China's Fujian Province and given the hull number 18, the



Setting sail: China's third aircraft carrier, *Fujian*, conducts its maiden sea trial on May 01. AP

carrier was launched in June 2022. Last month, China announced that it is building its fourth aircraft carrier, likely a nuclear-powered supercarrier, to be unveiled very soon. Chi-

na's first aircraft carrier *Liaoning* was commissioned in 2012 and the second carrier *Shadong* was launched in 2017.

In an interview last week, outgoing Comman-

der of Hawaii-based U.S. Indo-Pacific Command (IN-DOPACOM) Adm John Aquilino said that in the three years since he's been in command, China has built more than 400 aircraft, 20 major warships, and doubled its missile inventory.

Indian Navy's carriers

Indian Navy currently operates two aircraft carriers - refurbished Russian carrier *INS Vikramaditya*, commissioned in 2013, and indigenously designed and built *INS Vikrant*, commissioned in September 2022.

In the second half of last year, the Indian Navy has

moved the case for a second Indigenous Aircraft Carrier (IAC-II), a repeat of a *Vikrant*-like carrier which has been approved by the Defence Procurement Board last September. It is now awaiting approval by the Defence Acquisition Council, expected to be taken up after the elections.

It will take around eight to 10 years to build a new carrier, Madhu S. Nair, Chairman and Managing Director of Cochin Shipyard Limited, told *The Hindu* as reported earlier, as long as the basic design, engines and propulsion are kept intact.

Fujian

- China's third aircraft carrier, Fujian, has successfully completed its eight-day maiden sea trials.
- Fujian is an 80,000-tonne supercarrier with electromagnetic catapults for launching aircraft, making China the second country after the U.S. to field a supercarrier with this technology.
- Named after East China's Fujian Province and given the hull number 18, the carrier was launched in June 2022

China's first aircraft carrier Liaoning was commissioned in 2012 and the second carrier Shadong was launched in 2017.

Indian Navy's carriers

- **Indian Navy currently operates two aircraft carriers – refurbished Russian carrier INS Vikramaditya, commissioned in 2013, and indigenously designed and built INS Vikrant, commissioned in September 2022**

Topics

- Interim Bail
- Model code of conduct
- **Freshwater beyond EEZ**
- **Alphafold 3**
- Palestine as UN Membership
- Essay topic



By saurabh Pandey



Voting for relief

Interim bail for Delhi CM reverses damage to level playing field in polls

In granting interim bail to Delhi Chief Minister Arvind Kejriwal, the Supreme Court of India has reversed a development that upset the level playing field for the ongoing general election. When Mr. Kejriwal was arrested in March for his alleged involvement in corruption in the formulation of a liquor policy for Delhi, it might not have seemed an obvious setback to federalism and democracy. But the arrest of a serving Chief Minister and a key figure in the Opposition, when the election process was already on, sent shock waves among regional parties. And, as he remained behind bars, it stoked fears that States run by parties other than those in power at the Centre could easily be undermined by getting central agencies to arrest Chief Ministers on charges that may or may not be based on evidence. In Mr. Kejriwal's case, the Court is right in both citing the general election as a good enough reason to grant him interim bail until June 1, when the last phase of polling will be held, and in rejecting the Centre's argument that it would amount to favourable treatment to politicians. As the Court has pointed out, interim release orders relate to the "peculiarities associated with the person in question and surrounding circumstances". The absence of a notable leader from the campaign arena, especially when he is yet to be convicted, will be a factor that will cast a doubt on the free and fair nature of the election.

The Court has made his bail conditional on his keeping away from the Delhi Secretariat and the CM's office. And he is to abide by his statement that he would not sign any official file, unless required to do so to get the Lieutenant General's approval for something. That Mr. Kejriwal did not respond to several summonses from the Enforcement Directorate (ED) does not show him in a good light. But, at the same time, it cannot be forgotten that be it the CBI's corruption charge, or the ED's money-laundering charge, the case against him is based on a belated statement made by suspects who had turned approvers and obtained pardon on the promise of testifying against him. The probative value of these statements will be tested during trial. Another factor to be noted is that there are statutory restrictions under the Prevention of Money Laundering Act on seeking bail, resulting in many questioning the validity of their arrest, as Mr. Kejriwal has done, rather than file for bail. If only courts applied the basic principle of granting bail to those who are unlikely to flee from justice, with appropriate conditions to neutralise their likely influence over witnesses and to safeguard evidence, orders granting bail would not evoke political reactions and doubts whether the political class is being unduly favoured.

Interim Bail

- It is basically for a short duration and before the hearing or final disposal of regular or anticipatory bail application.
- Interim bail is important as when application for regular or anticipatory bail goes to court, certain documents are required like charge sheet or case diary etc.
- So, that they can judiciously decide the application.

- **But this process requires time and the accused has to remain in legal custody until the court gets the documents and can decide the bail application.**
- **But according to interim bail, an accused can apply for it to avoid jail till court gets the documents etc.**
- **Thus, interim bail is a temporary bail for a shorter time period during which the court can call the documents to make a final decision on the regular or anticipatory bail application.**

The fraying of the model code of conduct



The model code of conduct has, once again, attracted national attention because of its egregious violation by senior politicians during the election campaign for the 18th Lok Sabha. Political parties are duty bound to obey the code as it was framed by the Election Commission of India (ECI) on the basis of a consensus among all political parties in order to have a peaceful, orderly and civilised election. However, as elections in India are a no holds barred war, this consensus often breaks down with party leaders losing no opportunity to hit their opponents below the belt. Of late, elections are a free for all. Distortions, blatant falsehoods, mischievous misinterpretations, slanging matches – all are par for the course.

The Constitution mandates the ECI to conduct elections in a free and fair manner. In fact, free and fair elections are a part of the basic structure of the Constitution. Article 324 confers on the Election Commission, plenary powers to enable it to ensure a free and fair election. In *Election Commission of India vs State of Tamil Nadu and Others* (1993), the Supreme Court of India restates the role and powers of the Commission in the following words: “The ECI is a high constitutional authority charged with the function and the duty of ensuring free and fair elections and of the purity of the electoral process. It has all the incidental and ancillary powers to effectuate the constitutional objective and purpose. The plenitude of the Commission’s powers corresponds to the high constitutional functions it has to discharge.”

Key provisions

The model code of conduct was framed by the Commission to ensure that the elections are free and fair and the electoral process remains pure. Also, a level playing field is a necessary condition to ensure that elections are free and fair. The key provisions of the code are: no party or candidate shall indulge in any activity which may aggravate existing differences or create communal hatred or cause tension between different castes, communities – religious or linguistic; criticism of other political parties shall be confined to their policies and programs. No unverified allegations or distortions against other parties shall be allowed; there shall be no appeal to cast or communal feelings for securing votes; no party or its candidate shall indulge in corrupt practices or commit offences under the election law.

Needless to say that violation of these directions are serious infractions of the code, making it impossible to hold free and fair elections and maintain the purity of the electoral process. So, it is the duty of the ECI to quickly examine those violations and take suitable action



P.D.T. Achary

is former Secretary General, Lok Sabha

It is the duty of the Election Commission of India to quickly examine violations and take action so that the purity of the electoral process is maintained

against the violators so that the purity of the electoral process is maintained. Here a question arises as to what action the Commission can take in such cases.

On deterrent action

It is common knowledge that the model code of conduct is not legally enforceable. So, it is not possible to seek any relief from the court for violation of the code. The only way open to the aggrieved party is to complain to the Commission and seek its intervention. It must be noted here that neither The Representation of the People Act nor The Conduct of Election Rules makes any provision for the model code of conduct. However, the Election Symbols (Reservation and Allotment) Order brought out by the ECI in 1968 makes a provision to deal with the violation of the Model Code of Conduct. The Symbols order was issued in exercise of the powers conferred by Article 324. Paragraph 16A of the Symbols order says that in case of violation of the model code of conduct or other direction or orders of the Commission, it can suspend the recognition of a party, or, in an extreme case, even withdraw its recognition. Suspension or withdrawal of recognition of a party will deprive it of the symbol reserved for it. This will pose enormous problems to a recognised party as it will not be able to use its reserved symbol in the election. So, the ECI has the power to act decisively against the violators of the model code of conduct. We have seen the ECI taking violators off the election campaign for 24 to 48 hours. It can also take the violator off the campaign in the elections no matter how high he or she is in the party. Such actions by the ECI will definitely act as a deterrent and send the right message to the political parties.

However, experience shows that after the late T.N. Seshan, the ECI has never acted so decisively as he used to do. T.N. Seshan struck terror in the minds of politicians. Elections in India today are a do-or-die battle and the only aim here is to defeat the enemy. Political adversaries are treated as enemies and the goal is to exterminate them. Elections have long ceased to be the civilised democratic exercise they are meant to be, where each player scrupulously adheres to be norms set by law. Now, every effort is made to stir the basest passions in men. At one time there existed a consensus among politicians that nothing should be done to exacerbate the divisions in the society especially on the basis of religion.

We should not forget that religion in India is a potent tool which can be effectively used to divide society. The founding fathers of the Constitution wisely chose secularism and democracy as the warp and woof of the

Constitution. They believed that only secularism can hold this country of immense diversities together. The Representation of People Act 1951, has made any appeal in the name of any religion a corrupt practice which will invalidate an election. Thus, religion is kept out of the electoral battle by the statute. But it is brought back and installed at the centre of this battlefield by politicians. The nation wants the ECI to address this issue with full seriousness.

A violation of oath

The issue of senior members of the Council of Ministers making communally charged speeches during the election campaign has not been dealt with sternly by the ECI or the courts. Speeches of such persons during the election campaign, which have extremely toxic references to the followers of a particular religion or community or caste and which can promote hatred in a section of voters, flagrantly violate the oath they have taken as Ministers. A Minister, through the oath he takes, gives a solemn assurance to the people of the country that he will do right to all manner of people without favour or ill will. By speaking directly or indirectly against a section of the society, they demonstrate their inherent bias and ill will against them which is a violation of oath. The Constitution or the election law does not prescribe any punishment for violating the oath by Ministers. Section 125 of the Representation of People Act 1951, provides for a three-year sentence as maximum punishment for promoting feelings of enmity or hatred between different classes of citizens on the ground of religion. Members of the Council of Ministers of the Union as well as the States are holding high constitutional office and are oath bound to do right to all without ill will towards anyone. Therefore, any utterances on their part to the contrary need to be seriously dealt with. The apex court can give a standing direction to the ECI to initiate criminal proceedings under Section 125 of the Representation of People Act 1951 whenever such occasion arises and also take the violators off the campaign till the ongoing elections are over.

The top court has always laid stress on maintaining the purity of an election. It says: “what is meant by purity of elections? According to us, it means that the elections should not only be free from corrupt practices but also free from evil practices” (A. Neelalohithadasan Nadar vs George Mascarene). Promoting hatred between two sections of people on the ground of religion, cast or community is an evil practice. The Constitution puts a lot of powers in the hands of the ECI. These powers are meant to be exercised when the need arises.

Model code of conduct

- free and fair elections are a part of the basic structure of the Constitution.
- Article 324 confers on the Election Commission, plenary powers to enable it to ensure a free and fair election.
- In Election Commission of India vs State of Tamil Nadu and Others (1993), the Supreme Court of India restates the role and powers of the Commission in the following words: “The ECI is a high constitutional authority charged with the function and the duty of ensuring free and fair elections and of the purity of the electoral process.”

Key Provisions of Model code of conduct

- The key provisions of the code are: no party or candidate shall indulge in any activity which may aggravate existing differences or create communal hatred or cause tension between different castes, communities — religious or linguistic; criticism of other political parties shall be confined to their policies and programs.
- No unverified allegations or distortions against other parties shall be allowed; there shall be no appeal to caste or communal feelings for securing votes; no party or its candidate shall indulge in corrupt practices or commit offences under the election law.

Enforcement

- It is common knowledge that the model code of conduct is not legally enforceable.
- So, it is not possible to seek any relief from the court for violation of the code.
- The only way open to the aggrieved party is to complain to the Commission and seek its intervention.
- It must be noted here that neither The Representation of the People Act nor The Conduct of Election Rules makes any provision for the model code of conduct.

- **However, the Election Symbols (Reservation and Allotment) Order brought out by the ECI in 1968 makes a provision to deal with the violation of the Model Code of Conduct.**
- **The Symbols order was issued in exercise of the powers conferred by Article 324.**
- **Paragraph 16A of the Symbols order says that in case of violation of the model code of conduct or other direction or orders of the Commission, it can suspend the recognition of a party, or, in an extreme case, even withdraw its recognition.**
- **Suspension or withdrawal of recognition of a party will deprive it of the symbol reserved for it.**

- **The Representation of People Act 1951, has made any appeal in the name of any religion a corrupt practice which will invalidate an election.**
- **The Constitution or the election law does not prescribe any punishment for violating the oath by Ministers. Section 125 of the Representation of People Act 1951, provides for a three-year sentence as maximum punishment for promoting feelings of enmity or hatred between different classes of citizens on the ground of religion.**
- **Members of the Council of Ministers of the Union as well as the States are holding high constitutional office and are oath bound to do right to all without ill will towards anyone.**

Freshwater quest, the likely new gold hunt



One would never imagine that huge volumes of freshwater exist under the saline ocean. In the 1960s, says a media report, the U.S. Geological Survey drilled boreholes off the New Jersey coast and unexpectedly struck freshwater. Similarly, with time, a team of scientists from Vietnam and even in other countries have discovered underwater sources of fresh water. For example, a river under the sea was discovered at the bottom of the Black Sea. This river appears to be over a 100 feet deep and has a flow rate of about four miles per hour; about 22,000 cubic meters of water passes through this particular channel. It would count among one of the largest rivers in the world when compared to land-based rivers, say media links. This makes one thing certain: there is scientific evidence of rivers under the sea.

Statistics show that the total volume of water on earth is estimated at 1.386 billion km³, where 97.5% is salt water and 2.5% freshwater. Out of this freshwater, only 0.3% is in liquid form on the surface, which means that the rest of the freshwater is underground, including on or under the ocean bed.

Considering that freshwater is a depleting resource, countries will begin exploring for and exploiting freshwater from above or under their ocean bed, within their maritime zones. Eventually, countries will expand exploration beyond their Exclusive Economic Zone (EEZ), into what is commonly known as the “Area”, which is covered under Part XI of the United Nations Law of the Sea Convention, 1982 (UNCLOS). The “Area” under UNCLOS is defined as the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction and is referred to as the common heritage of mankind. This means that it is available for everyone’s use and benefit, keeping in mind the



Archana Reddy

is Advocate, LL.M
International
Shipping Law-IMO-
International
Maritime Law
Institute (IMLI), Malta

India can take the lead in shaping non-controversial legislative text that addresses the gaps in the laws of the sea, especially in exploratory activities that concern freshwater extraction

future generations.

The law of the sea

Although UNCLOS arrays most of the internationally accepted law on the subject, customary international law continues to remain an important source of the law of the sea. While UNCLOS is known as a single comprehensive text covering the constitution and the governance of the oceans, it is interesting to know that the Convention on the Territorial Sea and the Contiguous Zone, the Convention on the High Seas, the Convention on Fishing and Conservation of the Living Resources of the High Seas and the Convention on the Continental Shelf (Geneva Conventions on the Law of the Sea, 1958) cover most of the issues as UNCLOS and these Geneva conventions are mostly platformed over customary international law.

To complicate matters further, Article 311 of UNCLOS states that this Convention shall prevail as between states parties, over the Geneva Conventions on the Law of the Sea, 1958. Hence, not only is UNCLOS not applicable to these non-signatory states but also these countries do not recognise the doctrine of Exclusive Economic Zone (200 nm) or the “Area” (beyond 200 nm). The least of the surprise is that the United States is a signatory to the Geneva Conventions 1958 and not UNCLOS.

Exploration and exploitation of the “Area” under UNCLOS is limited to the term “resources”, which is defined as all solid, liquid or gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules – and resources when recovered from the Area are referred to as “minerals”. If this be the case, does the definition of the term “minerals” cover “freshwater”? The International Seabed Authority (referred to as the Authority) is

empowered under UNCLOS to administer and control the activities in the Area. Consequently, exploration of all minerals from the Area is required to be in accordance with the rules, regulations and procedures laid down by the Authority. If state parties to UNCLOS are regulated by the Authority, who regulates state parties to the Geneva Conventions, especially in activities concerning mining and exploratory activities in the “Area”?

A zone of exploration

As evident from current events, the next wars are expected to be fought over water and expansion. Given that in the years to come freshwater will become a very scarce and an expensive commodity, the Area will qualify as a potential zone for freshwater exploration and extraction. Just as oil wells are explored and capped for future use, fresh water wells may be identified and capped for future use. In the lacuna of specific legislation and terminologies governing and controlling the advancement of resource beyond national jurisdiction (such as fresh water) integrated with multiple legislations governing the law of the sea, the “Area” will once again attract controversy.

Given that a large international community is diligently working towards Sustainable Development Goals and activities beyond national jurisdictions, arriving at an amicable non-controversial legislative text, addressing various lacunae in the laws of the sea, especially exploratory activities concerning freshwater from the Area, ought to be the next logical milestone. In this, India can take the lead role. This would be an area which would truly benefit mankind, rather than spending gallons of money, looking for water and proposing plans for human settlement on Mars and the moon.

Freshwater beyond EEZ

- **Statistics show that the total volume of water on earth is estimated at 1.386 billion km³ , where 97.5% is salt water and 2.5% freshwater.**
- **Out of this freshwater, only 0.3% is in liquid form on the surface, which means that the rest of the freshwater is underground, including on or under the ocean bed.**

- a river under the sea was discovered at the bottom of the Black Sea.
- This river appears to be over a 100 feet deep and has a flow rate of about four miles per hour; about 22,000 cubic meters of water passes through this particular channel.
- It would count among one of the largest rivers in the world when compared to land-based rivers,

- **Considering that freshwater is a depleting resource, countries will begin exploring for and exploiting freshwater from above or under their ocean bed, within their maritime zones.**
- **Eventually, countries will expand exploration beyond their Exclusive Economic Zone (EEZ), into what is commonly known as the “Area”, which is covered under Part XI of the United Nations Law of the Sea Convention, 1982 (UNCLOS).**
- **The “Area” under UNCLOS is defined as the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction and is referred to as the common heritage of mankind.**

UNCLOS



- **UNCLOS is known as a single comprehensive text covering the constitution and the governance of the oceans, it is interesting to know that the Convention on the Territorial Sea and the Contiguous Zone, the Convention on the High Seas, the Convention on Fishing and Conservation of the Living Resources of the High Seas and the Convention on the Continental Shelf (Geneva Conventions on the Law of the Sea, 1958) cover most of the issues as UNCLOS and these Geneva conventions are mostly platformed over customary international law.**
- **To complicate matters further, Article 311 of UNCLOS states that this Convention shall prevail as between states parties, over the Geneva Conventions on the Law of the Sea, 1958.**

- Hence, not only is UNCLOS not applicable to these non-signatory states but also these countries do not recognise the doctrine of Exclusive Economic Zone (200 nm) or the “Area” (beyond 200 nm).
- Exploration and exploitation of the “Area” under UNCLOS is limited to the term “resources”, which is defined as all solid, liquid or gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules — and resources when recovered from the Area are referred to as “minerals”.

Folds and faults

Free use of AlphaFold 3 must extend to scrutiny of its inner mechanisms

Proteins are long chains of amino-acid residues that fold into specific shapes. Properly folded proteins function normally whereas misfolded ones can lead to debilitating diseases. Since these chains are quite long, a given protein can actually fold into one of a very large number of shapes – yet it makes a beeline for a specific shape while avoiding all the others. How and why this happens constitute an important mystery in structural biology called the protein-folding problem. In 2018, five decades after it was mooted, a Google subsidiary named DeepMind developed a purpose-built AI tool to predict the shapes into which different proteins could fold, called AlphaFold. The upgraded AlphaFold 2 followed two years later. Many scientists and technologists acknowledge that these two deep-learning systems have transformed human awareness of protein structures, a feat the machines demonstrated in the biennial Critical Assessment of Protein Structure Prediction contest. Recently, DeepMind launched AlphaFold 3, which can reportedly predict the shapes with nearly 80% accuracy as well as model DNA, RNA, ligands, and modifications to them. As with the first two AlphaFolds, no. 3 is great for being able to elucidate the folded proteins' structures in seconds rather than the years humans have required with advanced microscopic techniques.

Not surprisingly, the excitement that followed the release of AlphaFold 3 has been unable to escape the hype and overblown expectations that dogged the launches of its predecessors. These machines can predict protein structures with relatively high accuracy but they cannot say why they are folded that way; this is still the task of human scientists. How the AlphaFolds will catalyse drug discovery is also unclear. Many drugs fail to make it to the market from the laboratory because medical researchers are unable to anticipate all the interactions between the drugs' various components and various parts of the body. The protein-folding problem is important to crack but it will not magically improve drugs' chances in human clinical trials. It is a step in that direction. Finally, the free use of AlphaFold 3 is limited while its inner mechanisms are unavailable for public exploration or scrutiny, so far. While the motivation to innovate of DeepMind is laudable, the cutting-edge value AlphaFold 3 presents to health care means the company should explore alternative revenue models in which the system is not trapped behind paywalls or exorbitant prices – a fate that has already befallen scientific papers and medicines born of publicly funded research. Recall that the AlphaFolds' training data itself includes protein structures first elucidated by such research.



Alphafold 3

- **proteins are long chains of amino-acid residues that fold into specific shapes.**
- **Properly folded proteins function normally whereas misfolded ones can lead to debilitating diseases.**
- **Since these chains are quite long, a given protein can actually fold into one of a very large number of shapes — yet it makes a beeline for a specific shape while avoiding all the others.**

- **Google subsidiary named DeepMind developed a purpose-built AI tool to predict the shapes into which different proteins could fold, called AlphaFold.**
- **Many scientists and technologists acknowledge that these two deeplearning systems have transformed human awareness of protein structures, a feat the machines demonstrated in the biennial Critical Assessment of Protein Structure Prediction contest. Recently, DeepMind launched AlphaFold 3, which can reportedly predict the shapes with nearly 80% accuracy as well as model DNA, RNA, ligands, and modifications to them.**

- **As with the first two Alpha Folds, no. 3 is great for being able to elucidate the folded proteins' structures in seconds rather than the years humans have required with advanced microscopic techniques.**
- **machines can predict protein structures with relatively high accuracy but they cannot say why they are folded that way; this is still the task of human scientists. How the AlphaFolds will catalyse drug discovery is also unclear.**

India backs Palestine's bid for full UN membership

The UNGA adopted a resolution with 143 votes in favour and nine against while 25 countries abstained; it does not give Palestinians full membership, but recognises them as qualified to join

Press Trust of India
UNITED NATIONS

India on Friday voted in favour of a draft UN General Assembly resolution that said Palestine is qualified and should be admitted as full member of the United Nations and recommended that the Security Council "reconsider" the matter "favourably".

The 193-member General Assembly met in the morning for an emergency special session where the Arab Group resolution 'Admission of new Members to the United Nations', in support of the State of Palestine's full membership in the UN, was presented by the UAE, as Chair of the Arab Group in May.

The resolution got 143 votes in favour, including by India, nine against and 25 abstentions. The UNGA hall broke into an applause after the vote was cast.

The resolution deter-



Key milestone: Palestinian Ambassador to the UN Riyad Mansour speaks at the UN General Assembly, in New York on Friday. AFP

mined that "the State of Palestine is qualified for membership in the United Nations" in accordance with Article 4 of the Charter of the UN and "should therefore be admitted to membership in the United Nations". It recommended that the Security Council "reconsider the matter favourably, in the light of this determination".

India was the first non-Arab State to recognise the Palestine Liberation Or-

ganisation as the sole and legitimate representative of the Palestinian people in 1974. India was also one of the first countries to recognise the State of Palestine in 1988 and in 1996, Delhi opened its Representative Office to the Palestine Authority in Gaza, which was later shifted to Ramallah in 2003.

Rights and privileges

An annex to the resolution said the additional rights

and privileges of participation of the State of Palestine will be effective as of the 79th session of the General Assembly that begins in September this year.

These include the right to be seated among member states in alphabetical order; the right to make statements on behalf of a group, including among representatives of major groups; the right of members of the delegation of the State of Palestine to be elected as officers in the plenary and the Main Committees of the General Assembly and the right to full and effective participation in UN conferences and international conferences and meetings convened under the auspices of the General Assembly.

Palestine, in its capacity as an observer state, does not have the right to vote in the General Assembly or to put forward its candidature to UN organs.

Palestine as UN Membership

- India voted in favour of a draft UN General Assembly resolution that said Palestine is qualified and should be admitted as full member of the United Nations and recommended that the Security Council “reconsider” the matter “favourably”.
- The 193-member General Assembly met in the morning for an emergency special session where the Arab Group resolution ‘Admission of new Members to the United Nations’, in support of the State of Palestine full membership in the UN, was presented by the UAE

- **The resolution determined that “the State of Palestine is qualified for membership in the United Nations” in accordance with Article 4 of the Charter of the UN and “should therefore be admitted to membership in the United Nations”.**
- **It recommended that the Security Council “reconsider the matter favourably, in the light of this determination”.**
- **India was the first non Arab State to recognise the Palestine Liberation Organisation as the sole and legitimate representative of the Palestinian people in 1974..**

- **India was also one of the first countries to recognise the State of Palestine in 1988 and in 1996, Delhi opened its Representative Office to the Palestine Authority in Gaza, which was later shifted to Ramallah in 2003.**

Benefits of UN MEMBERS

the right to be seated among member states in alphabetical order; the right to make statements on behalf of a group, including among representatives of major groups;

the right of members of the delegation of the State of Palestine to be elected as officers in the plenary and the Main Committees of the General Assembly and the right to full and effective participation in UN conferences and international conferences and meetings convened under the auspices of the General Assembly.

Palestine, in its capacity as an observer state, does not have the right to vote in the General Assembly or to put forward its candidature to UN organs.

How does a country become a Member of the United Nations?

- **Membership in the Organization, in accordance with the Charter of the United Nations, “is open to all peace-loving States that accept the obligations contained in the United Nations Charter and, in the judgment of the Organization, are able to carry out these obligations”.**
- **States are admitted to membership in the United Nations by a decision of the General Assembly upon the recommendation of the Security Council.**

The procedure is briefly as follows:

- **The State submits an application to the Secretary-General and a letter formally stating that it accepts the obligations under the Charter.**
- **The Security Council considers the application. Any recommendation for admission must receive the affirmative votes of 9 of the 15 members of the Council, provided that none of its five permanent members — China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America — have voted against the application.**
- **If the Council recommends admission, the recommendation is presented to the General Assembly for consideration. A two-thirds majority vote is necessary in the Assembly for admission of a new State.**
- **Membership becomes effective the date the resolution for admission is adopted.**

Topics

- **P. vranovensis**
- **Negativity bias**
- **Why flash flood in Afghanistan ?**
- **Hybrrid Annuity model**
- **India -EFTA**
- **What are the rules of contesting seats**
- **H5N1**
- **Magpies**
- **Can heavy snowfall and rain contribute to some earthquakes**
- **CAR -T and TIL Therapy**
- **Mains**



By saurabh Pandey



This worm develops food habits and its offspring 'inherit' them

Researchers from Princeton University have reported that after the *Caenorhabditis elegans* worms ate a disease-causing strain of bacteria, its progeny were born with the 'knowledge' to avoid making the same mistake for up to four generations

D.P. Kasbekar

Researchers fondly call the roundworm *Caenorhabditis elegans* "the worm" because of its widespread use in research to understand neuronal and molecular biology. It was the first multicellular organism to have its full genome sequenced and neural wiring mapped. *C. elegans* grows within 3-5 days from a fertilised egg to a millimetre-long adult, and it has informed profound insights into the human body, as well as biology more broadly.

On March 28, researchers from Princeton University in the U.S. reported that after *C. elegans* worms ate a disease-causing strain of bacteria, its children inherited the 'knowledge' to avoid making the same mistake – up to four generations. Their findings were published in the journal *PLoS Genetics*. Given the mechanism by which this transmission occurs, the study raises questions about whether humans could have the same ability.

Message in a bottle
Pseudomonas vranovensis is a disease-causing bacterium found in *C. elegans*'s natural environment.

The researchers found that *P. vranovensis* makes a small RNA molecule called sRNA. When the worms ingest this strain, they also take in the sRNA. The sRNA then altered the worm's feeding behaviour such that, from that point on, the worms 'know' to avoid feeding on this bacterium and save themselves from getting sick.

Remarkably, this learned avoidance behaviour was found to be transmitted to the trained worm's progeny, grand-progeny, great-grand progeny, and great-great-grand progeny. The ability decayed only from the fifth generation.

The same team of researchers had previously discovered this trans-generational ability in *C. elegans* worms against *P. aeruginosa* bacteria (which also cause disease in humans). In the new study, they were able to confirm *C. elegans* worms in the wild had the same ability.

Understanding RNA, large and small
A DNA molecule is like a big ladder. Its two side rails, or strands, are made of a long series of alternating units of phosphate and the sugar deoxyribose molecules. Each sugar unit is attached to one of four chemical bases: adenine (A), cytosine (C), guanine (G), and thymine (T). The As and Cs on one strand are

bonded with Ts and Gs on the other by hydrogen bonds. These bonds form the rungs that hold the strands together.

A single *P. vranovensis* bacterium has 67 million rungs in its DNA, coding for about 5,500 genes. A gene is a segment of a few thousand base-pairs of the DNA molecule. Every gene is instructions that tell a cell how to make a protein.

In contrast to DNA, the RNA molecule is like a half-ladder or a comb. Its spine is made up of alternating units of phosphate and the sugar ribose. Each ribose molecule is attached to one of four bases: A, C, G or uridine (U), which jut out from the strand like the comb's tines. A cell copies the sequence of As, Ts, Cs, and Gs in a gene in the DNA into the sequence of Us, As, Gs, and Cs in an RNA molecule. This RNA is called the messenger (mRNA). The length of this mRNA is comparable to that of the gene from which it is derived. The mRNA moves to structures called ribosomes, where the cell assembles the corresponding protein.

Diet control
But not all genes encode mRNAs and proteins. The end product of some genes, especially small genes that are only about a tenth as long (100-200 rungs), is sRNA. These sRNA bind to other proteins and RNAs, and either enhance or reduce the expression of other genes.

The Princeton University researchers showed that a *C. elegans* worm took up a



C. elegans grows within 3-5 days from a fertilised egg to a millimetre-long adult, and it has informed profound insights into the human body, as well as biology more broadly

124-tine sRNA from an ingested *P. vranovensis*. This sRNA reduced the expression of a gene in the worm called *maco-1*, which plays an important neurological role. As it happens, *maco-1* is also found in humans.

In the laboratory, the researchers reared *C. elegans* worms on a diet of *Escherichia coli* bacteria. When the researchers engineered the *E. coli* to express the *P. vranovensis* sRNA and fed them to the worms, the worms learned to avoid the pathogenic strains of *P. vranovensis*. When these worms had children, the latter also had the ability to avoid pathogenic *P. vranovensis*.

Good 'memory loss'

Another *Pseudomonas* bacterium, *P. mendocina*, is also present in the worm's habitat but it doesn't cause disease. Instead, *P. mendocina* is a source of nutrition. *C. elegans* worms trained to avoid the pathogenic *P. vranovensis* strain avoided feeding on the non-pathogenic *P.*

mendocina as well. The researchers have speculated that this is perhaps why the 'loss of memory' happens around the fifth generation – so they can re-remember the advantage of consuming *P. mendocina*.

The sRNA that triggered learned avoidance behaviour came initially from the bacteria and was taken up by the worm that fed on them. Thereafter, the sRNA was maintained in the worms' bodies, transmitted to their descendants, and maintained in them. This happened through a mechanism called RNA interference – which scientists first discovered by studying *C. elegans* worms.

Food for thought

In fact, discoveries based on studying *C. elegans* were recognised by Nobel Prizes in 2002, 2006, and 2008. This tiny worm has played an outsized role in the advancement of scientific and medical research.

For example, a gene that triggers a process during *C. elegans*'s development has been found in the human genome, and mutations in it have been associated with limb deformities.

So a question arises: whether our bodies can also take up sRNA molecules from the microbes in our gut, mouth or vagina, and whether they can modify our behaviour, and possibly the behaviour of our children and later generations. (D.P. Kasbekar is a retired scientist.)



Caenorhabditis elegans was the first multicellular organism to have its full genome sequenced and neural wiring mapped. TTLWIKIMEDIA COMMONS (CC BY-SA 4.0)

THE GIST

P. vranovensis makes a small RNA molecule called sRNA. When the worms ingest this strain, they also take in the sRNA. The sRNA then alters the worm's feeding behaviour such that, from that point on, the worms 'know' to avoid feeding on this bacterium

The *C. elegans* worms' trans-generational ability also worked against the *P. aeruginosa* bacteria – which cause disease in humans

Scientists would like to discover whether our bodies can also take up sRNA molecules from the microbes in our gut or mouth and whether they can modify our behaviour, and possibly the behaviour of our children and later generations

P. vranovensis

- **P. vranovensis makes a small RNA molecule called sRNA. When the worms ingest this strain, they also take in the sRNA.**
- **The sRNA then alters the worm's feeding behaviour such that, from that point on, the worms 'know' to avoid feeding on this bacterium**
- **The C. elegans worms' trans-generational ability also worked against the P. aeruginosa bacteria — which cause disease in humans**
- **Scientists would like to discover whether our bodies can also take up sRNA molecules from the microbes in our gut or mouth and whether they can modify our behaviour, and possibly the behaviour of our children and later generations**

What is sRNA ??

Bacterial small RNAs (sRNAs) are an emerging class of regulatory RNAs of about 40–500 nucleotides in length and, by binding to their target mRNAs or proteins, get involved in many biological processes such as sensing environmental changes and regulating gene expression.

WHAT IS IT?

Negativity bias: Why bad news sticks

Arkatapa Basu

Negativity bias is a psychological tendency ingrained in humans. It is characterised by a heightened sensitivity to negative stimuli over positive ones. Thanks to this bias, we notice negative events more readily as well as dwell extensively on them. It manifests in various aspects of life, from our ability to retain memories to social interactions.

This bias is also why a negative first impression can be challenging to overcome while past traumas tend to have enduring effects. Psychologist Rick Hanson has attributed this bias to millions of years of evolution — during which our ancestors faced constant threats in their environments. In these hostile conditions, their bodies and minds placed a premium on being able to spot and respond to threats.

The resulting evolutionary strategy ensured the survival of our species as well as selected for those individuals who were better able to sidestep or survive threats than others. These members then passed on their genes to modern humans, reinforcing the need for the bias in subsequent generations.

Today, the negativity bias affects how we perceive and remember events, interactions, and



Thanks to negativity bias, we notice negative events more readily as well as dwell extensively on them. GETTY IMAGES/ISTOCKPHOTO

feedback. It explains why criticism sticks much more than praise and why negative news items often garner more attention than optimistic, affirmative stories.

Understanding negativity bias offers insight into human behaviour and cognition, and highlights the interplay between evolutionary heritage and modern psychological phenomena.

For feedback and suggestions
for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'

Negativity bias

- **Negativity bias is a psychological tendency ingrained in humans.**
- **It is characterised by a heightened sensitivity to negative stimuli over positive ones.**
- **Thanks to this bias, we notice negative events more readily as well as dwell extensively on them.**
- **It manifests in various aspects of life, from our ability to retain memories to social interactions.**



Afghans gather near a flooded area between Samangan and Mazar-i-Sharif, following a flash flood triggered by heavy rainfall in the Samangan province, on Friday. At least 62 people, mainly women and children, were killed on May 10 in flash floods that ripped through Afghanistan's Baghlan province, in the north of the country, a local official said. On Saturday, the official death toll stood at 153. AFP

Why Flash Floods in Afghanistan ??

- **Flash floods are floods that rise and fall rapidly with little or no advance warning .**
- **They are usually caused by intense rainfall, or a sudden outburst of a landslide dam or glacial lake, the rapid melting of snow, or by failure of artificial hydraulic structures. In this chapter, we concentrate on the first three causes.**
- **Flash floods are common in mountainous regions. Afghanistan is prone to flash floods because of its steep slopes in headwaters .**
- **Flash floods occur mainly as a result of heavy rainfall combined with rapid snowmelt, mostly during the spring months.**

- **Besides water, flash floods carry considerable amounts of debris. Amu River, for example, has an elevation difference of 2700 m between Pamir and Kham Ab and carries about 250 million cubic metres of sediment from flash floods every year.**
- **The river erodes large areas of land in Afghanistan.**
- **In general, Hairatan district in the north, and Harirood and Farahrood rivers (Hilmand basin) in the western part, are flash flood-prone.**
- **Lack of vegetation and denudation of the mountain areas are the major causes of flash floods. In recent years, flash floods have been occurring more frequently and with increasing ferocity in countries like Afghanistan.**

More than 300 killed in Afghanistan floods

Flash floods have killed more than 300 people in Afghanistan's northern Baghlan province. Many others remain missing. Authorities have declared a state of emergency and rushed to rescue the injured.



NH construction slows as funds go scarce, hybrid annuity model falters

From 34 km per day in FY24, the pace of national highway construction is expected to slow to 31 km per day; influx of mid-level developers with moderate credit profiles, especially after March 2020, blamed; projects under hybrid annuity model haven't taken off as anticipated

NEWS ANALYSIS

Rishi Ranjan Kala

From 34 km per day in FY24, the pace of national highway construction is expected to slow to 31 km per day. Credit rating agency CareEdge Ratings expects the execution pace to decline by 7-10% year-on-year – from 12,350 km in FY24 to about 11,500 km in FY25.

Among other factors, the blame is being laid on the influx of mid-level developers with moderate credit profiles, especially after March 2020. The drastically expanded pool of bidders led to lower bids, but heightened the execution risks, including funding hurdles and other delays, analysts say. To make matters worse, projects under the hybrid annuity model (HAM) – a public-private partnership (PPP) model that combines engineering, operation, procurement, and construction (EPC) and build, operate, transfer (BOT) models – haven't taken off as anticipated.

Maulesh Desai, Director, CareEdge Ratings, says other key challenges facing the roads sector include land acquisition hurdles and delays in the 'appointed date' – namely the handover of the contract letter to the successful bidder, enabling commencement



Hitting a roadblock: The RBI's recent draft guidelines on project financing have left embattled construction firms anxious about the implications for under-construction infra projects. PTI

of work. Of the ₹1.5-lakh-crore HAM projects awarded after March 2020, nearly one-third are delayed by 4-6 months beyond the three-month grace period.

Their aggregate 'bid project cost' (BPC) – the lowest lifecycle cost of the project, which includes construction, operation and maintenance – is ₹50,000 crore. The developers have applied for or received an extension for a similar or longer period, CareEdge says.

Notably, another significant chunk of HAM projects are awaiting an 'appointed date' for more than a year; their aggregate BPC is about ₹40,000 crore, as of April 1, 2024, compared with ₹14,500 crore, as of June 30, 2023,



CareEdge Ratings expects the execution pace to decline by 7-10% year-on-year – from 12,350 km in FY24 to about 11,500 km in FY25

the rating agency says. HAM projects for 2,200-plus km of national highways remain non-starters even a year after they were awarded.

Daleep Thusu, Senior Vice President of infrastructure consultancy Rudrabhishek Enterprises, says while HAM was seen effective until March 2020, it had since fallen short, likely due to pandemic-related disruptions.

Regulatory clarity

InCoBAN, an infrastructure industry improvement ecosystem, observes that since March 2020 competition intensified in the roads sector with the inclusion of mid-sized sponsors of moderate credit standing, leading to execution risks, delays

and funding scarcity. "Moreover, unexpected events such as COVID-19, post-bidding commodity price hikes, prolonged monsoons, and stringent debt terms have exacerbated the delays," says InCoBAN co-founder Abhilasha Panwar. To remedy this, Ms. Panwar suggests stepping up project supervision, alongside exploring alternative funding sources such as multilateral organisations. "Simplifying approval processes, addressing regulatory hurdles, and nurturing collaboration among stakeholders can enable seamless implementation," she adds.

Echoing this, Mr. Thusu stresses the need for a concerted effort by government agencies, developers, financiers, and other stakeholders to expedite HAM projects. "It calls for removing regulatory bottlenecks, enhancing preparedness, collaboration, embracing technology and innovation, skills development, and a conducive policy environment," he says.

Ms. Panwar points out that clarity in regulatory guidelines not only fosters private sector participation but also encourages engagement in HAM initiatives.

Project finance worries

The Reserve Bank of India's recent draft guidelines on project financing have added another layer

of worry for embattled construction companies, which are anxious about the implications for under-construction infrastructure projects.

Rajashree Murkute, a senior director at CareEdge Ratings, says the draft guidelines hold out challenges for both under-construction and operational infrastructure projects. "A mandatory tail-period accounting for 15% of a project's economic life will restrict the ability of infrastructure projects to secure additional top-up loans. CareEdge Ratings estimates that this will necessitate an 8-10% increase in equity requirements for HAM-based road projects to align the loan tenure with 85% of the economic life for concessions lasting 15 years," she explains.

Defining a specific credit event and implementing a resolution plan in a time-bound manner call for increased monitoring and timely reviews from all stakeholders, she adds.

Infrastructure projects, being capital-intensive, are sensitive to changes in interest rates. Consequently, a significant rise in provisioning requirements, from 0.4% to 5%, during the construction phase is likely to diminish the bidding appetite of developers in the medium term, she cautions.

(The writer is with The Hindu businessline)

What is Hybrid Annuity Model (in PPP)?

[tojo jose](#)

January 28, 2016



The government has decided to introduce Hybrid Annuity Model (HAM) to revive PPP (Public Private Partnership) in highway construction. At present, three different models –PPP Annuity, PPP Toll and EPC (Engineering, Procurement and Construction) were followed by the government while adopting private sector participation.

Launch of the new model is due to the many problems with the existing ones. Large number of stalled projects are blocking infrastructure projects and at the same time adding to NPAs of the banking system.

In this context, the government has introduced Hybrid Annuity Model (HAM) to rejuvenate PPP.

By features the HAM is a mix between the existing two models – BOT Annuity and EPC. Hence to understand the HAM, we should know the basic features of the existing PPP models.

1. The Build Operate and Transfer (BOT) Annuity Model

Under BOT annuity, a developer builds the highway, operates it for a specified duration and transfers it back to the government. The government starts payment to the developer after the launch of commercial operation of the project. Payment will be made on a six month basis.

2. BOT Toll Model

In this toll based BOT model, a road developer constructs the road and he is allowed to recover his investment through toll collection. This toll collection will be over a period of nearly 30 years in most cases. There is no government payment to the developer as he earns his money invested from tolls.

3. Engineering, Procurement and Construction (EPC) Model

Under this model, the cost is completely borne by the government. Government invites bids for engineering knowledge from the private players. Procurement of raw material and construction costs are met by the government. The private sector's participation is minimum and is limited to the provision of engineering expertise. A difficulty of the model is that financial is the high financial burden for the government

What's Hybrid Annuity Model?

- **The government funds** 40% of the project cost (construction support) in instalments, which are linked to physical progress
- **A private player**, who is selected through a bidding process, will have

to bear 60% of the cost through a combination of debt and equity



- **Revenue source:** The state government will be in charge of toll collection

Investment lessons from the India-EFTA trade deal



India's free trade agreement (FTA) negotiations with countries such as the United Kingdom and the European Union (EU) seem to be on ice due to the ongoing parliamentary elections in India. However, before election fever gripped the country, India managed to clinch a historic trade deal, in March, with the European Free Trade Association (EFTA), comprising Iceland, Liechtenstein, Norway and Switzerland. The newly minted Trade and Economic Partnership Agreement (which we refer to as FTA) between India and EFTA is expected to give a much-needed leg-up to the low levels of extant trade between the two sides. The FTA between India and EFTA is also important because, as economist Biswajit Dhar has argued, India has agreed to include issues such as environment and labour, which it has traditionally opposed incorporating in trade agreements.

On investment

Another reason sets this FTA apart from those India signed recently with countries such as Australia, the United Arab Emirates (UAE), and Mauritius. The India-EFTA FTA includes a somewhat detailed investment chapter, which is missing in the other recent Indian FTAs. This chapter focuses on investment facilitation issues, not investment protection. But it has a remarkable and unprecedented characteristic. India has managed to extract a promise from the EFTA countries that they shall "aim to" increase foreign direct investment (FDI) to India to \$50 billion within 10 years of the FTA coming into force, followed by another \$50 billion in the succeeding five years. Likewise, Article 7.1(3)(b) of the investment chapter provides that the EFTA states shall "aim to" facilitate the generation of one million jobs in India. In legal terms, these articles codify what is known as an obligation of conduct – an obligation to make an honest endeavour towards achieving a goal,



Prabhush Ranjan

is a Humboldt Fellow,
Max Planck Institute,
Heidelberg, and
Professor, Jindal
Global Law School

India needs a clear free trade agreement policy, especially in dealing with international trade and foreign investment laws

notwithstanding the outcome or the result. This differs from an obligation of result, which would require achieving a specified outcome. In other words, the EFTA countries are legally obligated to make an honest effort to invest \$100 billion and generate one million jobs in India. They are not required to realise these outcomes. Nonetheless, the Indian negotiators need to be complimented for incorporating such path-breaking specified obligations of conduct in the investment chapter, which are typically not found in FTAs or investment treaties. Notably, this creates a template worth emulating in the ongoing negotiations with the U.K., the EU, and other countries.

Trade and investment

Economic theory has long demonstrated the inextricable linkage between trade and investment. This is truer in a world where the production process is scattered along global supply/value chains, a function of trade and investment. Thus, unsurprisingly, FTAs routinely contain binding rules on both trade and investment. India's FTAs signed in the first decade of this century with countries such as Japan, Korea, Malaysia and Singapore are based on this economic logic. In addition to binding trade rules, they all contain an investment chapter with provisions for protecting investment. However, India departed from this model as part of its FTA 2.0 approach. In other words, India decoupled international trade law from international investment law. This is evident in its FTAs with Australia, Mauritius, and the UAE which contain binding trade but not investment rules. India's approach seems to be to have separate agreements on trade and investment with the same country. This is most markedly seen in the case of the UAE. After signing the FTA with the UAE in 2022, New Delhi and Abu Dhabi entered into a bilateral investment treaty earlier this year. India follows a similar decoupling

approach to the U.K., where trade and investment agreements are seemingly negotiated as two disparate treaties.

In this context, the India-EFTA FTA, which contains an investment chapter within the trade agreement, assumes pivotal significance. Can it be said that India has decided to move away from the decoupling of trade and investment law in its FTAs and is going back to the template followed in the early 2000s? It is too early to say that the India-EFTA FTA will be a bellwether for future FTAs.

FTA 3.0

India needs a clear FTA policy, especially in dealing with international trade and foreign investment laws. Suppose India expects not just trade but also higher investment flows from a particular country, which is undoubtedly true with most of its FTA-negotiating partners. In that case, two critical elements must be incorporated into its FTA policy. First, India should negotiate trade and investment as part of one comprehensive economic treaty. Decoupling trade from investment is not a good idea. Combining the two would give India a clear negotiating leverage to strike a beneficial deal. For example, India can argue that it needs more concessions in trade in return for offering something on investment or vice-versa. Second, India should consider expanding the scope of investment issues from mere facilitation to effective protection, with an efficacious dispute settlement mechanism under international law. Providing enforceable legal protection to foreign investors under international law will boost their confidence. This is critical at a time when foreign direct investment levels in India have dropped. A clear and comprehensive FTA policy is imperative for launching India to a higher economic growth trajectory.

India -EFTA

- India-European Free Trade Association signed a Trade and Economic Partnership Agreement (TEPA) today i.e. on 10th March 2024.
- India has been working on a Trade and Economic Partnership Agreement (TEPA) with EFTA countries comprising Switzerland, Iceland, Norway & Liechtenstein. The Union Cabinet chaired by the Hon'ble Prime Minister has approved signing of the TEPA with EFTA States. EFTA is an inter-governmental organization set up in 1960 for the promotion of free trade and economic integration for the benefit of its four Member State

India and EFTA



- **EFTA is an important regional group, with several growing opportunities for enhancing international trade in goods and services.**
- **EFTA is one important economic block out of the three (other two - EU & UK) in Europe. Among EFTA countries, Switzerland is the largest trading partner of India followed by Norway.**
- **The highlights of the agreement are:**
 - **EFTA has committed to promote investments with the aim to increase the stock of foreign direct investments by USD 100 billion in India in the next 15 years, and to facilitate the generation of 1 million direct employment in India, through such investments. The investments do not cover foreign portfolio investment.**
 - **For the first ever time in the history of FTAs, a legal commitment is being made about promoting target-oriented investment and creation of jobs.**
 - **EFTA is offering 92.2% of its tariff lines which covers 99.6% of India's exports. The EFTA's market access offer covers 100% of non-agri products and tariff concession on Processed Agricultural Products (PAP).**

●

- **India is offering 82.7% of its tariff lines which covers 95.3% of EFTA exports of which more than 80% import is Gold.**
- **The effective duty on Gold remains untouched.**
- **Sensitivity related to PLI in sectors such as pharma, medical devices & processed food etc. have been taken while extending offers. Sectors such as dairy, soya, coal and sensitive agricultural products are kept in exclusion list.**
- **India has offered 105 sub-sectors to the EFTA and secured commitments in 128 sub-sectors from Switzerland, 114 from Norway, 107 from Liechtenstein, and 110 from Iceland.**
- **TEPA would stimulate our services exports in sectors of our key strength / interest such as IT services, business services, personal, cultural, sporting and recreational services, other education services, audio-visual services etc.**
-

- **Services offers from EFTA include better access through digital delivery of Services (Mode 1), commercial presence (Mode 3) and improved commitments and certainty for entry and temporary stay of key personnel (Mode 4).**
- **TEPA has provisions for Mutual Recognition Agreements in Professional Services like nursing, chartered accountants, architects etc.**
- **Commitments related to Intellectual Property Rights in TEPA are at TRIPS level.**

the rules on contesting seats?

How many seats can a candidate contest? When were the guidelines amended?

Irfan Chakraborty

The story so far: 7th Congress leader Rajul Gandhi announced that he would contest from Rae Bareilly in Uttar Pradesh, questions were raised on why he took the decision after the Kerala election was over – he is a contestant from Wagon too. According to the representation of the People's Act (RPA, 1950), a candidate is permitted to contest an election from up to two constituencies, but he or she can hold only one seat at a time if elected from both.

Is there a cap? A sub-section, 33(2), of the RPA, allowing a candidate to contest from two seats, was introduced through an amendment in 1996, prior to which there was no bar on the number of constituencies from which a candidate could contest. However, Section 33(2) of the same Act stipulates that a candidate can hold only one seat at a time, regardless of whether he or she has been elected from more than one seat. Thus, if a candidate wins from two seats, a by-election is necessary from the seat he or she vacates.

Former Chief Election Commissioner S. Golwasekar said the opposition to a candidate contesting from many seats was basically due to the fact that many by-elections had to be conducted after polls were over. Since then, the Election Commission of India and the Law Commission have both

proposed that the RPA Act should be further amended to allow one person to contest from only one seat, given that a candidate cannot hold two seats at the same time. Mr. Golwasekar said this was proving to be difficult as "no politician would like to reduce it to one from two, and laws are made by parliamentarians."

Moreover, a person has to be a voter in a particular State to contest Assembly polls from there. But to contest in a Lok Sabha election, a person can be registered as a voter in any constituency of the country. If a person is a registered voter in any constituency, he or she can contest from any seat in India, except Assam, Lakshadweep and Sikkim.

What is the minimum age to contest?

The minimum age for a person to contest Lok Sabha and Assembly polls is 25 years, while one can become a member of the Rajya Sabha or the State Legislative Council only at 30 years. There is no minimum educational qualification needed to contest general elections in India. Candidates must be citizens of India, registered in some constituency of the country as a valid voter and must not have been convicted of any offence punishable by more than two years.

How can a candidate be disqualified?

A person shall be disqualified from being chosen as or being a member of either House if he holds any office of profit under the Government of India or the Government of any State; if he or she is of unsound mind and stands so declared by a competent court; if he or she is an undischarged insolvent; if he or she is not a citizen of India or has voluntarily acquired the citizenship of a foreign state.

Under the RPA Act, if a person is convicted of any offence and sentenced to an imprisonment of two years or more, this will lead to his disqualification to contest elections. Even if this person is out on bail, after the conviction and his appeal is pending for disposal, he or she is disqualified from contesting an election. For some categories of serious offences, one may incur disqualification for any conviction, regardless of the quantum of punishment.

Over the years, what are some of the changes undertaken by the EC regarding candidacies?

The EC has amended the rules for political party funding during elections. The new regulations include decreasing the cash donation limit from ₹2,000 to ₹2,000. The Electoral Bond Scheme, notified in January, 2018, allowing anonymous contributions to bank use of cash, was scrapped by the Supreme Court in 2024. For the 2024 polls, the EC has banned cash transportation in bank vehicles after sunset. The Commission is also monitoring non-scheduled chartered flights for cash, liquor, and drug movement. ARI founder member Jagdeep Chakkar says there have been many interventions, but the desired effect has not come about as parties have found a way to circumvent it.

Mr. Golwasekar points out that no law has been brought in with regard to misuse of candidates. "That falls under criminal law which are enacted by politicians themselves," he says. But he also adds that the presence of central paramilitary forces has been able to put a stop to practices like booth-capturing – a point strongly rebutted by Prof. Chakkar who says the "use of para-military forces is a shame to a democracy."

What are the rules on contesting seats?

- A sub-section, 33 (7), of the RPA, allowing a candidate to contest from two seats, was introduced through an amendment in 1996, prior to which there was no bar on the number of constituencies from which a candidate could contest.
- However, Section 70 of the same Act stipulates that a candidate can hold only one seat at a time, regardless of whether he or she has been elected from more than one seat.
- Thus, if a candidate wins from two seats, a byelection is necessary from the seat he or she vacates.
- Former Chief Election Commissioner N. Gopalaswami said the opposition to a candidate contesting from many seats was basically due to the fact that many byelections had to be conducted after polls were over.

- **Since then, the Election Commission of India and the Law Commission have both proposed that the RPA Act should be further amended to allow one person to contest from only one seat, given that a candidate cannot hold two seats at the same time.**
- **Mr. Gopalaswami said this was proving to be difficult as “no politician would like to reduce it to one from two, and laws are made by parliamentarians.**

- **Moreover, a person has to be a voter in a particular State to contest Assembly polls from there.**
- **But to contest in a Lok Sabha election, a person can be registered as a voter in any constituency of the country.**
- **If a person is a registered voter in any constituency, he or she can contest from any seat in India, except Assam, Lakshadweep and Sikkim.**

Over the years, what are some of the changes undertaken by the ECI regarding candidates?

- **The ECI has amended the rules for political party funding during elections.**
- **The new regulations include decreasing the cash donation limit from ₹20,000 to ₹2,000.**
- **The Electoral Bond Scheme, notified in January, 2018, allowing anonymous contributions to limit use of cash, was scrapped by the Supreme Court in 2024. For the 2024 polls, the ECI has banned cash transportation in bank vehicles after sunset.**
- **The Commission is also monitoring non-scheduled chartered flights for cash, liquor, and drug movement**

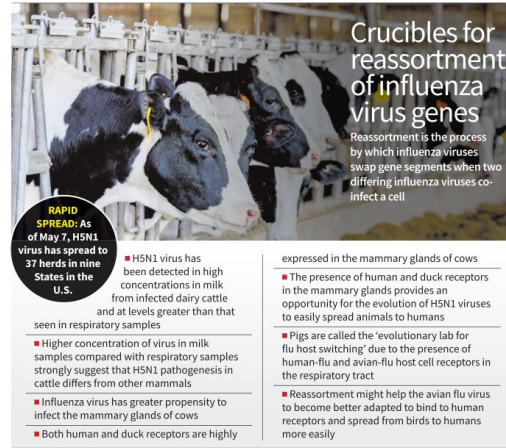
Will cattle be the next lab for flu host-switching?

The co-expression of both human and avian receptors in the mammary glands of cows indicate susceptibility to viruses of both swine/human and avian origin

R. Prasad

Cattle have so far not been associated with being infected on large-scale, and as a result, cattle have not been well studied as domestic hosts for influenza A virus species. In contrast to the notion that cattle are considered to be almost resistant to infection with influenza A virus, H5N1 virus, which was first detected in dairy cattle in Texas in late March, has rapidly spread to 37 herds in nine States in the U.S. as of May 7.

On April 24, the U.S. FDA said that in a nationally representative commercial milk sampling study of pasteurised milk, about one in five of the retail samples tested positive for bird flu viral fragments. A greater proportion of positive results were in milk from areas with infected herds. An NIH-funded study had found an absence of infectious virus in milk samples. The April 23 report of the FAO noted that the H5N1 virus was detected in "high concentrations in milk from infected dairy cattle and at levels greater than that seen in respiratory samples". That the concentration was less in the respiratory samples of the infected cows compared with the milk samples strongly suggests that the pathogenesis of the H5N1 virus in cattle differs from other mammals, says a study posted as a preprint; preprints are yet to be peer-reviewed.



One reason for dairy cattle milk containing high concentrations of H5N1 virus fragments could be the propensity of the virus to infect the mammary glands of cows as a previous study had found. On evaluating the expression of H5N1 receptors in the mammary gland, respiratory tract and cerebrum of cattle, the authors found both the human and the duck receptors to be highly expressed in the mammary glands. In the mammary gland, the human receptors and the duck receptors were found to be widely distributed in the alveoli but not in the ducts. Chicken-type influenza receptors were common in the cow respiratory

tract. The high concentration of H5N1 virus fragments in milk from H5N1-infected cows could be due to local viral replication in the mammary glands of cows as H5N1 has a high affinity for the receptor, the authors say.

The study found that the chicken receptor was expressed on the surface of the respiratory epithelium in the upper respiratory tract and upper part of the lower respiratory tract, while human and duck receptors were either lacking or very limited in expression. However, in the lung alveolar cells, the researchers found all the receptors of humans, chickens and ducks being abundantly expressed.

The abundance of human and duck receptors in the mammary glands and the large presence of human, chicken and duck receptors in the lung alveolar cells of cows provides a perfect environment for the evolution of H5N1 viruses that can easily spread from animals to humans. The reason why pigs are called the "evolutionary lab for flu host switching" is precisely due to the presence of both the human-flu and avian-flu host cell receptors in their upper-respiratory tract, says Dr. Sam Scarpino from Northeastern University in a tweet. The latest study has found that cow mammary glands contain the same kind of mixed flu re-

ceptors seen in pigs.

"One of the key changes required for avian flu to transmit effectively in humans involves flu's hemagglutinin (HA) host cell receptor preference," Dr. Scarpino said in another tweet. "Currently the cell surface receptor that influenza uses in birds is subtly different from the one in the human upper-respiratory tract". But when pigs get infected with human and avian influenza viruses at the same time, the viruses can potentially undergo reassortment, wherein small segments of their genomes get swapped. The swapping might sometimes help the avian flu viruses to become better adapted to bind to human receptors and hence spread from birds to humans more easily. The H1N1 pandemic of 2009 was due to the reassortment of the virus in pig populations.

"The co-expression of both human and avian receptors in the mammary glands indicate susceptibility to viruses of both swine/human and avian origin. The co-expression of both receptors can make bovines to behave like a mixing vessel for new influenza A virus with increased zoonotic potential, the authors write.

With the mammary glands of cows harbouring receptors for both human-flu and avian-flu, "dairy cattle may have similar potential as pigs to serve as evolutionary intermediaries between avian and human flu".

Crucibles for reassortment of influenza virus genes

Reassortment is the process by which influenza viruses swap gene segments when two differing influenza viruses co-infect a cell

RAPID SPREAD: As of May 7, H5N1 virus has spread to 37 herds in nine States in the U.S.

- H5N1 virus has been detected in high concentrations in milk from infected dairy cattle and at levels greater than that seen in respiratory samples
- Higher concentration of virus in milk samples compared with respiratory samples strongly suggest that H5N1 pathogenesis in cattle differs from other mammals
- Influenza virus has greater propensity to infect the mammary glands of cows
- Both human and duck receptors are highly

expressed in the mammary glands of cows

- The presence of human and duck receptors in the mammary glands provides an opportunity for the evolution of H5N1 viruses to easily spread animals to humans
- Pigs are called the 'evolutionary lab for flu host switching' due to the presence of human-flu and avian-flu host cell receptors in the respiratory tract
- Reassortment might help the avian flu virus to become better adapted to bind to human receptors and spread from birds to humans more easily

The magpies of the Himalayas



**SPEAKING OF
SCIENCE**

D. Balasubramanian

Magpies belong to the Corvidae family of birds that includes crows, jays and ravens. Birds of this family are generally considered to be noisy, inquisitive birds that in folklore from around the world have often been associated with omens, good or bad. In some European cultures, they accompany witches. An English rhyme, "One for sorrow, two for joy; three for a girl, four for a boy; Five for silver, six for gold; Seven for a secret never to be told," suggests that spotting a lone magpie brings bad news. But no one will deny that the magpies are striking in appear-

ance, or that some of the most flamboyant species are found in the Himalayas.

From Kashmir to Myanmar, a few closely related blue magpie species are a common sight. The gold-billed magpie, *Urocissa flavostris*, also called the yellow-billed blue magpie, has mischief in its eyes and occupies the high altitude zone between 2000 and 3000 meters above sea level. At slightly lower heights we find the red-billed magpie, and the blue magpie is found at lower altitudes where humans live in larger numbers.

Trekking corridors

Best sightings of the yellow and red-billed varieties are in the trekking corridor in Western Sikkim that leads from the town of Yuxsom, at 1,780 metres above sea level, to fabulous sights of



High above: Gold-billed magpies occupy the high altitude zone between 2,000 and 3,000 meters above sea level. GETTY IMAGES

the Kanchenjunga from near the Goche La pass at about 4,700 metres above sea level. The journey takes you from tropical moist broad-leaf forests at the lower altitudes through high sub-Alpine forests to a treeless Alpine landscape of juniper bushes. Somewhere in the middle are

forests whose canopies close in over you, and an astonishing diversity and density of birds.

Field studies by zoologists at the Sikkim Government College have documented that over 250 species of birds are found in this zone, and at around 2,500 metres above sea le-

vel, you can see or hear nearly 60 individual birds in a five-minute time interval. The yellow-billed blue magpie is very often a part of this chorus. The body of the bird is about the size of a pigeon, but with a 45-centimeter-long tail, adding up to an overall size of 66 cm. While foraging for worms on the ground, the tail is pointed upward; while picking berries in trees, the tail swoops downward. The flight is characteristic too: a few quick wing beats, followed by long gliding movements.

The yellow-billed blue magpie builds its nests at the forks of branches in rhododendron trees. The nest itself appears to be a hurried job of twigs, with a soft lining of grass in which three-six eggs are laid in May or June. Both parents take part in raising the

young. As the nursery rhyme says, two for joy.

The blue magpie and the red-billed magpie are very similar in appearance too, though a little smaller. The blue magpie is less of a forest bird, and more often seen around villages. All the species can be spotted as solitary birds, in pairs, or noisy flocks of 8-10 birds.

As human presence in forests increases, there are worries about how well the birds can cope. The colorful flowers of rhododendrons attract tourists. To support tourists, villagers often resort to forest resources such as firewood. It is hoped that just like agriculture, tourism will also learn to be a sustainable trade.

(The article was written in collaboration with Sushil Chandani, who works in molecular modelling)

- **Magpies belong to the Corvidae family of birds that includes crows, jays and ravens.**
- **Birds of this family are generally considered to be noisy, inquisitive birds that in folklore from around the world have often been associated with omens, good or bad.**

- **The goldbilled magpie, *Urocissa* *avirostris*, also called the yellow-billed blue magpie, has mischief in its eyes and occupies the high altitude zone between 2000 and 3000 meters above sea level.**
- **At slightly lower heights we find the redbilled magpie, and the blue magpie is found at lower altitudes where humans live in larger numbers**

- **yellow and red-billed varieties are in the trekking corridor in Western Sikkim that leads from the town of Yuxsom, at 1,780 metres above sea level, to fabulous sights of the Kanchenjunga from near the Goche La pass at about 4,700 metres above sea level.**
- **The yellow-billed blue magpie builds its nests at the forks of branches in rhododendron trees.**

- **The blue magpie and the red-billed magpie are very similar in appearance too, though a little smaller.**
- **The blue magpie is less of a forest bird, and more often seen around villages.**



Question Corner

Strange trigger

Can heavy snowfall and rain contribute to some earthquakes?

A recent study has found that episodes of heavy snowfall and rain likely contributed to a swarm of earthquakes over the past several years in northern Japan. This is the first time that climate conditions have been found to initiate some quakes. The seismic activity in the region was surprisingly found to synchronise with certain changes in underground pressure, and those changes were influenced by seasonal patterns of snowfall and precipitation. Scientists suspect that this new connection between quakes and climate may

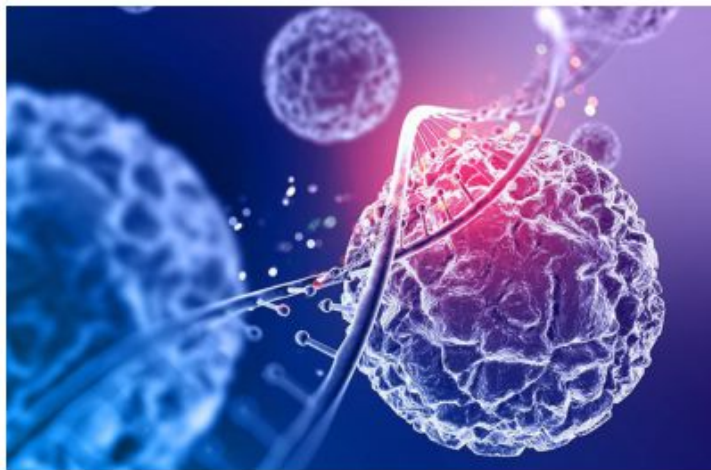
not be unique to Japan. Since late 2020, hundreds of small earthquakes – earthquake swarms – have shaken up Japan's Noto Peninsula, in 2020 changes in seismic velocity appeared to be synchronised with the seasons. When it rains or snows, that adds weight, which increases pore pressure, which allows seismic waves to travel through slower. When the seismic velocity observations and the model of excess pore pressure were overlapped, they fit extremely well.

Readers may send their questions / answers to
questioncorner@thehindu.co.in

Can heavy snowfall and rain contribute to some earthquakes?

- **A recent study has found that episodes of heavy snowfall and rain likely contributed to a swarm of earthquakes over the past several years in northern Japan.**
- **This is the first time that climate conditions have been found to initiate some quakes.**
- **The seismic activity in the region was surprisingly found to synchronise with certain changes in underground pressure, and those changes were influenced by seasonal patterns of snowfall and precipitation.**

- **Scientists suspect that this new connection between quakes and climate may not be unique to Japan.**
- **Since late 2020, hundreds of small earthquakes — earthquake swarms — have shaken up Japan's Noto Peninsula, in 2020 changes in seismic velocity appeared to be synchronised with the seasons.**
- **When it rains or snows, that adds weight, which increases pore pressure, which allows seismic waves to travel through slower.**
- **When the seismic velocity observations and the model of excess pore pressure were overlapped, they fit extremely well.**



Early clinical trial sheds light on regulatory T cell therapies

Results from a new clinical trial shed light on the performance of infusions of immune-calming regulatory T cells for children with type 1 diabetes. The trial shows that a single dose of the cells can transfer over efficiently in children but does not show signs of preserving insulin-releasing cells in the pancreas, highlighting the need for further research. Researchers have theorized that supporting regulatory T cell activity - or even infusing these cells - could treat autoimmune disorders.

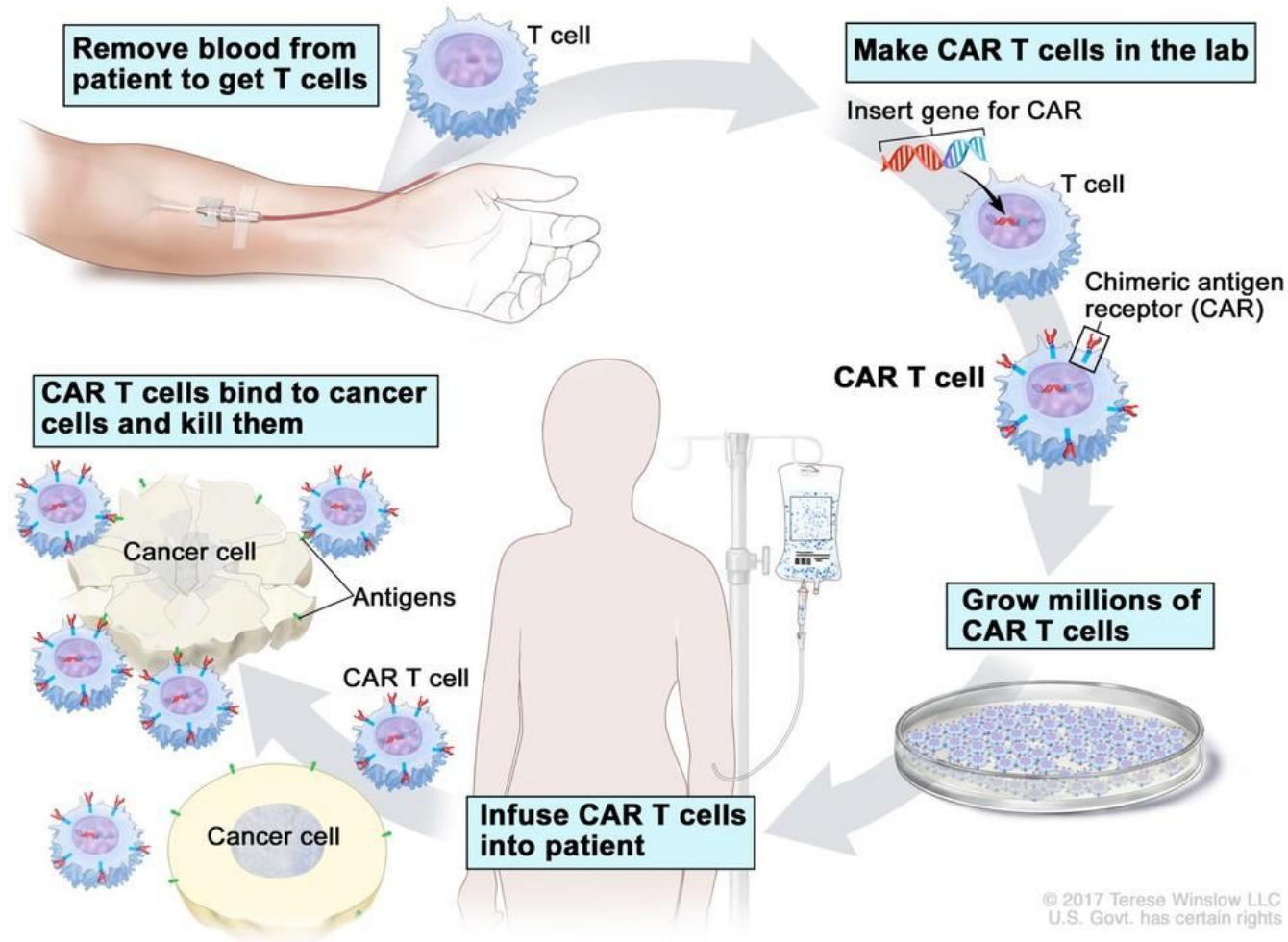
CAR T-cell therapy is a type of treatment in which a patient's T cells (a type of immune cell) are changed in the laboratory so they will bind to cancer cells and kill them.

TIL THERAPY

- **TIL therapy uses T cells called tumor-infiltrating lymphocytes that are found in your tumor. Doctors test these lymphocytes in the lab to find out which ones best recognize your tumor cells.**
- **Then, these selected lymphocytes are treated with substances that make them grow to large numbers quickly.**
- **The idea behind this approach is that the lymphocytes that are in or near the tumor have already shown the ability to recognize your tumor cells.**

- But there may not be enough of them to kill the tumor or to overcome the signals that the tumor is releasing to suppress the immune system.
- Giving you large numbers of the lymphocytes that react best with the tumor can help to overcome these barriers.

CAR T-cell Therapy



Topics

- Semal tree
- 55 Cancr i e or Janssen
- Smart cities
- Goldilock economy
- Mount IBU
- Santa Ana
- **Great Mosque of Djenne**
- **Mains**



By saurabh Pandey



Rajasthan due to Udaipur's Holi

Large quantities of semal are cut in south Rajasthan and sold in Udaipur. The price varies from ₹500 to ₹1,500 per tree, depending on size. The cutting violates the Rajasthan Forest Act 1953 and the Forest (Conservation) Act 1980. Once ubiquitous, the crimson semal flower is now a rare sight

G.M. Manavsi

In the eve of Holi in Udaipur, Subash Chowk, a prominent intersection surrounded by luxury hotels, is transformed. Bhajans and Bollywood songs blare from speakers and firecrackers fly into the sky. In the centre stands the *Holika Dahau*, a 50-foot-high tree sheathed in hay and set ablaze, sending tongues of flame leaping over a two-storey building. Locals and tourists alike throng the chowk to catch a glimpse. They circle the bonfire and celebrate a mythological victory of good over evil. This is one of Udaipur's main attractions for Holi.

Central to the Holika Dahau festivities is the silk cotton tree (*Bombax ceiba* L.), known locally as semal. Traditionally, the debarked stem or branch of a semal tree is used as the bonfire's main pillar.

"It is astonishing to see the ecologically important semal tree in Udaipur's tallest Holika Dahau. Its roots, fruits, seeds, stem, stem bark, and gum are all medicinally valuable," Vartika Jain, an assistant professor at the Government Meera Girls' College, Udaipur, wrote recently on the 'Semal Conservation Mission' Facebook group.

In 2009, Dr. Jain co-authored a paper reporting that around 1,500-2,000 trees or branches of semal were cut, debarked, and ignited during Holi in the Udaipur district in that year.

Dr. Jain's work suggests the situation is no better in 2024. Large quantities of semal are cut in southern Rajasthan, in places like Bhil and Garasia, and sold in Udaipur.

The cutting violates a panoply of laws, from the Rajasthan Forest Act 1953 to the Forest (Conservation) Act 1980. The price varies from ₹500 to ₹1,500 per tree, depending on its size. Once ubiquitous in the region, the crimson semal flower is now a rare sight.

Holding the forest together

Apart from the flowers, the silk cotton tree is characterised by its spiled trunk and fluffy seed pods, and is native to India. "It has multiple purposes and is useful to wild animals, insects, and even to tribal communities," Satish Sharma, the ex-assistant conservator of forests, Udaipur, and an expert on Rajasthan's biodiversity, said over phone.

According to Dr. Jain, semal is an integral species that holds the forest ecosystem together. The rock bears nestle in its branches because the tree's spikes keep its predator, the sloth bears, away. Members of tribal communities consume the tree's reddish root for food during the monsoons. Larvae of the moth *Bucculatrix crataegae* feed on its leaves. The golden-crowned sparrow weaves the lining of its nests with white cotton from its seeds.

The Dysdercus bugs, the Indian crested porcupine, Hanuman langurs, and some other species feast on the nectar in its flowers. It is, as Dr. Jain put it, a "one-tree wildlife sanctuary".

Members of the Garasia tribe in the area also believe they are descended from semal trees.

To them and others, it provides opportunities for agroforestry and resources like food, fodder, and fuel wood. Members of the Kathodi tribe use its wood to craft musical instruments



The flowers of a silk cotton tree in full bloom in New Delhi. FILE PHOTO

while those of the Bhil use it to make utensils.

'Both conservation and destruction'

The communities' relationship with the semal is more strained today, however. Many members of these communities 'prepare' these trees for Holi in Udaipur and other parts of the state.

"They don't make much money from selling semal, but because they don't have to grow, water, or protect it, the costs and effort are minimal, making semal sales beneficial for them," according to Mr. Sharma.

After 37 years with the forest department, he said he's seen both the "conservation and the destruction of semal".

In this way, the semal disappeared from the forests of south Rajasthan, which in turn prompted those selling the tree to mix individuals of *Alantus excelsa*, *Lantana camara*, and *Nyctanthes arbor-tristis* trees in their sales.

"The loss of a single species is detrimental to the whole environment," Dr. Jain said. She has been trying to protect the trees for more than 15 years. Mr. Sharma calls her the "Semal Lady of Rajasthan".

In 2008, Dr. Jain began the 'Semal Conservation Mission' under the Society for Microvita Research and Integrated Medicine. The mission is an amorphous group of doctors, businesspersons, forest officers, sociologists, and other researchers united in raising awareness of the importance of the semal tree through articles in journals, magazines, and newspapers; they also distribute pamphlets in schools and colleges. Members of the group have also planted



Central to the Holika Dahau festivities is the silk cotton tree (*Bombax ceiba* L.). Known locally as semal. Traditionally, the debarked stem or branch of a semal tree is used as the bonfire's main pillar

more than 500 semal trees in and around Udaipur and have pushed for Holi celebrations switching the semal with an iron pole draped in dried grass for the bonfire.

Supply and demand

To a local news publisher, the city of Udaipur boasted of having organised 500 Holika Dahau events in 2024 alone. But in rural areas, these events are communal and thus rarer. Many villages come together to light a single Holika Dahau. Ganda Pal, famous for lighting the Holika Dahau in daylight, hosts visitors from 10 villages. "The rural and tribal communities make sparing use of semal," Mr. Sharma said. "It is the urbanites who need to understand. There will be supply if there is demand from urban areas."

So, he added, the key to this aspect of protecting Rajasthan's semal lies with the state's cities.

This is why he said he stresses the importance of raising awareness in Udaipur rather than among the tribal communities, whose members are responding to demand.

Tribal communities rely on small plots of agricultural land, some livestock, and manual labour for their income. They also gather and sell minor forest products like

bamboo, *Pongamia pinnata* seeds, and mahua (*Madhuca longifolia*) flowers. They also wish to take advantage of the abundance of semal in south Rajasthan and the high demand from Udaipur. None of the experts with whom this reporter spoke suggested state failure is a factor.

No study since 2009

Curbing demand hasn't been easy. Many Holika Dahau events enjoy the patronage of businesspersons, shopkeepers, and local transport operators' association interested in boosting tourist footfall.

"There is disinterest in the administration. [In] our local municipal bodies, to legally and ecologically protect this species," Sunil Dubey, an environmentalist in Udaipur, said.

Despite years of damage, there is little documentation of the decline in the semal population. Since 2008, Dr. Jain's Semal Conservation Mission has been tracking the sale of semal in Udaipur, yet only a single study from 2009 has documented the species' decline in the region. Neither the Forest Department nor other researchers have made efforts to document the loss.

The Principal Chief Conservator of Forests and Rajasthan's Forest Department head Manish Kumar Garg didn't respond to a request for comment.

As a result, the tree is not recorded in the state's list of 'rare, threatened, and endangered' species. (Trees on this list enjoy priority conservation efforts.) Dr. Jain is concerned semal "will soon join the list" if its members continue to meet fiery deaths on Holi.

(G.M. Manavsi is a freelance science reporter and conducts outreach activities for the Cariosity Lab at IIT Gandhinagar.)

Semal Tree



- The tree is widely planted in southeastern Asian countries and regions (such as in Myanmar, Thailand, Vietnam, Malaysia, Philippines, Indonesia, southern China and Taiwan, etc.).
- According to Chinese historical record, the king of **Nam Yuet** (located in the southern China and northern Vietnam nowadays), **Zhao Tuo**, gave a tree to the emperor of the **Han dynasty** in the 2nd century BC.
- This tree is commonly known as *Let-pan semal* , *shimul* or *ximolu* in India.
- It is widely planted in parks and on roadsides there because of its beautiful red flowers which bloom in March/April.

- **This tree is quite common in New Delhi although it doesn't reach its full size of 60m there because of the semi arid climate.**
- **The cotton fibers of this tree can be seen floating in the wind around the time of early May.**
- **This tree shows two marked growth sprints in India: in spring and during the monsoon months.**
- **Perhaps due to subtropical climate and heavy rainfalls, it is found in dense populations throughout the Northeast India.**
- **In Myanmar, its flowers are let to be dry and cooked, which is one of the traditional foods of Myanmar**

- The white fluffy fibres are carded into thread and woven into textiles in Nepal and India. In North India, the fibers are also used in pillows.
- Bombax ceiba is literally known as "cotton-tree flowers" in **Cantonese**. It plays a vital role in **Southern Chinese**, especially Guangzhou Cantonese culture



An artist's concept shows the exoplanet 55 Cancri e, a rocky planet, along with the star it orbits in this updated illustration released by NASA. REUTERS

Finally, rocky planet with atmosphere found 41 light years away

Reuters

Astronomers have searched for years for rocky planets beyond our solar system with an atmosphere, a trait considered essential for any possibility of harbouring life. Well, they finally seem to have located one. But this hellish planet, apparently with a surface of molten rock, offers no hope for habitability.

Researchers said on Wednesday the planet is a "super-earth", a rocky world significantly larger than our planet but smaller than Neptune, and it orbits perilously close to a star dimmer and slightly less massive than our sun, rapidly completing an orbit every 18 hours or so.

Infrared observations using two instruments aboard the James Webb Space Telescope indicated the presence of a substantial, if inhospitable, atmosphere, perhaps continuously replenished by gases released from a vast ocean of magma.

"The atmosphere is likely rich in carbon dioxide or carbon monoxide, but can also have other gases such as water vapor and sulphur dioxide. The current observations cannot pinpoint the exact

All of the previous exoplanets found to have atmospheres were gaseous planets, not rocky ones. As Webb pushes the frontiers of exoplanet exploration, the discovery of a rocky one with an atmosphere represents progress

atmospheric composition," said planetary scientist Renyu Hu of NASA's Jet Propulsion Laboratory and Caltech, lead author of the study published in the journal *Nature*.

The Webb data also did not make clear the thickness of the atmosphere. Dr. Hu said it could be as thick as the earth's or even thicker than that of Venus, whose toxic atmosphere is the densest in our solar system.

The planet, called 55 Cancri e or Janssen, is about 8.8 times more massive than the earth, with a diameter about twice that of our planet. It orbits its star at one-25th the distance between our solar system's innermost planet Mercury and the sun. As a result, its surface

temperature is about 1,725 degrees C. The planet is probably tidally locked, meaning it perpetually has the same side facing its star, much like the moon does toward the earth. The planet is located in our Milky Way galaxy about 41 light-years from the earth, in the constellation Cancer. A light year is the distance light travels in a year, 9.5 trillion km. Four other planets, all gas giants, are known to orbit its host star.

That star is gravitationally bound to another star in a binary system. The other one is a red dwarf, the smallest kind of ordinary star. The distance between these companions is 1,000 times the distance between the earth and the sun, and light takes six days to get from one to the other.

All of the previous exoplanets found to have atmospheres were gaseous planets, not rocky ones. As Webb pushes the frontiers of exoplanet exploration, the discovery of a rocky one with an atmosphere represents progress.

55 Cancri e or Janssen

- the planet is a "super-earth", a rocky world significantly larger than our planet but smaller than Neptune, and it orbits perilously close to a star dimmer and slightly less massive than our sun, rapidly completing an orbit every 18 hours or so.
- The atmosphere is likely rich in carbon dioxide or carbon monoxide, but can also have other gases such as water vapor and sulphur dioxide. The current observations cannot pinpoint the exact atmospheric composition.

- The planet, called 55 Cancri e or Janssen, is about 8.8-times more massive than the earth, with a diameter about twice that of our planet.
- It orbits its star at one-25th the distance between our solar system's innermost planet Mercury and the sun.
- As a result, its surface temperature is about 1,725 degrees C.
- The planet is probably tidally locked, meaning it perpetually has the same side facing its star, much like the moon does toward the earth.
- The planet is located in our Milky Way galaxy about 41 light-years from the earth, in the constellation Cancer.

- **That star is gravitationally bound to another star in a binary system.**
- **The other one is a red dwarf, the smallest kind of ordinary star.**
- **The distance between these companions is 1,000 times the distance between the earth and the sun, and light takes six days to get from one to the other.**

An overview of the Smart Cities Mission

How are smart cities defined by the government? What are the two major aspects of the Smart Cities Mission? Why is the mission considered to be exclusionary to many? Did the SCM override the 74th Constitutional Amendment?

EXPLAINER

Tikender Panwar

The story so far:

The Smart Cities Mission (SCM), a flagship programme of the NDA-1 government, has taken a back seat in this year's list of poll promises and achievements.

What are smart cities?

The term 'Smart City' has been used widely ever since 2009, after the great financial crash. Smart cities were defined by urban practitioners as new Silicon Valleys built with a strong integration of a network of airports, highways, and other types of communications, a so-called intellectual city with advanced ICT.

The NDA-1 government wanted to adapt to these global changes, already happening through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). It went ahead with a major flagship programme and thus, the SCM was announced in June 2015. Hundred cities were selected for five years under the mission. However, the mission did not clearly define a smart city. It stated, "there is no universally accepted definition of a Smart City... The conceptualisation of Smart City... varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents. A Smart City would have a different connotation in India than, say, Europe. Even in India, there is no one way of defining a Smart City."

What was the SCM?

The SCM had two main aspects: area-based development consisting of three components – redevelopment (city renewal), retrofitting (city improvement), and green field projects (city extension); and pan-city solutions based on ICT. These further comprised some six categories that would include



Still in the dark: The Cochin Smart Mission Limited has installed LED lights on the Katrakadavu Bridge and on the Kaloorkadavanthra Road, in Kochi. H. VIBHU

e-governance, waste management, water management, energy management, urban mobility, and skill development. Around ₹2 lakh crore was kept aside for the mission, with public-private partnerships (PPP) an important driver of the same.

The mission that was to be completed in 2020, was given two extensions till June 2024. Additionally, to make the mission effective, a business model of governance was adopted bypassing the existing models of city governance in the country. An SPV (special purpose vehicle) led by a bureaucrat or a representative of an MNC, and other major stakeholders was created and registered under the Companies Act. The elected council, thus, had little role in the governance structure.

What is the status of the SCM?

The Urban Ministry's dashboard as of

diversity in existing urban realities. The scheme was divorced from the ground realities of urban India – the urbanisation here is dynamic and not static like the West.

The SCM became an exclusionary scheme wherein not more than 1% of a city's geographical area was selected for development. For example, Chandigarh which received ₹196 crore in the first tranche under the SCM spent it on smart water meters, a Wi-Fi zone, and solid waste management programmes all ploughed into one pocket-sector 43.

According to two major reports by McKinsey, to make Indian cities liveable, a capital expenditure of \$1.2 trillion is required by 2030. In this context, ₹1,67,875 crore is less than \$20 billion in nine years. This comes to around 0.027 % of the total requirement in urban India. Hence, there was little traction for this scheme.

Additionally, the SPV model designed for smart cities was not aligned with the 74th Constitutional Amendment, which led to many cities objecting to the governance structure. The design, according to critics, was too top-bottom. A hilly town that had an annual budget of less than ₹100 crore claimed projects worth more than ₹2,500 crore. This was incongruent to the demands of the residents of the town.

Urban India, according to the World Bank has more than 49% of the population living in slums. In the name of executing smart city projects, there was displacement of people living in poorer localities. Street vendors, for example, were displaced and urban commons were disrupted.

Another major consequence of the SCM has been enhanced urban flooding. Some of the towns which have historically never been flooded were made vulnerable because of infrastructure development projects that spoiled or dismantled the water channels and contours.

Tikender Singh Panwar is former Deputy Mayor, Shimla, and Member, Kerala Urban Commission.

THE GIST

Smart cities were defined by urban practitioners as new Silicon Valleys built with a strong integration of a network of airports, highways, and other types of communications, a so-called intellectual city with advanced ICT.

The Urban Ministry's dashboard as of April 26, exhibits that 8,033 projects sanctioned under the SCM have seen a fall in the total outlay from the expected ₹2 lakh crore to ₹1,67,875 crore, which is 16% less than the projected capital flow in 100 cities.

The SCM became an exclusionary scheme wherein not more than 1% of a city's geographical area was selected for development. The scheme was divorced from ground realities of urban India.



Smart cities

- **What are smart cities?**
- **The term ‘Smart City’ has been used widely ever since 2009, after the great financial crash.**
- **Smart cities were defined by urban practitioners as new Silicon Valleys built with a strong integration of a network of airports, highways, and other types of communications, a so-called intellectual city with advanced ICT.**



Smart
government



Mobility/
Wi-Fi



Smart/
digital citizens



Open
data



Smart health



Smart
farming/
agriculture



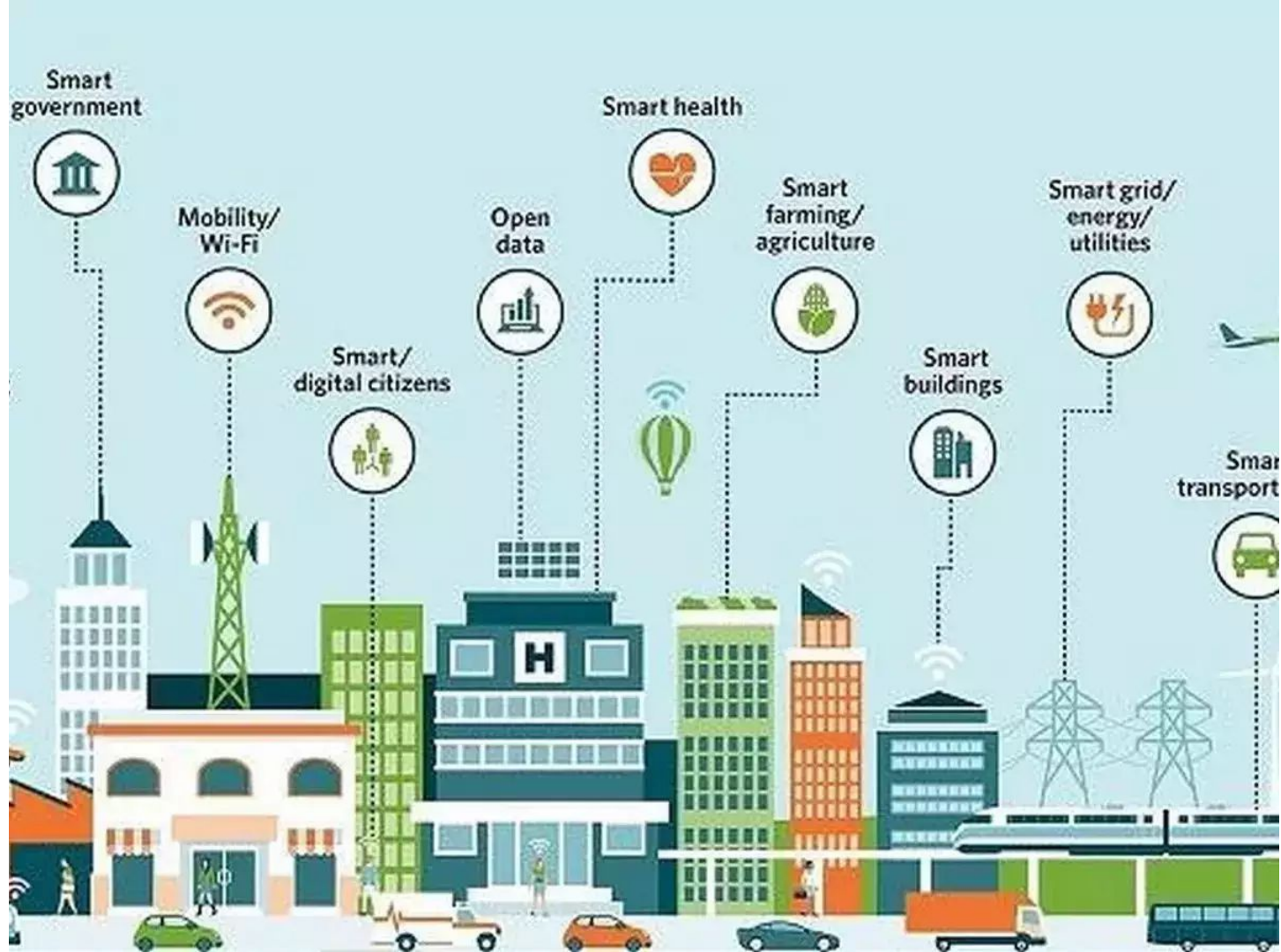
Smart grid/
energy/
utilities



Smart
buildings



Smart
transport



- **The SCM had two main aspects: area-based development consisting of three components — redevelopment (city renewal), retrofitting (city improvement), and green field projects (city extension); and pan-city solutions based on ICT.**
- **These further comprised some six categories that would include e-governance, waste management, water management, energy management, urban mobility, and skill development.**
- **Around ₹2 lakh crore was kept aside for the mission, with public-private partnerships (PPP) an important driver of the same.**

Where did the SCM falter?

The SCM became an exclusionary scheme wherein not more than 1% of a city's geographical area was selected for development.

the SPV model designed for smart cities was not aligned with the 74th Constitutional Amendment, which led to many cities objecting to the governance structure.

- **Urban India, according to the World Bank has more than 49% of the population living in slums.**
- **In the name of executing smart city projects, there was displacement of people living in poorer localities.**
- **Street vendors, for example, were displaced and urban commons were disrupted. Another major consequence of the SCM has been enhanced urban flooding**

European banks' Goldilocks rally tempts buyers... and bears

NEWS ANALYSIS

Reuters
LONDON

Investors are racing back into European bank stocks after a surprisingly upbeat earnings season, pushing their shares to multi-year highs, but the bounce has also lured short sellers betting that the optimism is unlikely to last.

The STOXX European banks index climbed past 200 on Friday, its highest level since August 2015, as confidence in the sector's earning power grows while the U.S. Federal Reserve and Bank of England hold back on widely-anticipated interest rate cuts.

But the number of investors making short bets

against some major banks is also rising, suggesting they are not convinced that the rebound will last.

The number of funds betting on a share price fall at British bank NatWest Group has almost doubled between Jan. 2 and May 3 from 16 to 31, according to data from Hazeltree, which provides software and other services to investment funds.

Deutsche Bank is among other European banks which have also caught the eye of speculators, Hazeltree said, while 21 investors are shorting Amsterdam-listed ING, up from seven funds at the start of the year.

While the percentage of shares shorted is not tracked, Hazeltree's data is indicative of investor posi-



Mixed message: Short bets against major banks are rising, suggesting the rebound won't last. REUTERS

tioning since around 700 asset manager funds contribute to it on an aggregated and anonymised basis, Hazeltree said.

Short sellers are investors who make money

from falls in the value of a stock. They borrow shares, sell them and re-buy the stock after the price has fallen, pocketing the difference.

The rise in both short

and long investor interest in the European banks reflects increasingly divergent views about the region's economy and the ability of consumers and companies to cope with

higher-for-longer borrowing costs, some analysts said.

Others analysts, including Benjie Creelan Sandford, equity analyst at Algebris Investments, said the banking sector's outperformance of the broader European market had sharpened focus around technical market indicators.

Creelan Sandford said higher measures of momentum reflected in the RSI (relative strength index) may have led some participants to tactically increase short positions.

The RSI can help investors to determine whether a particular security might be overbought or oversold.

"From here individual stock selection will have an increasingly important

role to play," he further said.

Back in favour

European bank chiefs confirmed they have seen a spike in investor interest this year, following a raft of better than expected earnings.

That included NatWest, which attracted the most short-selling interest by value according to the Hazeltree data, as the bank prepares for its escape from state ownership.

While that should be a long-term boon for the bank, the rise in short bets could reflect concerns a mooted retail share sale by the government may not attract much demand.

British banks also face bigger-picture worries about slowing consumer

credit demand and mortgage defaults which are set to rise in 2024 as higher costs hit borrowers' ability to repay, according to consulting firm EY.

The region's investment banks also did well in the first quarter with Deutsche Bank reporting much better than expected profit and Barclays showing progress in its strategy.

European banks' strong quarter also contrasted with a number of the big U.S. banks where costs rose ahead of revenue growth, said Nigel Moden, Banking and Capital Markets Leader at EY.

Investors have taken note, Mr. Moden said, and European banks' shares rose by an average 2% on results day relative to the European banks index.

Goldilock economy

Goldilocks economy refers to the perfect or the ideal state of an economy.

The economy will reflect the stability of growth, complete employment, and so on.

There is neither a high growth nor a slowdown.

The economy follows a steady growth to avoid any ups and downs. It neither has inflation combined with high growth nor a recession.

The goldilocks economy is characterised by the following features:

1. The rate of unemployment is low. The rate is measured by taking into account the count of people who are ready to work, able to work, and those who have asked or searched for work in the last four weeks.
2. The prices of assets, such as real estate, bonds, stocks and other assets increase.
3. The interest rates are low. The market rate of interest or the benchmark rate is low.
4. Inflation is low.
5. The GDP numbers grow steadily.

- **A Goldilocks economy generally requires the government to incrementally spend on infrastructure, roadways, and railways, and encourage public-private participation in the growth of various industries.**

JAKARTA

Indonesia's Mount Ibu erupts again, spews huge ash tower



AFP

▲ A volcano in eastern Indonesia erupted on Monday, spewing a huge ash tower more than 5 km into the sky after authorities raised its alert level to the second-highest last week. No damage or casualties were immediately reported. Ibu is one of Indonesia's most active volcanos, erupting more than 21,000 times last year. AFP

Mount Ibu

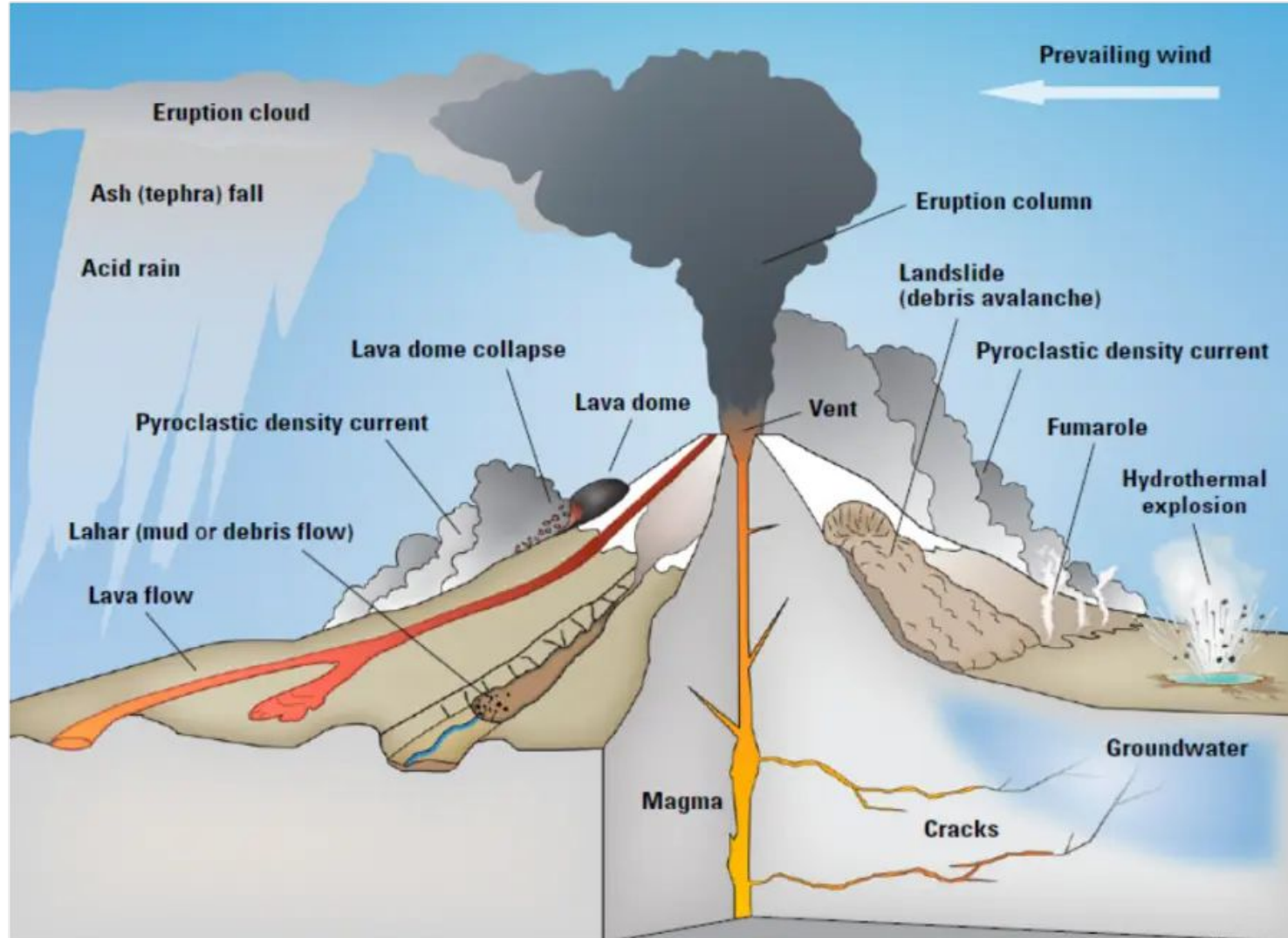
- Mount Ibu is a **stratovolcano** at the north-west coast of **Halmahera** island, **Indonesia**.
- The summit is truncated and contains nested **craters**.
- It is a stratovolcano located in the province of Maluku, East Indonesia.
- The stratovolcano is a tall, steep, and cone-shaped type of volcano.
- Unlike flat-shield volcanoes, they have higher peaks. At their peak, stratovolcanoes usually have a small crater. The crater may be filled with water or ice, or it may contain a volcanic dome during a period of relative inactivity.
- Stratovolcanoes comprise the largest percentage (~60%) of the Earth's volcanoes, and most are characterised by eruptions of andesite and dacite, lavas that are cooler and more viscous than basalt

-





Stratovolcano



Far-flung Philippine towns to host U.S. forces in move to deter China's threats

The U.S. and the Philippines have identified Santa Ana in northern Cagayan province as one of nine mostly rural areas where rotating batches of U.S. troops could encamp indefinitely and store weapons and equipment on local military bases under the Enhanced Defence Cooperation Agreement

Associated Press
SANTA ANA

The far-flung coastal town of Santa Ana in the northeastern tip of the Philippines has long been known by tourists mostly for its beaches, waterfalls, fireflies and a few casinos.

But that's changing after the laid-back town of about 35,000 people, which still has no traffic light, became strategically important to the United States.

The U.S. and the Philippines, which are longtime treaty allies, have identified Santa Ana in northern Cagayan province as one of nine mostly rural areas where rotating batches of American forces could encamp indefinitely and store their weapons and equipment on local military bases under the Enhanced Defence Cooperation Agreement (EDCA).

Thousands of U.S. forces withdrew from two huge Navy and Air Force bases in the Philippines in the early 1990s at the end of the Cold War, ending nearly a century of American military presence in the country. In recent years, Washington has been reinforcing an arc of military alliances in Asia to counter an increasingly assertive China, which it now regards as its greatest security challenge.

That dovetails with Philippine efforts to bolster its external defences after an



Defence ties: U.S. soldiers during joint military exercises with the Philippines in Santa Ana on May 6. AP

alarming spate of territorial hostilities with Beijing in the South China Sea that started last year. The high seas confrontations have injured several Filipino navy personnel, damaged their boats and strained diplomatic ties.

Geopolitical rivalry

The remote town of Santa Ana is caught in the geopolitical rivalry between Washington and Beijing because of its strategic location. It lies across a sea border from Taiwan, the self-governing island that China regards as a renegade province to be reclaimed by force if necessary. The U.S. has vowed to defend the territory.

Some villagers in Santa Ana have expressed apprehension over the prospect of living near U.S. forces.

Their Governor, Manuel Mamba, has vehemently opposed the looming U.S. military presence, saying it would turn Cagayan into a military target of China.

Others say the Philippines needs the Americans as a counterweight to China, which they say has been using its military might to threaten Manila's territorial interests in the South China Sea.

"There's no choice. If you compare the number of our forces with that of China, they have much, much more," Romeo Asuncion, a planning and economic development officer in Santa Ana, said. "If the Americans are here, they would protect us whatever happens."

Some villagers acknowledged that even without the U.S. forces, the town

would likely be affected in any major-power military showdown due to Santa Ana's relative proximity to Taiwan.

Authorities and village leaders recently met at the initiative of the local military to discuss contingency plans, including the possibility of setting up emergency shelters for refugees, in case tensions between China and Taiwan flare into an armed conflict, Marion Miranda, Santa Ana's disaster-mitigating officer, said.

In another rural Cagayan town southwest of Santa Ana called Lal-lo, part of the airport was designated as a possible encampment site for American forces. Unlike the two massive military bases that American forces used to occupy, including a Navy

base at Subic Bay that was about the size of Singapore and had a vibrant red-light district, the U.S. military is building a new presence in a much smaller area within Philippine camps.

'Important location'

During largescale combat drills called *Balikatan* – Tagalog for "shoulder-to-shoulder" – that ended on Friday, helicopters carrying allied forces, their weapons and other supplies landed and took off at the Lal-lo airport and the navy camp in Santa Ana.

"It's an important location. It's critical because it is an EDCA site so it's a very big deal to both the United States and to the Philippines," U.S. Marine Lt. Col. Matthew Schultz told presspersons at Lal-lo airport.

The EDCA accord, which was signed in 2014, had an initial term of 10 years and has been automatically extended with both sides in agreement, Ambassador to the U.S. Jose Manuel Romualdez said by telephone from Washington.

The agreement allows rotating batches of U.S. forces to stay rent-free at the military sites and store their defence equipment – except nuclear weapons – there. The U.S. has allocated more than \$82 million for the construction of ammunition and fuel storage, an urban combat training facility, aircraft parking,

runway repairs and warehouses for humanitarian response items in the first five EDCA sites.

Philippine President Ferdinand Marcos Jr. agreed last year to add four more EDCA sites where U.S. forces could stay, including the Philippine navy camp in Santa Ana and the Lal-lo airport.

Mr. Marcos and other Philippine officials say the renewed U.S. military presence would bolster external defence and help Filipinos respond more rapidly to natural disasters and is not directed at any country.

China, however, has expressed alarm over the increased U.S. troop deployments in the Philippines and elsewhere in Asia and said the EDCA sites in the northern Philippines could serve as surveillance outposts and staging grounds for U.S. forces to contain Beijing.

Such a display of combat readiness by the U.S. and the Philippines, according to Mr. Romualdez, aims at preventing a major conflict by making Chinese President Xi Jinping realise the cost of a wrong move.

"We are precisely doing all of these things as a deterrence," Mr. Romualdez said. "We're trying to tell Xi [Jinping], when you wake up in the morning, you will tell yourself, 'I'm not gonna do it.' Not today, not tomorrow and hopefully never."

The U.S. and the Philippines, which are longtime treaty allies, have identified Santa Ana in northern Cagayan province as one of nine mostly rural areas where rotating batches of American forces could encamp indefinitely and store their weapons and equipment on local military bases under the Enhanced Defence Cooperation Agreement (EDCA).



Lending a hand



Yearly ritual: Malians take part in the annual replastering of the Great Mosque of Djenné, the world's largest mud-brick building, on Sunday. The building threatened by climate change and regional conflicts has been on UNESCO's World Heritage in Danger list. AP

Great Mosque of Djenne

- **Maliens take part in the annual replastering of the Great Mosque of Djenne, the world's largest mud-brick building, on Sunday.**
- **The building threatened by climate change and regional conflicts has been on UNESCO's World Heritage in Danger list**

- The Great Mosque of Djenné is a large brick or adobe building in the Sudano-Sahelian architectural style.
- The mosque is located in the **city of Djenné, Mali**, on the flood plain of the Bani River.
- The first mosque on the site was built around the 13th century, but the current structure dates from 1907
- As well as being the centre of the community of Djenné, it is one of the most famous landmarks in Africa.
- Along with the "Old Towns of Djenné" it was designated a World Heritage Site by UNESCO in 1988.

he Nation'
Jnity and

using the

104. The 7th edition of the Indian Ocean
Conference was held at

(a) Dhaka

(b) New Delhi

(c) Malé

(d) Perth



Geotextiles

Geotextiles are woven, nonwoven or knitted textile materials consisting of synthetic and or natural polymers.

They are used in geotechnical and civil engineering applications, such as infrastructure works, roads, railways, coastal protection, landfills, erosion control...



Benefits

Geotextile products have been improving geotechnical designs for years, providing numerous advantages in comparison to traditional techniques:

- **A reduced environmental impact when using geotextiles.**
In use as a filter layer instead of traditional materials, greenhouse gas emissions are reduced by 90% and energy demand drops by > 80%.
See [Quality & Certification](#) for more information.

A reduced thickness of the design.

A geotextile fabric can act as a high performing filter layer, replacing up to 1m of filter material in e.g. erosion control systems.

New Chabahar pact 'not exempt' from Iran sanctions: U.S.

Suhasini Haidar

NEW DELHI

The new 10-year agreement between India and Iran to develop the Chabahar port carries the “potential risk” of sanctions, the U.S. State Department said on Tuesday, casting a cloud over whether the special exemption India had received from the U.S. in 2018 will still be applicable for the next phase of development and investments in the Iranian project.

In particular, India’s plans under the new agreement to invest approximately \$120 million in equipment for the port and a credit window of \$250 million are likely to be under the scanner if the U.S. decides against extending its sanctions carve-

out for India.

In response to specific questions about the long-term contract signed between India Ports Global Ltd. and Port and Maritime Organisation of Iran on Monday, in the presence of Shipping Minister Sarbananda Sonowal and his Iranian counterpart Mehrdad Bazrpash in Tehran, the State Department spokesperson said the U.S. had noted the agreement and said there was “no” specific exemption for it.

“We’re aware of these reports that Iran and India have signed a deal concerning the Chabahar port,” U.S. State Department spokesperson Vedant Patel said.

“As it relates to the United States, U.S. sanctions on Iran remain in place and we’ll continue to enforce



Officials during the signing of the deal between India Ports Global Ltd and Ports and Maritime organisation of Iran on Monday. PTI

them,” he said, adding that all entities considering business deals with Iran “need to be aware of the potential risk that they are opening themselves up to and the potential risk of sanctions”.

The statement by the U.S. that came hours after

the signing of the contract in Iran is significant as India has thus far managed operations at Chabahar’s Shahid Beheshti Terminal despite stringent sanctions on companies otherwise dealing with Iran.

In 2018, a carve-out made by the previous

Trump administration had been seen as a considerable success for India-U.S. diplomacy, and for India’s plans to support the then-democratic government in Afghanistan.

Carve-out clause

According to the U.S.’s carve-out clause, detailed in amendments to the Iran Freedom and Counter-Proliferation Act (IFCA) made in November 2018, the U.S. President could authorise exemptions to sanctions imposed against Iran in two cases: humanitarian aid for Iranian people, and assistance for Afghanistan.

Section 1244 of the IFCA (f) states that “The [US] President may provide for an exception from the imposition of sanctions under this section for reconstruction assistance or

economic development for Afghanistan” provided it is in the “national interest of the United States”.

A third exception, a six-month waiver on oil imports from Iran ran out in 2019, and India complied with the U.S. demand to “zero out” its purchases of Iranian oil.

The External Affairs Ministry declined to comment on the U.S.’s response. However, it is understood that officials are studying the comments with a view to whether they indicate any impact on the U.S. position on India’s future dealings on Chabahar.

With election under way in India, and due in the U.S. later this year, a clearer picture may not, however, appear for several months.

India and Iran agreement on Chabahar port

The new 10-year agreement between India and Iran to develop the Chabahar port carries the “potential risk” of sanctions, the U.S. State Department, casting a cloud over whether the special exemption India had received from the U.S. in 2018 will still be applicable for the next phase of development and investments in the Iranian project.

In particular, India’s plans under the new agreement to invest approximately \$120 million in equipment for the port and a credit window of \$250 million are likely to be under the scanner if the U.S. decides against extending its sanctions carveout for India.



AFGHANISTAN

KABUL

IRAN

PAKISTAN

NEPAL

INDIA

Myanmar

Bay of Bengal

Arabian Sea

CHABAHA
PORT

GWADAR

MUMBAI

72 KM

Distance
between the
Chabahar &

- **Chabahar Port is located in the Sistan-Balochistan province of Iran, on the southeastern coast of the country, near the border with Pakistan and Afghanistan.**

- **Alternate route to Afghanistan and Central Asia**
- **Access to the Arabian Sea**
- **Key component of India's connectivity plans in the region**
- **Leverage point for India to compete with China**

- **Iran and US tussle**
- **Delays in the completion of the projects**
- **Lack of proper road and rail connectivity**
- **Competition with other ports in the proximity**
- **Security concerns**

- **In response to specific questions about the long term contract signed between India Ports Global Ltd. and Port and Maritime Organisation of Iran.**
- **According to the U.S.'s carve-out clause, detailed in amendments to the Iran Freedom and Counter-Proliferation Act (IFCA) made in November 2018, the U.S. President could authorise exemptions to sanctions imposed against Iran in two cases: humanitarian aid for Iranian people, and assistance for Afghanistan.**

Section 1244 of the IFCA (f) states that “The [US] President may provide for an exception from the imposition of sanctions under this section for reconstruction assistance or economic development for Afghanistan” provided it is in the “national interest of the United States”.

A third exception, a sixmonth waiver on oil imports from Iran ran out in 2019, and India complied with the U.S. demand to “zero out” its purchases of Iranian oil

U.S. lawmakers to introduce legislation to formalise strategy for Indian Ocean Region



Sriram Lakshman

Members of the U.S. House of Representatives' Foreign Affairs Committee will introduce legislation on Tuesday requiring the U.S. administration to present a formal and "cohesive" Indian Ocean strategy across key departments.

The Indian Ocean Region Strategic Review Act, sponsored by Joaquin Castro (Democrat, Texas) and Darrell Issa (Republican, California), is based on a recommendation of the Bipartisan U.S.-China Economic and Security Review Commission, a body set up in 2000 to review and report on the U.S.-China relationship.

The Commission's November 2022 report had recommended that the U.S. administration submit an Indian Ocean Region



Joaquin Castro, member of the U.S. House of Representatives' Foreign Affairs Committee. REUTERS

(IOR) strategy that would include plans to develop U.S. economic interests in the region, defend freedom of navigation, support regional partners, and promote cooperation with Japan, Australia, India, the U.K., and France, among others.

Mr. Castro supported the Biden administration's Indo-Pacific strategy, his spokesperson told *The Hindu*, but felt it was too

heavily focused on the Pacific Ocean and wanted the State Department to increase its prioritisation of the Indian Ocean Region.

The proposed Act would require coordination across three key departments – State, Defence, and the U.S. International Agency for International Development (USAID) – in synthesising and executing a strategy for the IOR. The

strategy will require the U.S. to strengthen diplomatic ties in the region such as via its participation in regional organisations.

The U.S. Secretary of State will be required to, within 180 days of the Act becoming law, submit a "multi-year strategy and implementation plan" for U.S. "engagement and posture" in the region, according to the text seen by *The Hindu*.

The Act will require the U.S. to "build upon existing agreements with strategic partners like India to foster military communication and intelligence sharing", according to a spokesperson for Mr. Castro.

There is also a freedom of navigation clause in the legislation and a mandate to protect international shipping lanes. The text of the legislation says the re-

port to Congress must provide details of efforts to improve cooperation between Quad countries (the U.S., India, Australia, and Japan).

The legislation will also require the administration to work closely with island nations, India, Japan, Australia, and others to foster commercial exchanges and economic development.

The Bill mandates that the U.S. government enhance the capacity of regional governments and NGOs to respond to and mitigate environmental disasters.

"Congressman Castro is optimistic that the legislation could be included in future legislative packages focused on competition with China along with other bipartisan priorities," a spokesperson for Mr. Castro said.



The Indian Ocean Region Strategic Review Act.

Members of the U.S. House of Representatives' Foreign AFFairs Committee will introduce legislation requiring the U.S. administration to present a formal and “cohesive” Indian Ocean strategy across key departments.

The Indian Ocean Region Strategic Review Act.

- **is based on a recommendation of the Bipartisan U.S.-China Economic and Security Review Commission, a body set up in 2000 to review and report on the U.S.-China relationship.**
- **the U.S. administration submit an Indian Ocean Region (IOR) strategy that would include plans to develop U.S. economic interests in the region, defend freedom of navigation, support regional partners, and promote cooperation with Japan, Australia, India, the U.K., and France, among others**

- **The proposed Act would require coordination across three key departments — State, Defence, and the U.S International Agency for International Development (USAID) — in synthesising and executing a strategy for the IOR.**
- **The strategy will require the U.S. to strengthen diplomatic ties in the region such as via its participation in regional organisations.**
- **The Act will require the U.S. to “build upon existing agreements with strategic partners like India to foster military communication and intelligence sharing”,**

- **There is also a freedom of navigation clause in the legislation and a mandate to protect international shipping lanes.**
- **The legislation will also require the administration to work closely with island nations, India, Japan, Australia, and others to foster commercial exchanges and economic development**

More solar storms brewing after last week's aurorae as Sun 'wakes up'

Beautiful though the aurorae are, the events on the Sun that produce them can trigger blackouts on the earth, knock out satellites in space, endanger the lives of astronauts and affect space weather in the Solar System. Studying, understanding, and, in future, predicting them is thus a key goal of solar physics research

Karthik Vinod

On Friday night, people from across the world were treated to a rare spectacle: vivid aurorae hanging like curtains of light in the sky. They appeared even in places where aurorae aren't usually visible. For instance, people at the Indian Astronomical Observatory spotted an aurora over Hanle in Ladakh – far away from places near the poles, where they are a more common sight.

"I haven't seen anything like this in the last 20 years," says Dibyendu Nandi, a space physicist at the Indian Institute of Scientific Education and Research (IISER), Kolkata.

Beautiful though the aurorae are, the events on the Sun that produce them can trigger blackouts on the earth, knock out satellites in space, endanger the lives of astronauts, and affect space weather throughout the Solar System. Studying, understanding, and, in future, predicting them is thus a key goal of solar physics research.

Approaching the peak

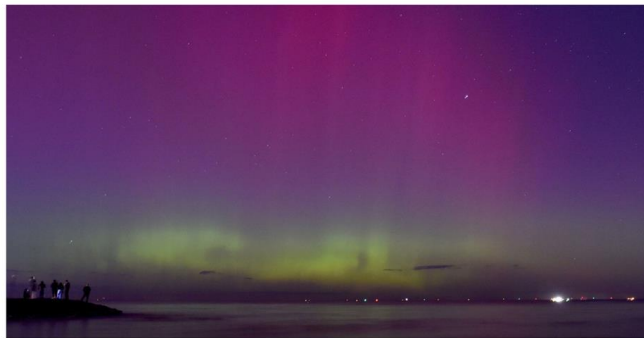
Aurorae like these are created when some violent events on the Sun's surface throw up a mass of charged particles into space. A geomagnetic storm happens on the earth when these particles become trapped in the planet's magnetic field and interact with atoms in the upper atmosphere. These interactions finally produce aurorae.

These storms are rare, occurring around once every few decades. The last time charged particles from the Sun blew into the earth with similar energy and intensity was in 2003. And both events happened as the Sun was nearing the peak of its solar cycle – an 11-year period during which the star's magnetic field flips.

The peak is when the flip actually happens, creating magnetically active patches on the star's surface called sunspots. These sunspots grow and shrink as solar cycles begin and end. The charged particles that struck the earth on May 10 are rooted in events at these sunspots. "This is definitely a sign that the Sun is 'waking up' and is becoming more active, especially compared to the last solar cycle," Jonathan Eastwood, a space physicist at Imperial College London, the U.K., said.

In the last solar cycle, which spanned the 2000s, no sunspot gave rise to a geomagnetic storm that matched the intensity of that on Friday.

Since early May, scientists have been monitoring the sunspot AR 3664. It was growing in size: by May 7, it was 16-times



People watch the aurora Australis at Port Phillip Bay in Melbourne, Australia on May 11. AFP

as wide as the earth and brimming with magnetic energy.

The supercharged magnetic fields in such sunspots sometimes disconnect and reconnect in fractions of a second, releasing a great burst of energy that sends plumes of charged particles called coronal mass ejections (CMEs) into space.

On May 10, three CMEs struck the earth. CMEs happen together with solar flares – powerful flashes of radiation – and all these active events are collected under the term 'solar storms'.

Surging currents

Magnetic fields deflect charged particles, but the earth's couldn't prevent many of the particles from slipping through to locations close to the planet's magnetic poles. Here, their interactions with oxygen atoms in the upper atmosphere produced vivid red light, and with oxygen, and nitrogen in the lower atmosphere producing green and purple light, respectively. Thus, the world had its aurora.

On May 10, a few space-weather forecasters – including the Center of Excellence in Space Sciences India (CESSI) at IISER Kolkata – warned of potential power disruptions.

The fluctuations in the earth's magnetic field during a geomagnetic storm can send currents surging through cables, like what happened in Sweden and South Africa in 2003.

"These storms can also affect satellites in orbit on which our communication and GPS navigation networks depend," Dr. Nandi, who also heads CESSI, said.



The Indian Astronomical Observatory spotted an aurora over Hanle in Ladakh – far away from places near the poles, where they are a more common sight

CESSI is the only Indian institute that provides timely updates on space weather.

Early warnings matter

This is not the worst geomagnetic storm to have ever struck the earth. In 1859, the Sun spouted a strong solar flare and triggered a super-geomagnetic storm on the earth, the most powerful in history. Telegraph wires either caught fire or were able to operate without a power supply (because they drew on the current surges produced by the storm).

Dr. Nandi said such storms – which CESSI would have categorised as 'extreme' – are likely to occur once every few centuries. The May 10 geomagnetic storm was 'severe' on CESSI's scale, and caused only minor power grid irregularities and GPS disruptions.

In high-latitude countries such as New Zealand, power grid operators switched off local circuits to prevent outages. According to Dr. Nandi, these are some ways by which early warnings from space-weather forecasters made a difference.

He also said the solar storm that struck the earth had weakened by May 12, but that it may be too early to say the storms are subsiding altogether. For example, CESSI flagged moderate storms on May 13 as a result of an earth-bound CME that erupted on May 11.

Waiting for Aditya

Space scientists have long wanted to anticipate a solar storm before it even begins brewing. Currently, the best they can do is catch a CME and/or flares as soon as they happen. Many spacecraft that monitor the Sun for these events are parked in the L1 point in space, about 1.5 million km in the earth-Sun direction, from where they have an uninterrupted view of the star. One of these spacecraft is Aditya-L1 of the Indian Space Research Organisation (ISRO), which reached L1 in March this year.

The principal investigator of its primary instrument, the Visible Emission Line Coronagraph (VELC), told *The Hindu* it is still being calibrated, so it hasn't chimed in on the events since May 10.

Of the other instruments: ISRO said on May 14 the ASPeX payload had "captured the enhancement of the alpha particle and proton flux of the solar wind" as signatures of the solar storm. It also said the SoLEXS and HELIOS payloads had detected "the multiple X- and M-class flares ... during the last few days". The Chandrayaan-2 orbiter around the moon also reportedly detected "signatures" of the emissions from the Sun. (Karthik Vinod is an intern with *The Hindu*.)

THE GIST

Solar storms are rare, occurring around once every few decades. The last time charged particles from the Sun blew into the earth with similar energy was in 2003. Both events happened as the Sun was nearing the peak of its solar cycle

Scientists monitoring a sunspot called AR 3664 observed it growing. By May 7, it was 16-times as wide as the earth and brimming with magnetic energy. On May 10, three coronal mass ejections struck the earth

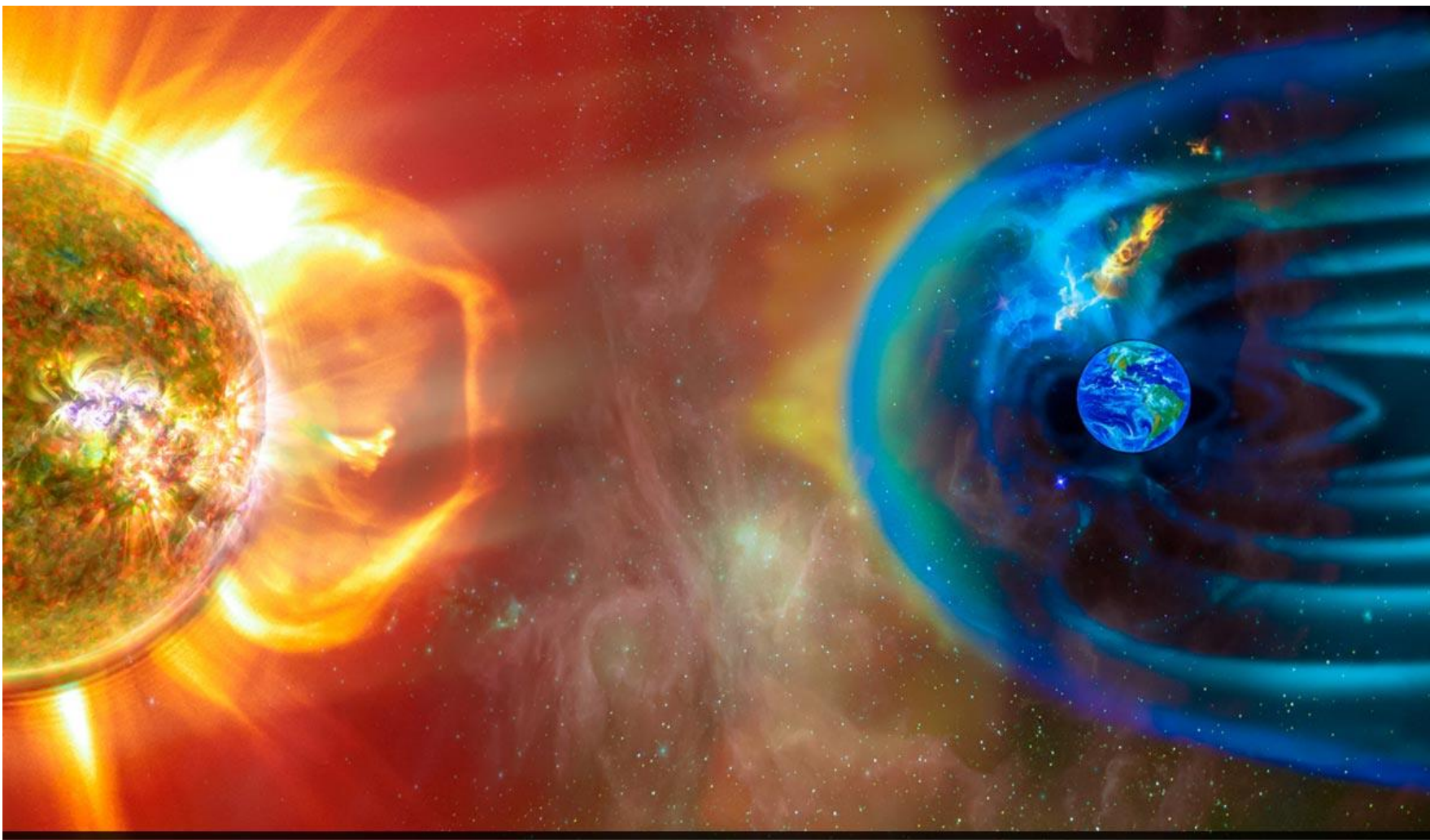
In 1859, the Sun spouted a strong solar flare and triggered a super-geomagnetic storm on the earth, the most powerful in history. Telegraph wires either caught fire or were able to operate without a power supply

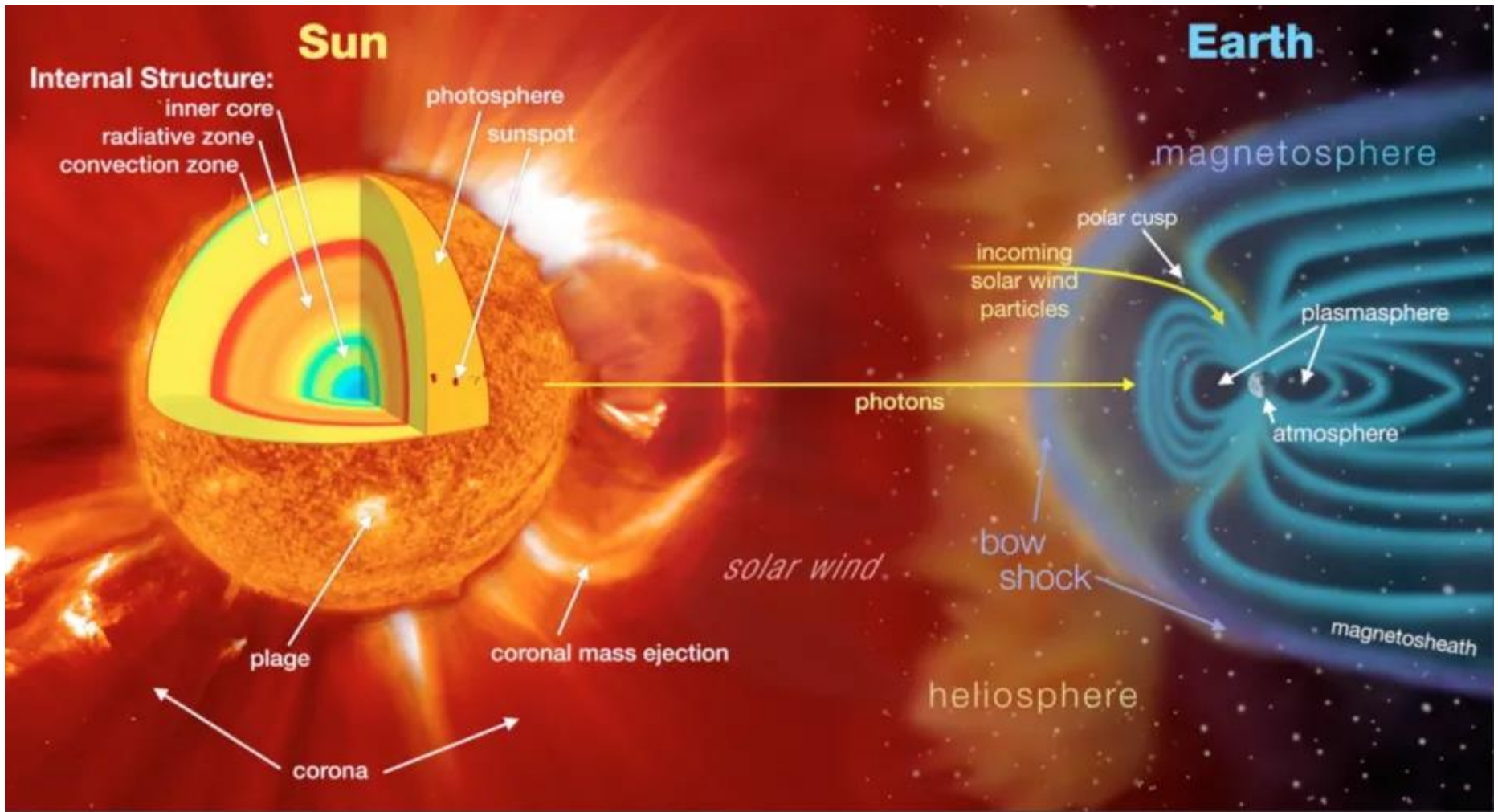


Solar storm



- **Solar storms are rare, occurring around once every few decades.**
- **The last time charged particles from the Sun blew into the earth with similar energy was in 2003. Both events happened as the Sun was nearing the peak of its solar cycle. Scientists monitoring a sunspot called AR 3664 observed it growing.**
- **By May 7, it was 16-times as wide as the earth and brimming with magnetic energy. On May 10, three coronal mass ejections struck the earth**
- **In 1859, the Sun spouted a strong solar flare and triggered a super-geomagnetic storm on the earth, the most powerful in history. Telegraph wires either caught fire or were able to operate without a power supply**





Sun

Earth

Internal Structure:

- inner core
- radiative zone
- convection zone

- photosphere
- sunspot

plage

coronal mass ejection

corona

photons

solar wind

bow shock

heliosphere

magnetosphere

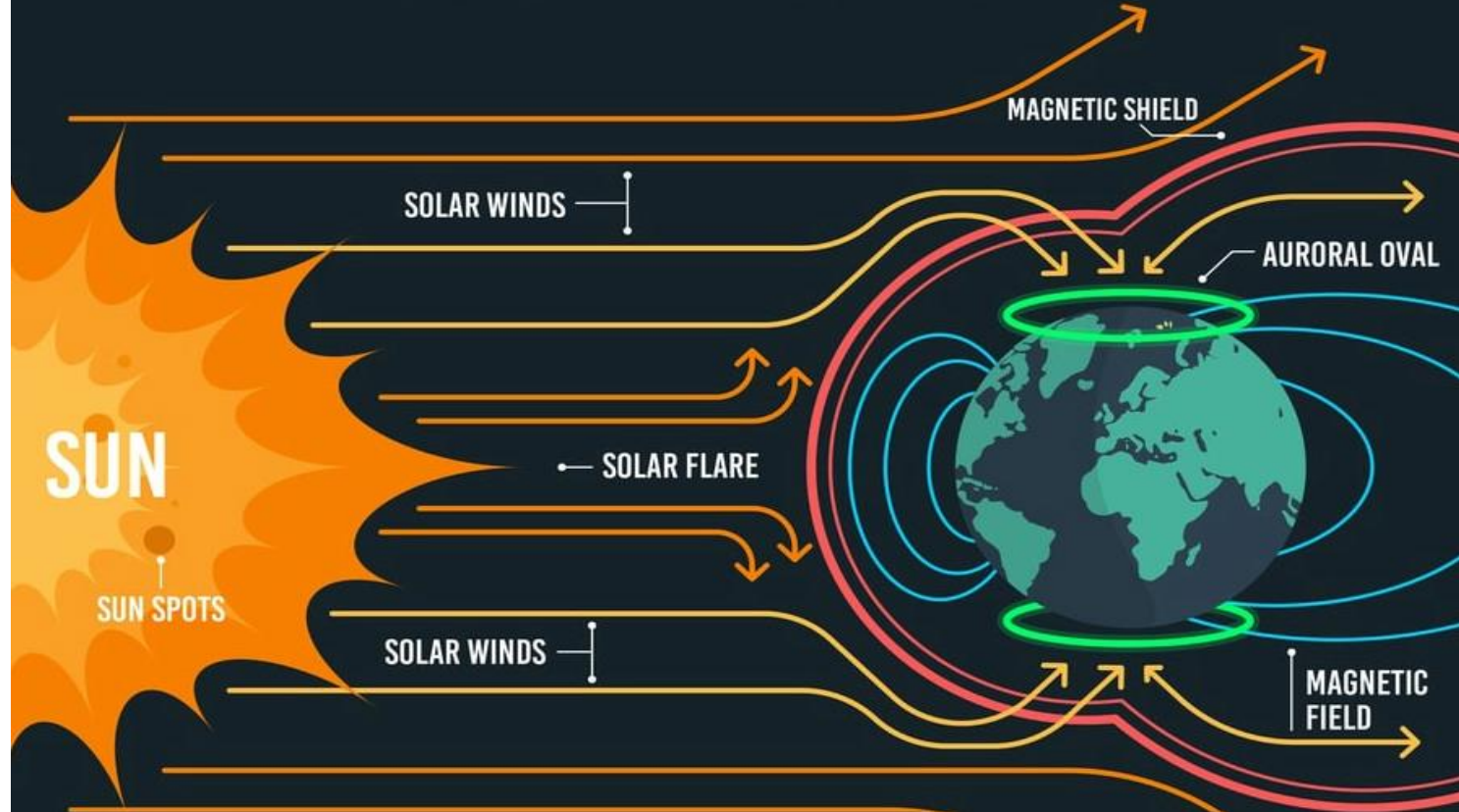
incoming solar wind particles

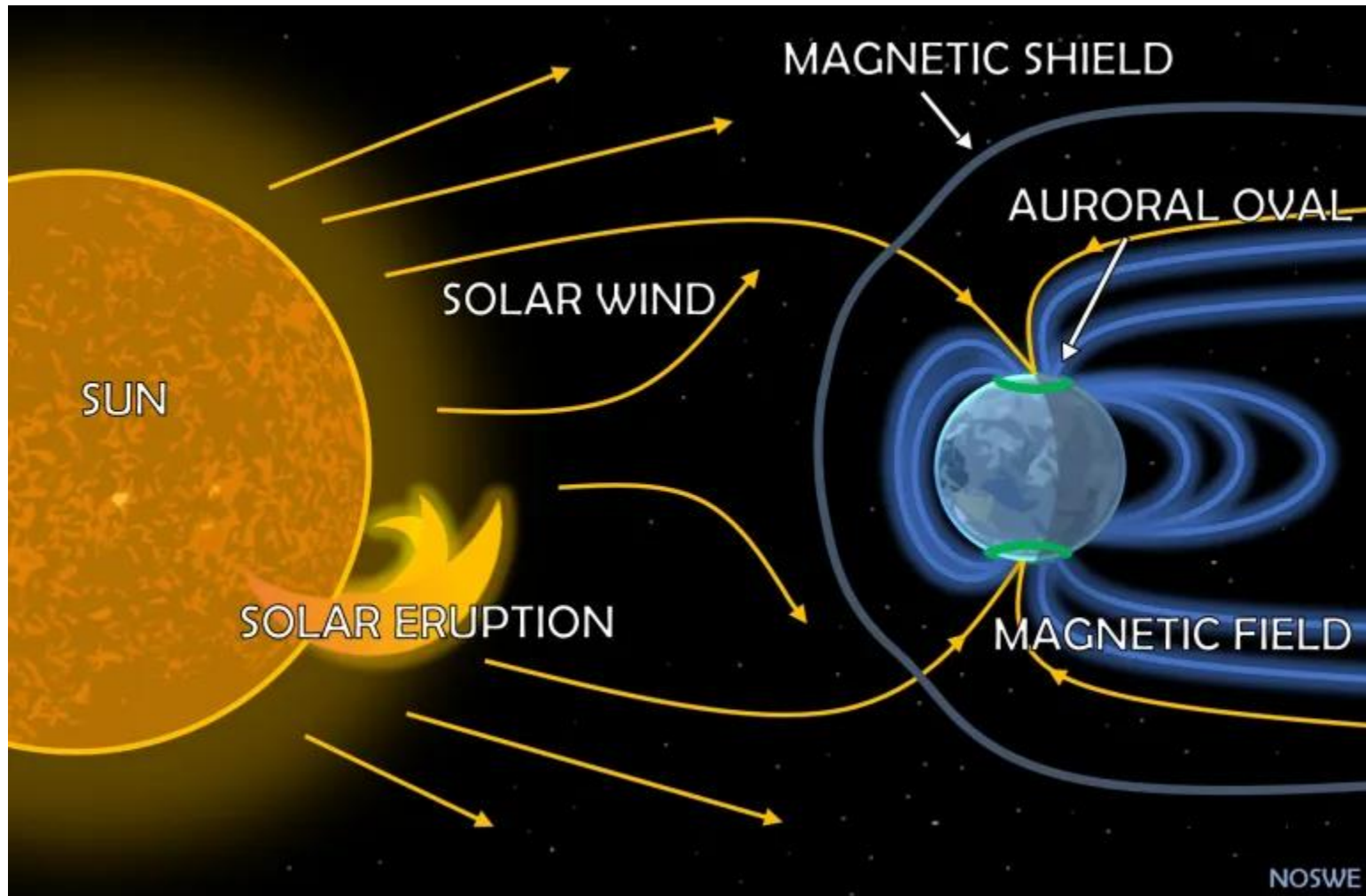
plasmasphere

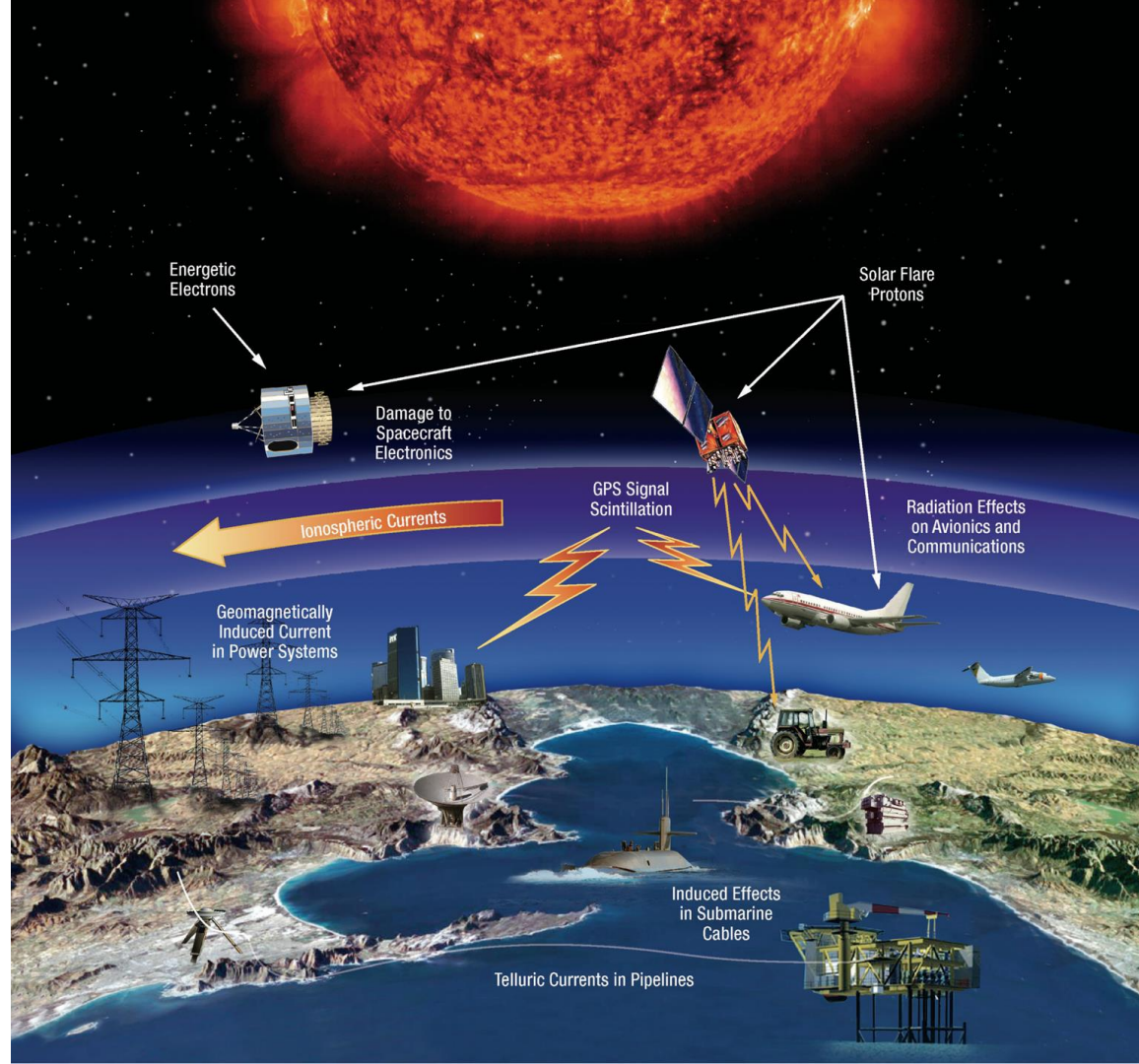
atmosphere

magnetosheath

WHAT CAUSES THE NORTHERN LIGHTS?







Geomagnetic Storm Impact Scale



G1

Minor

Weak power grid fluctuations and minor impacts on satellites are possible.

Migratory animals are affected at this and higher levels.

Aurora is commonly visible at high latitudes.

G2

Moderate

Transformer damage is possible with long duration storms.

Corrective actions to spacecraft orientation may be required; may affect orbit predictions.

Aurora may be seen as low as New York and Idaho.

G3

Strong

Power system voltage corrections may be required.

Satellite and LF radio navigation problems may occur. HF radio may be interrupted.

Aurora may be seen as low as Illinois & Oregon.

G4

Severe

Possible widespread voltage control problems on the power grid.

HF radio sporadic, satellite navigation degraded for hours, LF radio navigation issues.

Aurora may be seen as low as Alabama and northern California.

G5

Extreme

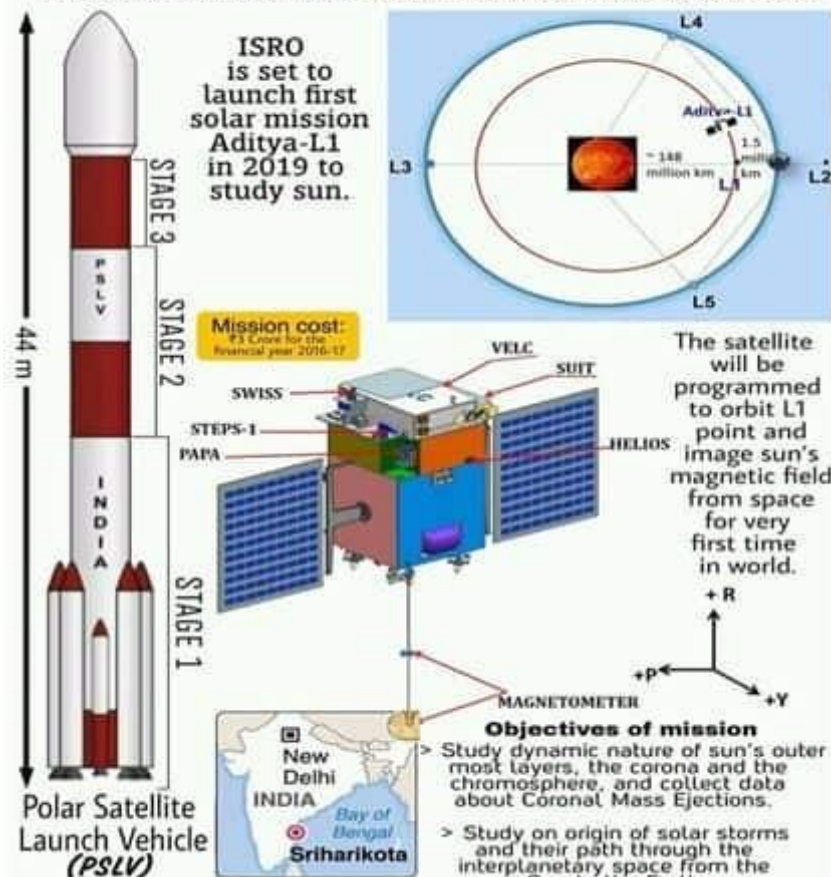
Blackouts or complete collapse of power grids possible.

Navigation systems may be out for hours or days.

Aurora may be seen as low as Florida and southern Texas.

About Aditya L1

The daring Aditya L1 solar mission
India's Aditya-L1 mission aims to put 1,500-kg heavy class satellite into halo orbit around Lagrangian point L1, a point between Sun and Earth about 1.5 million km from Earth.



- **Many spacecraft that monitor the Sun for these events are parked in the L1 point in space, about 1.5 million km in the earth-Sun direction, from where they have an uninterrupted view of the star.**
- **One of these spacecraft is Aditya-L1 of the Indian Space Research Organisation (ISRO), which reached L1 in March this year.**
- **The principal investigator of its primary instrument, the Visible Emission Line Coronagraph (VELC), it is still being calibrated, so it hasn't chimed in on the events since May 10.**

- **Of the other instruments: ISRO said on May 14 the ASPEX payload had “captured the enhancement of the alpha particle and proton Flux of the solar wind” as signatures of the solar storm. It also said the SoLEXS and HEL1OS payloads had detected “the multiple X- and M-class flares ... during the last few days”.**
- **The Chandrayaan-2 orbiter around the moon also reportedly detected “signatures” of the emissions from the Sun.**

Wax treatment for joint injury

Q

Q: I fractured my ankle five months ago. Under continuous stress, say when you

leave your legs dangling for over an hour, they swell up. On the doctor's advice, I underwent wax treatment. What is the basis for using wax? Can one not use hot water instead of wax?

A: The swelling in the ankle and foot is due to an increased accumulation of lymphatic fluid around the injured area. This is because of gravity.

The principle behind wax treatment is the latent heat given off by the molten wax (above 45 degrees C) during its cooling process.

This heat enlarges the blood vessels (a process called vasodilation) below the applied area and helps to effectively drain the accumulated fluid.

This temperature is quite bearable and soothing. But the latent heat given off by hot water, at about 100 degrees C, is certainly harmful to the human body.

Hot water can also be used at bearable temperatures but it cools far more rapidly than



The latent heat given off by the molten wax during cooling enlarges the blood vessels and helps to drain the accumulated fluid. GETTY IMAGES

molten wax.

In the case of molten wax, moreover, the latent heat given off during its change of state, from liquid to solid, helps in vasodilation as well.



For feedback and suggestions

for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'

Wax Treatment

- The principle behind wax treatment is the latent heat given off by the molten wax (above 45 degrees C) during its cooling process.
- This heat enlarges the blood vessels (a process called vasodilation) below the applied area and helps to effectively drain the accumulated fluid.
- This temperature is quite bearable and soothing. But the latent heat given off by hot water, at about 100 degrees C, is certainly harmful to the human body.
- Hot water can also be used at bearable temperatures but it cools far more rapidly than molten wax.



▲ This picture from the Alberta Wildfire Service, taken on May 10, shows smoke from wildfires burning in the Grande Prairie Forest area, 4 km east of the town of Teepee Creek, in Alberta, Canada. After its worst-ever-wildfire season last year, Canada experienced one of its warmest winters with low to non-existent snow in many areas, raising fears of a hot summer triggering blazes in forests amid an ongoing drought. AFP

Mapping

- **Grande Prairie Forest area, 4 km east of the town of Teepee Creek, in Alberta, Canada**

Candid notes on the NHRC's status deferral



The National Human Rights Commission of India (NHRC) was formally informed late last week that the deferral of its status would continue for a year more. The deferral was put in place by the sub-committee on accreditation (SCA) of the Global Alliance of National Human Rights Institutions (GANHRI) for a year, in 2023. While the SCA did not agree with the plea of some leading international non-governmental organisations, to put the NHRC in category 'B', it also rejected India's request to lift the deferral.

The NHRC chairperson, a former Justice of the Supreme Court of India, Justice Arun Mishra, and the government may have been unhappy with the continuing deferral but are sure to be relieved that they have avoided the ignominy of a downgrade. The NHRC, directly and, the government, from behind the scenes, had lobbied hard for the deferral to be removed and the cloud over India's 'A' status goes away. Justice Mishra retires in early June and, if the new government to be formed in June after the general election 2024 does not reappoint him, he will be the first NHRC chairman to leave the organisation with the sword of Damocles hanging over its head. This would only strengthen the initial doubts raised about his appointment.

The NHRC brochure

A peep into Justice Mishra's approach to human rights is available from a brochure published by the NHRC, titled 'Human Rights 75'. The document was put out as part of the celebrations of 'Azadi ka Amrit Mahotsav'. In its introduction the document sought to establish that "India's earliest civilisations... laid the fundamental edifice for some basic human rights principles". To substantiate this point it referred to ancient texts such as the *Vedas* and the *Upanishads*. It rightly asserted that they promoted the exploration of spiritual truths. Thereafter, the



Vivek Katju

is a retired Indian
Foreign Service officer

Much of the criticism of the West for weaponising human rights is valid, but the continuing deferral of the NHRC's status must lead to hard questions in India

publication went on to state, "The concept of justice and fairness is also central to ancient Indian literature. The *Manusmriti*, while reflecting the social norms of its time, also outlines principles of justice, including punishment proportionate to the crime".

For crores of historically disadvantaged Indians, the *Manusmriti* is the fountainhead of the evil of discrimination and violence they have suffered. Its mention in a NHRC document, despite the routine caveat attached to the reference, will be outrageous to them and to those who are pledged to uphold the Indian Constitution. Was the *Manusmriti*'s mention an oversight or does it reflect the considered views of Justice Mishra? Even at this stage a clarification would be useful. He would certainly know that the foundational values of the Indian Constitution are in direct conflict with the basic postulates of the *Manusmriti*.

Drifting away from the Paris Principles?

Certainly, the GANHRI's decision has not been influenced by the reference to the *Manusmriti* but because of the belief that India has not been adhering to the Paris Principles. In early 2017, the SCA had put the NHRC in the deferral category but it was lifted after a review later that year. Hence, India retained its 'A' status.

In a public note on that occasion, the NHRC had stressed the importance of the 'A' status. It stated, "'A' status accreditation also grants participation in the work and participation of the GANHRI, as well as the work of the Human Rights Council and other UN mechanisms". On the Paris Principles the NHRC noted, "The United Nations' Paris Principles provide the international benchmarks against which the National Human Rights Institutions (NHRIs) can be accredited". The Paris Principles were adopted by the UN in 1993. The NHRC stated that the Paris Principles set out "six main criteria that NHRIs are

expected to meet. These are: Mandate and competence, Autonomy from Government, Independence guaranteed by a Statute or Constitution, Pluralism, Adequate Resources; and adequate powers of investigations. The GANHRI found the NHRC, India compatible with these criterion" and so gave it 'A' status. That was then. But now, the GANHRI's doubts continue, obviously.

This is a peer-reviewed evaluation

The GANHRI evaluation process is a peer-reviewed one and hence cannot be dismissed as the government has done, since 2019, any criticism of the human rights situation in India. Indeed, External Affairs Minister S. Jaishankar has been especially sensitive to charges of the Narendra Modi government falling short in observing civil liberties and fundamental freedoms. He has, in response to criticism of India on these issues, pointed to the deficiencies in the West on these fronts. He has been acclaimed in India for doing so. Much of the criticism of the West for weaponising human rights is valid but the diplomacy of criticising the West and those who lecture India need not have been abrasive. Firmness does not need the use of the bludgeon of harsh language but the rapier of logic and reason. It also requires the acceptance that India, like all other countries, is not perfect. But such approaches are considered timid in these muscular times.

It is not clear if the Jaishankar muscular approach was adopted by the NHRC in dealing with the SCA. If it was, it has obviously not succeeded. The continuing deferral proves this. But there is a more substantial issue involved. This is the attitude of the government towards the NHRC. Doubts arise because of the nature of the appointments to it and also because of the continuing vacancies in the body. Finally, the NHRC itself has a lot to introspect about.

Deferral status of NHRC

- **The National Human Rights Commission of India (NHRC) was formally informed late last week that the deferral of its status would continue for a year more.**
- **The deferral was put in place by the sub-committee on accreditation (SCA) of the Global Alliance of National Human Rights Institutions (GANHRI) for a year, in 2023.**
- **While the SCA did not agree with the plea of some leading international non-governmental organisations, to put the NHRC in category 'B', it also rejected India's request to lift the deferral**

- **NHRC had stressed the importance of the ‘A’ status. It stated, “‘A’ status accreditation also grants participation in the work and participation of the GANHRI, as well as the work of the Human Rights Council and other UN mechanisms”.**
- **On the Paris Principles the NHRC noted, “The United Nations’ Paris Principles provide the international benchmarks against which the National Human Rights Institutions (NHRIs) can be accredited”.**

- **The Paris Principles** were adopted by the UN in 1993. The NHRC stated that the Paris Principles set out “six main criteria that NHRIs are expected to meet.
- These are: Mandate and competence, Autonomy from Government, Independence guaranteed by a Statute or Constitution, Pluralism, Adequate Resources; and adequate powers of investigations.

GANHRI

It is an organisation affiliated to the UN High Commissioner for Human Rights.

It is a global network of national human rights institutions (NHRIs) that works to promote and protect human rights.

GANHRI represents 120 NHRIs from around the world.

GANHRI's mission is to unite, promote, and strengthen NHRIs to operate in line with the UN Paris Principles.

The challenge of extra-pulmonary TB



While the most common form of tuberculosis (TB), which is pulmonary TB, infects the lungs, some 20% of TB infections develop in the lymph nodes, brain, gut, eyes, or other organs. Some of these organs have immune privileges in the body. This means that extra-pulmonary infections can persist even after the TB infection in the lungs is resolved. Just as we have an undercount of the people infected with TB, the public health challenge of extra-pulmonary TB (EPTB) may be larger than our current estimates.

The World Health Organization (WHO) reports over 10 million new cases of TB every year and India alone accounts for 27% of the global TB burden. However, the burden of EPTB is hard to estimate. EPTB is often stain negative, which means it is not detectable on regular TB stain tests. The infection may surface in any part of the body and present itself like other non-TB conditions. Many cases of EPTB may not have a corresponding lung infection. So, EPTB's true prevalence in society remains hidden.

As the burden of pulmonary TB is greatest, it makes epidemiological sense to focus our efforts on its elimination. The lungs are the primary source of infection spread and reducing this burden will impact all forms of the disease. However, given the scale of TB, variants like EPTB end up affecting a large number of people. EPTB's under diagnosis results in irreparable damage to the infected organs, leading to vision loss or even blindness, for example. It is therefore important to address TB in all its complexity.

Knowledge gap

The twin challenges in tackling EPTB are lack of awareness, even among physicians, and lack of accurate diagnostic and treatment criteria. The mycobacterium that causes TB was first isolated in the eye just a year after Robert Koch



Tejah Balantrapu

is Associate Director, Science, Health Data, and Story-telling, LV Prasad Eye Institute



Soumyava Basu

is Head, Uveitis Services, LV Prasad Eye Institute

The twin challenges in tackling EPTB are lack of awareness, even among physicians, and lack of accurate diagnostic and treatment criteria

identified the organism. Yet, many who treat the disease (and some who treat the eyes) are ignorant of this association. This situation is true with most of the other organs that host a TB infection as well. Even for those who are aware, it is challenging to reach an accurate diagnosis and put patients on the right therapy for treatment.

As TB can be present in multiple organs, the lack of formal and functioning protocols to exchange information between doctors in multiple specialities leads to silos of knowledge. In 2014, a group of experts from different health institutions across the country, the WHO, and the Cochrane Infectious Disease Group came together to formulate INDEX-TB, a set of guidelines for EPTB management in India. The group also released a set of clinical practice points for 10 organs, but good quality evidence was available only for five of them. This work has remained dormant. More needs to be done to foster and build a common approach to EPTB management, especially in a high TB burden country like India.

Armed with guidelines and practice points, our hospital systems need to generate better data on EPTB. Our current source of EPTB numbers are the TB departments of large public hospitals. However, specialist departments for each organ are the primary centres for EPTB management. Their data practices are diverse and do not become part of our aggregate numbers for EPTB prevalence. These departments must capture patient data and be ready to share it with the National TB Control Programme. Their action may help reinvigorate Ni-kshay, the national patient management portal for TB control, which has incomplete and missing data on TB patients insofar as EPTB patient data are concerned.

Research priority

Key aspects of EPTB, including the mechanisms of infection spread and the TB bacterium's

interactions with our organs, remain under-explored. A troubling aspect of EPTB infection is the prolonged presence of disease markers even after the infection is resolved with treatment. Some EPTB patients who complete anti-TB therapy may still find themselves affected by the disease. In the eye, for example, an autoimmune response to antigens triggered by the original infection can lead to a persistent intraocular inflammation even after appropriate anti-TB therapy. Similarly, there might be other immunological mechanisms lurking in other organs affected by EPTB that may prolong the disease, even after the bacteria have been cleared from that organ. This phenomenon causes a lot of misery to persons with EPTB and is an active area of research.

A concerted effort by different EPTB specialities, and advanced immunological tools such as single-cell RNA sequencing, might be able to uncover the immune mechanisms for the disease. Unless we understand these mechanisms, physicians will continue to treat EPTB with long duration anti-TB therapy (sometimes for even two years or more), assuming that the infection is persisting in the organ. This not only fails to resolve the disease, but also exposes the patient to the toxicity of anti-TB therapy.

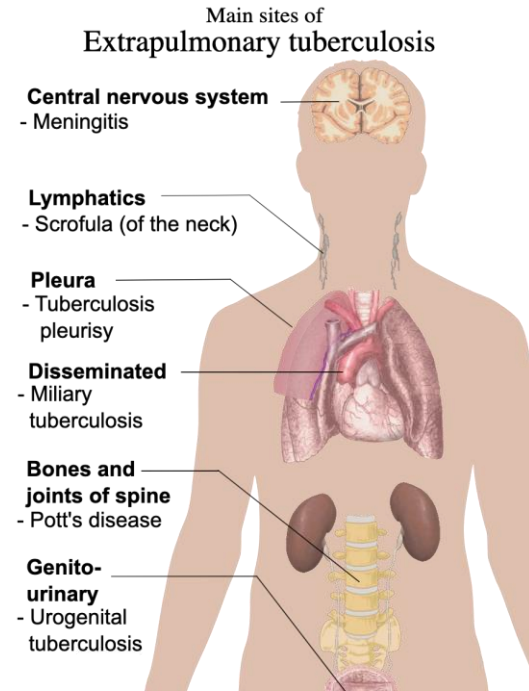
Diagnosis and treatment protocols for all organs affected by EPTB do not exist. We will need high-quality data through clinical trials to formulate them. Similarly, INDEX-TB guidelines were formulated over a decade ago and need to be updated with the latest data and experience. They also need to be multidisciplinary and benefit from inputs from a variety of specialised areas of health care.

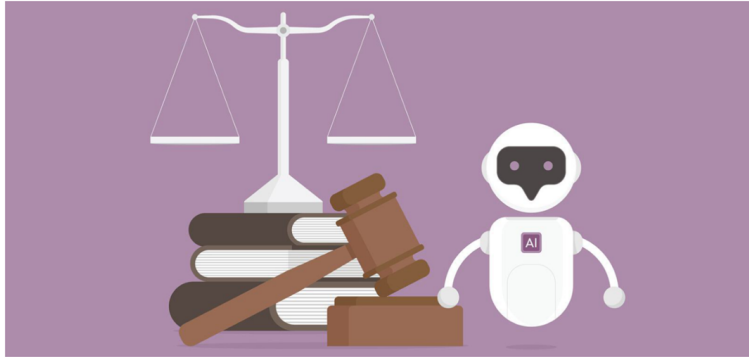
Nearly one in five TB patients have EPTB. Most of them go undiagnosed, and the few who are diagnosed cannot benefit from care unless they visit a few specialist health facilities. It is time we bring EPTB out of the shadows.

Extrapulmonary tuberculosis (EPTB)



It is tuberculosis outside of the lungs. EPTB includes tuberculosis meningitis, abdominal tuberculosis (usually with ascites), skeletal tuberculosis, Pott's disease (spine), scrofula (lymphadenitis), and genitourinary (renal) tuberculosis





GETTY IMAGES

On the importance of regulatory sandboxes in artificial intelligence

Regulatory sandboxes have become a significant instrument in various countries, used to evaluate innovations within a defined and monitored time frame while being subject to regulatory oversight and controlled constraints

Sanhita Chauriha

The advancement of Artificial Intelligence (AI) technologies has posed both unprecedented opportunities and complex challenges for societies worldwide. As AI applications continue to proliferate across industries such as healthcare, transportation, finance, and more, concerns have emerged regarding ethical implications, data privacy, and potential risks associated with their deployment. In response, many governments and regulatory bodies have turned to innovative approaches such as "AI regulatory sandboxes" to strike a balance between fostering AI innovation and ensuring responsible development.

To regulate but not restrict
Regulatory sandboxes have become a significant instrument in various countries, used to evaluate innovations within a defined and monitored time frame while being subject to regulatory oversight and controlled constraints. This approach serves as a valuable tool for policymakers, furnishing them with empirical evidence regarding the advantages and potential risks associated with emerging technologies. Moreover, an evidence-based approach empowers policymakers to adopt a well-informed stance in crafting legal and policy responses that foster beneficial innovation. For businesses engaged in these sandboxes, insights gleaned from a study on "fintech regulatory sandboxes" indicate that this controlled environment enhances access to funding by mitigating information imbalances and reducing regulatory costs. Such multifaceted utility positions regulatory sandboxes as a catalyst for fostering innovation, supporting economic growth, and ensuring responsible governance in a rapidly evolving landscape of emerging technologies.

While the inception of the first formal regulatory sandbox is often attributed to the Financial Conduct Authority in the U.K., numerous other nations have subsequently introduced or announced similar initiatives to assess innovations spanning various industries. According to data from the World Bank, as of November 2020, there were approximately 73 regulatory sandboxes, both announced and operational, within the financial sector across 57 jurisdictions. In India, all financial sector regulators, including the Reserve Bank of India, Securities and Exchange Board of India, Insurance Regulatory and Development Authority of India, Pension Fund Regulatory and Development Authority, and International Financial Services Centre Authority, have launched their respective regulatory sandboxes. Expanding beyond finance, Karnataka has enacted the Karnataka Innovation Authority Act, 2020, establishing an Innovation Authority dedicated to promoting and regulating innovative technologies through a regulatory sandbox model. Notably, the recently passed Telecommunications Act 2023 proposed a regulatory sandbox where the central Government has the authority to establish one or more regulatory sandboxes, as prescribed, to promote and facilitate innovation and technological development in the field of telecommunications, specifying the manner and duration for their implementation.

The benefits of regulatory sandboxes
In the discourse surrounding AI regulation, the concept of regulatory sandboxes emerges as a compelling avenue for exploration. When one considers the necessity of stringent, detailed regulation or favouring adaptable strategies like soft or self-regulation, the introduction of a regulatory sandbox remains a viable option. Firstly, such a

sandbox provides a controlled environment for experimentation, offering invaluable insights into AI technologies capabilities and limitations while fostering collaboration between innovators and regulators. Additionally, it promotes transparency and accountability by requiring participants to disclose information about their AI models, addressing concerns about opacity and enabling tailored regulations. Furthermore, by mandating risk assessments and safeguards, the sandbox encourages responsible innovation, mitigating potential societal impacts of AI applications and nurturing a culture of ethical development within the industry.

Article 53 of the European Union's AI Act, has the provision of a regulatory sandbox to test technology before making it mainstream. Additionally, Spain became the first European country to have established the statute of the Spanish Agency for the Supervision of Artificial Intelligence (AESIA), ahead of the European regulation on artificial intelligence. This regulation will mandate member states to designate a 'national supervisory authority' responsible for overseeing the implementation of regulations related to AI.

Globally, there is a competitive race to regulate and harness AI's vast potential. The EU has come up with an AI Act, the U.S. has released a white paper on the AI Bill of Rights, and the U.K. has a national AI Strategy. China is trying to regulate various aspects of AI like generative AI while Singapore is following an innovation-friendly approach.

India's approach to AI
In India, NITI Aayog released a discussion paper outlining a national strategy for AI, which led to the establishment of the national AI Portal. The Ministry of Electronics and Information Technology (MeitY), released a report on AI Innovation 2023 highlighting India's AI

vision through seven working groups. The latest proposal of the Digital India Act, 2023 also talks about regulating AI by creating a separate set of laws and regulations.

India's interest in regulating AI is grounded in a multifaceted approach encompassing economic ambitions, ethical considerations, job creation, industrial transformation, and overall societal welfare. As a global technology hub, the chair of the Global Partnership on Artificial Intelligence and the Delhi Declaration, India aspires to foster innovation in alignment with its cultural and ethical values. A comprehensive regulatory sandbox can be envisioned to guide businesses, researchers, and policymakers, steering AI development towards sustainable growth.

A regulatory sandbox should not be viewed as an approach to directly govern AI, but rather as a progressive step preceding formal legislation. It serves as a preparatory measure tailored to India's specific circumstances, paving the way for future regulatory actions aligned with the country's needs and developments in the AI landscape. By providing a controlled environment for testing innovative AI applications, a regulatory sandbox enables stakeholders to assess risks, refine regulatory frameworks, and foster collaboration between regulators, industry players, and other stakeholders. This collaborative approach not only promotes responsible AI deployment but also positions India at the forefront of shaping effective and adaptive regulatory frameworks for emerging technologies. Given the distinct Indian context, it becomes pivotal to determine which approach is most viable and efficient in striking a balance between fostering AI innovation and ensuring ethical, transparent, and accountable AI implementations.

Sanhita Chauriha is a Data Privacy and Technology Lawyer.



What it is an AI Sandbox?

- **The AI Sandbox is the development hardware, software, data, tools, interfaces, and policies necessary for starting an enterprise deep learning practice.**
- **Deep learning models require lots of data and specialized computing resources called GPUs (graphical processing units)**

Nobel-winning author, Alice Munro, also known as ‘Canada’s Chekhov’, dies at 92



Agence France-Presse

OTTAWA

Alice Munro, the Nobel Prize-winning author known as “Canada’s Chekhov” for her mastery of the short story, has died at 92, Canadian media reported on Tuesday.

Awarded the Nobel Prize for Literature in 2013 and the International Booker Prize for her body of work in 2009, Munro had suffered from dementia in recent years. According to the *Globe and Mail*, she died late on Monday at her care home in Ontario.

Munro set her taut, acutely observed stories in the rural Ontario countryside where she grew up, focusing a stark lens on the frailties of the human condition.



Despite her vast success Alice Munro long remained as unassuming and modest as the characters in her fiction. AP

Despite her vast success and an impressive list of literary prizes, however, she long remained as unassuming and modest as the characters in her fiction.

That shy public profile contrasted with another Canadian contemporary literary giant, Margaret

Atwood.

Born on July 10, 1931, in Wingham, Ontario, Munro grew up in the countryside.

At just 11 years old, she decided she wanted to be a writer, and never wavered in her career choice.

Munro’s first story *The*

Dimensions of a Shadow was published in 1950, while she was studying at the University of Western Ontario.

Her short stories often appeared in the pages of prestigious magazines such as *The New Yorker* and *The Atlantic*, with her last collection *Dear Life* appearing in 2012.

Critics praised her for writing about women for women, but without demonising men.

Her subjects and her writing style, such as a reliance on narration to describe the events in her books, earned her the moniker “our Chekhov,” in reference to the 19th century Russian playwright Anton Chekhov – a term coined by Russian-American short story writer Cynthia Ozick.

Alice Munro

- **Alice Munro, the Nobel Prize-winning author known as “Canada’s Chekhov” for her mastery of the short story, has died at 92, Canadian media reported on Tuesday.**
- **Awarded the Nobel Prize for Literature in 2013 and the International Booker Prize for her body of work in 2009,**

he Nation'
Inity and

using the

104. The 7th edition of the Indian Ocean
Conference was held at

(a) Dhaka

(b) New Delhi

(c) Malé

(d) Perth

61. Which of the following were objectives of the G20 Summit, 2023 under India's Presidency?

1. Green development
2. Accelerating progress on SDGs
3. Women-led development

Select the correct answer using the code given below.

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1, 2 and 3
- (d) 1 and 3 only

64.

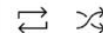
65.

Table of Contents

PREAMBLE	1
FOR THE PLANET, PEOPLE, PEACE AND PROSPERITY	2
A. STRONG, SUSTAINABLE, BALANCED, AND INCLUSIVE GROWTH.....	3
GLOBAL ECONOMIC SITUATION	3
UNLOCKING TRADE FOR GROWTH	4
PREPARING FOR THE FUTURE OF WORK.....	5
ADVANCING FINANCIAL INCLUSION.....	6
FIGHTING CORRUPTION.....	6
B. ACCELERATING PROGRESS ON SUSTAINABLE DEVELOPMENT GOALS (SDGS).....	7
RECOMMITTING TO ACHIEVING SDGS	7
ELIMINATING HUNGER AND MALNUTRITION	8
MACROECONOMIC IMPACTS OF FOOD AND ENERGY INSECURITY.....	8
STRENGTHENING GLOBAL HEALTH AND IMPLEMENTING ONE HEALTH APPROACH.....	8
FINANCE-HEALTH COLLABORATION	10
DELIVERING QUALITY EDUCATION	10
CULTURE AS A TRANSFORMATIVE DRIVER OF SDGS.....	11
C. GREEN DEVELOPMENT PACT FOR A SUSTAINABLE FUTURE.....	11
MACROECONOMIC RISKS STEMMING FROM CLIMATE CHANGE AND TRANSITION PATHWAYS.....	12
MAINSTREAMING LIFESTYLES FOR SUSTAINABLE DEVELOPMENT (LiFE)	12
DESIGNING A CIRCULAR ECONOMY WORLD.....	13
IMPLEMENTING CLEAN, SUSTAINABLE, JUST, AFFORDABLE & INCLUSIVE ENERGY TRANSITIONS.....	13
INTEGRATING CLIMATE AND SUSTAINABLE FINANCE.....	14
CONSERVING, PROTECTING, SUSTAINABLY USING AND RESTORING ECOSYSTEMS.....	14

FEB 2024-THE HINDU

Saurabh Pandey UPSC - 13 / 29



The Hindu Editorial & News Analysis I 11th February 2024 I...

Saurabh Pandey UPSC



The Hindu Editorial & News Analysis I 12th February 2024 I...

Saurabh Pandey UPSC



The Hindu Editorial & News Analysis I 13th February 2024 I...

Saurabh Pandey UPSC



The Hindu Editorial & News Analysis I 14th February 2024 I...

Saurabh Pandey UPSC



The Hindu Editorial & News Analysis I 15th February 2024 I...

Saurabh Pandey UPSC

The Hindu Editorial & News Analysis I 13th February 2024 I Gravitational lensing II

Saurabh Pandey



Saurabh Pandey
UPSC

21.8K subscribers

Analytics

Edit video

303



Share

Promote



Chat Replay is disabled for this Premiere.

Target RBI Manager

Topics

- Igla -s
- Delhi waste management
- CODEX
- Flash flood in indonesia
- Cold lava
- **Mains**



By saurabh Pandey



Army set to receive next batch of shoulder-fired Igla-S air defence systems

Dinakar Peri

NEW DELHI

The Army is all set to begin receiving another set of Russian Igla-S very short range air defence systems (VSHORAD) by the end of May or early next month, filling a critical void in its air defence requirements which has been repeatedly delayed.

In another development, multiple sources confirmed that the payments issue between India and Russia that has held up critical payments for defence deals as well as payments has been resolved.

The Igla-S systems were contracted last year under the fourth tranche of



The Igla-S system.

Emergency Procurements (EP) and are being assembled by Adani Defence Systems And Technologies Limited (ADSTL) in India under technology transfer from Rosoboronexport, multiple official sources confirmed.

The Army is also set to receive the first of two Israeli Hermes-900 Medium Altitude Long Endurance

Unmanned Aerial Vehicles (UAV) assembled by ADSTL in Hyderabad next month.

Last year, the Army contracted 48 Igla-S launchers, 100 missiles, 48 night sights, and one missile testing station under a ₹260 crore contract and deliveries are set to begin by end of this May, a source said.

The missile will be imported and some parts like sights, launcher, and battery will be assembled/manufactured here by Adani defence, another source in the know said.

A VSHORAD is the soldier's last line of defence against enemy combat aircraft, helicopters and UAVs in the multilayered air defence network.

Igla -S



- **"Igla-S" man-portable air defence missile system is designed to engage all types of visible fixed- and rotary-winged aircraft on head-on and pursuit courses as well as small-sized air targets like cruise missiles around the clock under thermal and background noise.**
- **powerful anti-aircraft missile system from Russia**
- **The Army is all set to begin receiving another set of Russian Igla-S very short range air defence systems (VSHORAD)**



On Delhi's mounting waste crisis

As the national capital, Delhi needs to scale up its processing capacity to manage daily waste. The quantity of waste is expected to increase in the coming years together with the per capita waste generation

EXPLAINER

Pradeep Dadani
Pushkara S.V.

The story so far:

The Supreme Court's recent criticism of solid waste management (SWM) in New Delhi highlights a critical issue. The national capital has more than 3,800 tonnes of solid waste remaining untreated. This waste reaches landfills and threatens public health and the environment.

What is the status of Delhi's SWM system?

According to the 2011 Census, New Delhi's population was about 1.7 crore, which in 2024 is expected to be around 2.32 crore. Considering an average per capita generation of about 0.6 kg/day per person, the city generates approximately 13,000 tonnes per day (TPD) of waste – roughly 1,400 trucksload – which adds up to about 42 lakh tonnes per annum. The city's population is expected to rise to 2.85 crore by 2031, so waste generation could go up to 17,000 TPD.

About 50% of the waste generated in the city is collected by the three municipal corporations: the Municipal Corporation of Delhi (MCD), Delhi Cantonment Board, and the New Delhi Municipal Corporation. Generally, about 50-55% of the waste generated in Indian cities is biodegradable wet waste; 35% is non-biodegradable wet waste; and 10% is an inert component. Accordingly, 7,000 TPD would be wet waste; 4,800 TPD dry waste; and 2,000 TPD inert.

What about the processing capacity of SWM in Delhi?

New Delhi has waste-processing facilities at Okhla, Bhalswa, Narela, Rawana, Tehsilkhanda, SMA Industrial Area, Nishta, and Ghaziabad. These facilities have a collective design capacity of about 5,200 TPD. This includes composting facilities handling around 900-1,000 TPD and waste-to-energy projects of 8,200 TPD.

However, the MCD is disposing of unprocessed waste of 3,800 TPD in the three designated landfills: Gazipur, Bhalswa, and Okhla. These landfills, consisting of unprocessed wet and dry waste, generate methane gases, leachates, and cause landfill fires, adversely affecting the surrounding environment. The accumulation of unprocessed waste in these landfills has led to a staggering 2.58 crore tonnes of legacy waste piling up over 200 acres of land. The MCD initiated binning to reduce the amount of waste in 2015, but the COVID-19 pandemic halted these efforts. Initially planned to be completed by 2024, this task will take another two to three years.

However, the environmental impact will persist until fresh waste is scientifically processed. With the current accumulation of 3,800 TPD of unprocessed waste, the landfills will only become bigger and taller.

What are the MCD's challenges?

The MCD faces several challenges in tackling waste within the city. One major issue is the lack of waste segregation at source. Many households and commercial establishments don't do this. As a result, unprocessed mixed waste enters landfills. Additionally, waste processing plants need large land parcels, of about 30-40 acres each, which is a challenge in Delhi. This challenge in turn leads to a significant portion of waste being left untreated.



Garbage tower: Rag pickers seen collecting items from the Bhalswa landfill in New Delhi on December 16, 2020. SHY KUMAR PUGHARWARI

Public awareness of proper waste management practices is also lacking, contributing to littering and improper disposal habits, which divert the MCD's attention towards clearing open points rather than processing wet waste. Lack of regular waste collection services in certain areas also add to the building of waste as well as littering, while illegal dumping in open areas and water bodies increases the pressure on the municipal body, warranting more resources for clean-up.

Finally, a lack of coordination among various stakeholders – including multiple municipal corporations – results in inefficient waste management, further complicating the MCD's efforts to address the city's waste management issues.

What efforts need to be made in order to separate the waste?

As the national capital, Delhi needs to scale up its processing capacity to manage daily waste. The quantity of waste is expected to increase in the coming years together with the per capita waste generation. With this in mind, the MCD should design a waste-management plan to cater to about three crore people while the total design capacity of the city's waste processing facility should be 18,000 TPD.

Biodegradable wet waste should be

composted or used to generate biogas. The design capacity of the wet waste-processing system should be set at 9,000 tonnes. Typically, the capacity of composting facilities is around 500 tonnes per day, which means Delhi will need at least 18 composting or biogas plants to ensure no biodegradable wet waste reaches landfills. This will demand significant efforts from the MCD to identify land, set up composting facilities, and operate them.

As for the non-biodegradable dry waste, about 2% will be recyclable, and this can be sent to recycling facilities. The remaining 33% won't yet be recyclable. The non-recyclable dry waste fraction is called refuse-derived fuel (RDF) and consists of plastics, paper, and textile waste. This material has good calorific value and can be used to generate power in waste-to-energy projects.

Although the cost of power generation through waste-to-energy projects tends to be slightly on the higher side, the objective is to scientifically manage waste and mitigate environmental impacts, particularly those arising from landfill fires.

Can waste processing be decentralised?

Given the challenges with identifying large land parcels, Delhi will need to

partner with its neighbouring States to set up a few of these composting plants. Additionally, the market for organic compost produced from wet waste lies in the neighbouring States of Haryana and Uttar Pradesh.

Delhi has 272 wards. States like Tamil Nadu and Kerala have set up decentralised Micro-Composting Centres (MCC) of five TPD capacity at the ward level. These MCCs can manage about 20% of the city's wet waste. Bengaluru has also set up ward-level Dry Waste Collection Centres (DWCC) of 2 TPD capacity each. These DWCCs can help manage about 10% of the dry waste.

Delhi's SWM system should integrate decentralised options for both wet and dry waste, backed by large processing facilities to ensure all the waste generated is scientifically processed. The city must also ensure existing processing facilities operate at full capacity, while new facilities are built to ensure no waste goes untreated. Finally, urban local bodies should also learn from best practices from other cities in India and abroad on efficient SWM processing.

Pradeep Dadani works with Sycom Projects and Consultants, Delhi, and is a senior SWM expert. Pushkara S.V. works with the Indian Institute for Human Settlements, Bengaluru, and is a practitioner in SWM.

THE GIST

▼ In Delhi, considering an average per capita generation of about 0.6 kg/day per person, the city generates approximately 13,000 tonnes per day (TPD) of waste – roughly 1,400 trucksload – which adds up to about 42 lakh tonnes per annum.

▼ The MCD faces several challenges in tackling waste within the city. One major issue is the lack of waste segregation at source. Many households and commercial establishments don't do this.

▼ Delhi's SWM system should integrate decentralised options for both wet and dry waste, backed by large processing facilities to ensure all the waste generated is scientifically processed.

Delhi waste management



- In Delhi, considering an average per capita generation of about 0.6 kg/day per person, the city generates approximately 13,000 tonnes per day (TPD) of waste — roughly 1,400 truckloads — which adds up to about 42 lakh tonnes per annum.
- The MCD faces several challenges in tackling waste within the city. One major issue is the lack of waste segregation at source.
- Many households and commercial establishments don't do this.
- Delhi's SWM system should integrate decentralised options for both wet and dry waste, backed by large processing facilities to ensure all the waste generated is scientifically processed.

What efforts need to be made in order to separate the waste?

- **As the national capital, Delhi needs to scale up its processing capacity to manage daily waste.**
- **The quantity of waste is expected to increase in the coming years together with the per capita waste generation**
- **Biodegradable wet waste should be composted or used to generate biogas.**
- **As for the non-biodegradable dry waste: about 2% will be recyclable, and this can be sent to recycling facilities.**

The non-recyclable dry waste fraction is called refuse-derived fuel (RDF) and consists of plastics, paper, and textile waste.

This material has good calorific value and can be used to generate power in waste-to-energy projects.

Although the cost of power generation through waste-to-energy projects tends to be slightly on the higher side, the objective is to scientifically manage waste and mitigate environmental impacts, particularly those arising from landfill fires.

Spices Board, CODEX discuss ETO limits



Growing share: In 2023-24, India's spice exports reached \$4.25 bn or 12% share of the global spice exports. »SL

Amiti Sen
NEW DELHI

The Spices Board has taken up with CODEX, the international food standards body, the crucial issue of setting limits for ethylene oxide (ETO) usage in spices. This follows the recall of certain branded spices exported by Indian companies to Hong Kong and Singapore on concerns related to ETO (ethylene oxide) contamination.

"India has taken up with the CODEX committee the need for setting up limits for ETO usage as different countries have different limits. CODEX has not prescribed a limit so far. Also, there is no standard for ETO testing. India has also given a proposal for that," an official told *businessline*.

ETO, a chemical used as a sterilising agent in spices, is considered carcinogenic when used beyond certain limits.

While work to prevent contamination needs to be intensified, India's sample failure in spices is less than 1% of its exports in major markets, the official added.

Mandatory order

"The Spices Board has taken steps to ensure the safety and quality of Indian spice exports to Hong Kong and Singapore. The board has made it mandatory to test such consignments destined to these two countries," the official said.

In the year 2023-24, India's spice exports reached \$4.25 billion, accounting for a 12% share of the global spice exports.

(The writer is with The Hindu businessline)

- **The Spices Board has taken up with CODEX, the international food standards body, the crucial issue of setting limits for ethylene oxide (ETO) usage in spices.**
- **This follows the recall of certain branded spices exported by Indian companies to Hong Kong and Singapore on concerns related to ETO (ethylene oxide) contamination.**
- **“India has taken up with the CODEX committee the need for setting up limits for ETO usage as different countries have different limits.**

- **ETO, a chemical used as a sterilising agent in spices, is considered carcinogenic when used beyond certain limits.**
-

CODEX

- The Codex Alimentarius, or "Food Code" is a collection of standards, guidelines and codes of practice adopted by the Codex Alimentarius Commission.
- The Commission, also known as CAC, is the central part of the Joint FAO/WHO Food Standards Programme and was established by FAO and WHO to protect consumer health and promote fair practices in food trade. It held its first meeting in 1963

- **Codex standards ensure that food is safe and can be traded.**
- **The 188 Codex members have negotiated science based recommendations in all areas related to food safety and quality. Codex food safety texts are a reference in WTO trade disputes.**
- **The reference made to Codex food safety standards in the World Trade Organization's Agreement on Sanitary and Phytosanitary measures (SPS Agreement) means that Codex has far reaching implications for resolving trade disputes.**

- **Since its foundation in 1963, the Codex system has evolved in an open, transparent and inclusive way to meet emerging challenges. International food trade is a 2000 billion dollar a year industry, with billions of tonnes of food produced, marketed and transported**

Indonesian rescuers carry on with complex search mission after flash floods

Agence France-Presse
TANAH DATAR

Along debris-filled rivers and mud-caked roads, rescuers on Wednesday dugged with tools and their bare hands through the wreckage after frightening flash floods and volcanic debris deluged areas near one of Indonesia's most active volcanoes.

In Sumatra island's Tanah Datar district, hundreds of workers raced to find 35 people still unaccounted for after houses were swept away at the foot of Mount Marapi in the dark of night on Saturday, as the clock ticked on the complex rescue mission.

Soldiers, marines, police and volunteers armed with rubber boats were getting involved in the rescue effort along professional search teams.

"We have been scouring the areas that cannot be reached with cars. The currents in the river are extreme, so the search is quite dangerous," said Ritno Kurniawan, a member of the local rafting community.

"We usually found the bodies along the riverbanks, buried under volcanic material or rocks."

The search – now in its fourth day – has been made more difficult by the prospect of further heavy rains and transport access being cut on several key roads by collapsed bridges or mud that had solidified.

The floods killed at least 58 people across six districts in West Sumatra province, injuring dozens and forcing more than 3,300 people to evacuate to temporary shelters.

Authorities have turned to heavy machinery and technology to aid the rescue effort – using cloud



All together: Indonesian rescue teams move logs as they search for flood victims at Batu Taba Village in Sumatra on Tuesday. AFP

well as calling on K-9 dogs and thermal drones to find bodies.

Provincial search and rescue official Hendri, who goes by one name, said rain, stacks of logs and large volcanic rocks in rivers were hindering the search.

Rescuers were also worried about another flash flood or cold lava flow known as a *lahar*, where volcanic material is swept down from a volcano's slopes by heavy rains.

Survivors in shock

Survivors were still in shock from the disaster, including some who lost their relatives and friends when large volcanic rocks and muddy waves suddenly crashed into their neighbourhoods.

Some tried to clear their houses of mud and collect their belongings, while others appeared stunned at what had happened to their properties and were enduring the agonising wait for any news about their loved ones.

year-old mother and three children of his nieces – two who were teenagers and one five years old, he said. "The rescuers have sent dogs, bloodhounds, and drones but they still have not been found," he said.

"I still have hope, but if they are no longer alive, I will accept it. I will let God handle it. This is fate, I can't deny it."

At his mother's home, most of the windows and doors were blown out while large logs piled up against the house, which had been flooded by mud.

The lack of visibility was stopping the multi-pronged search effort during the night.

That was lowering survival hopes for those missing before a "golden period" of seven days runs out by the weekend.

But volunteer rescuers like Ritno remained unfazed despite the challenges.

"I am exhausted, but it is our responsibility," he said. "It's a calling from hu-

- Indonesian authorities seeded clouds on , trying to prevent further rain and flash floods after deluges that hit Sumatra Island .
- Monsoon rains triggered a landslide of mud and cold lava from Mount Marapi, eventually causing rivers to breach their banks.
- Heavy rains cause frequent landslides and flash floods in Indonesia, an archipelago nation of more than 17,000 islands where millions of people live in mountainous areas or near floodplains.

Cold lava flood from Mt. Marapi and widespread flooding hits Indonesia

Death toll has risen to 41, with 17 people missing following a cold lava flood from Mt. Marapi in Indonesia's West Sumatra province



What is cold lava ?

Cold lava, also known as lahar, is volcanic material like ash, sand and pebbles carried down a volcano's slopes by rain.

Indonesia is prone to landslides and floods during the rainy season.

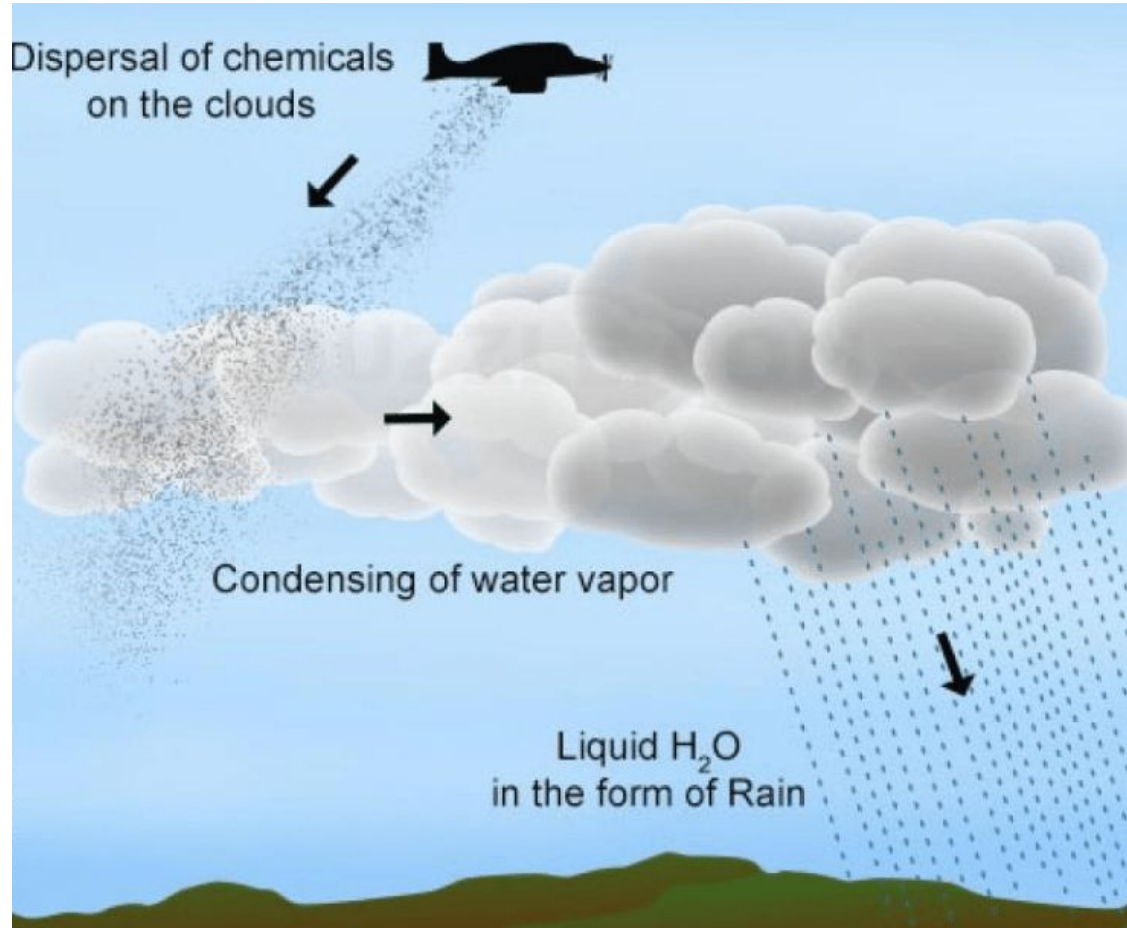
carried cold lava down from Mount Marapi, the most active volcano in Sumatra

Cold lava, also known as lahar, is a mixture of volcanic material and pebbles that flow down a volcano's slopes in the rain.

- **Cold lava, also known as "lahar" in Javanese, comprises a mixture of water and rock fragments that flows rapidly down the slopes of a volcano, entering river valleys and spreading across wide areas.**
- **This cold lava can flow at speeds of hundreds of kilometers**
..

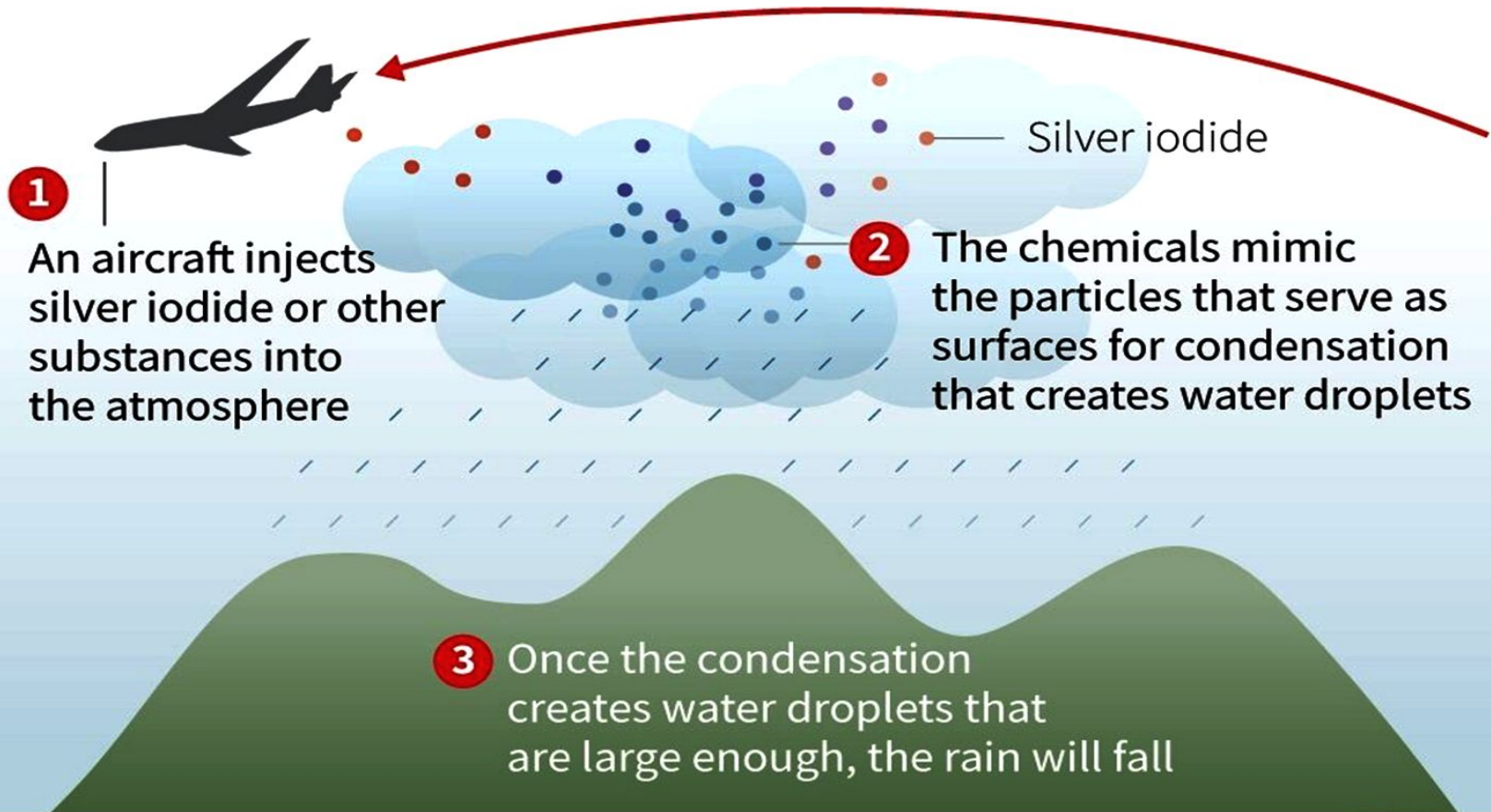


What is cloud seeding ??



Cloud seeding

Traditional method of rainmaking, in use since the 1940s



he Nation'
Jnity and

using the

104. The 7th edition of the Indian Ocean
Conference was held at

(a) Dhaka

(b) New Delhi

(c) Malé

(d) Perth

Topics



- AI in drug development
- Can parties be derecognised or de registered ??
- Trade Protectionism
- Mapping - New caledonia, Nagorno karabakh
- **Mains**



By saurabh Pandey



The use of AI in drug development

What are target proteins and how are they identified? How do AI-based tools AlphaFold 3 and RoseTTAFold All-Atom help in predicting the correct target protein and its interactions with drugs? Where does India stand in the field of computational drug development?

EXPLAINER

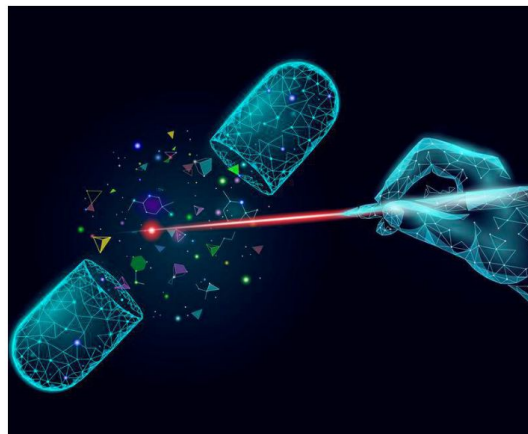
Binay Panda

Drug development is an expensive and time-consuming process. However, the advent of Artificial Intelligence (AI) has opened up a world of possibilities with respect to fast-tracking drug development.

How does the process start?

The process of developing a drug starts with identifying and validating a target. A target is a biological molecule (usually a gene or a protein) to which a drug directly binds in order to work. The overwhelming majority of targets are proteins. Only those proteins with ideal sites where drugs can go and dock to do their business are druggable proteins.

Target proteins are identified in the discovery phase, wherein a target protein sequence is fed into a computer which looks for the best-fitting drug out of millions in the library of small molecules for which the structures are stored in the computer. The process assumes that the structures of the target protein and drug are known. If not, the computer uses models to understand the sites where a drug can bind. This discovery process avoids time-consuming laboratory experiments that require expensive chemicals and reagents and have a high failure rate. Once the suitable protein target and its drug are identified, the research moves to the pre-clinical phase, where the potential drug candidates are tested outside a biological system, using cells and animals for the drug's safety and toxicity. After this, as part of the clinical phase, the drug is tested on a small number of human patients before being used on more patients for efficacy and safety. Finally, the drug undergoes regulatory approval and marketing and post-market survey phases. Due to a high failure rate, the discovery phase limits the number of drugs that pass and carry on to



GETTY IMAGES

the pre-clinical and clinical phases.

How can AI help this process?

AI has the potential to revolutionise target discovery and understand drug-target interaction by drastically cutting down time, increasing the accuracy of prediction of interaction between a drug and its target, and saving money. The development of two AI-based prediction tools, AlphaFold and RoseTTAFold, developed by researchers at DeepMind, a Google company, and the University of Washington, U.S., respectively, has provided a major scientific breakthrough in the last four years in the area of computational drug development. Both tools are based on deep neural networks. The tools' neural networks use massive amounts of input data to produce the desired output – the three-dimensional structures of proteins. Published recently, the new avatars of AlphaFold and

RoseTTAFold, called AlphaFold 3 (developed jointly by Isomorphic Labs, a DeepMind spinoff) and RoseTTAFold All-Atom, respectively, take the capability of these tools to an entirely new level. The significant difference between the upgraded versions and their previous forms is their capability to predict not just static structures of proteins and protein-protein interactions but also their ability to predict structures and interactions for any combination of protein, DNA, and RNA, including modifications, small molecules and ions. Additionally, the new versions use generative diffusion-based architectures (one kind of AI model) to predict structural complexes. In a test with 400 interactions between targets and their small molecule drugs, AlphaFold 3 accurately predicted their interactions 76% of the time versus 40% by RoseTTAFold All-Atom.

What are the drawbacks?

With all the promise and potential in drug development, AI tools have limitations. For example, the tools can, at best, provide up to 80% accuracy in predicting interactions (the accuracy comes down drastically for protein-RNA interaction predictions). Second, the tools can only aid a single phase of drug development, target discovery and drug-target interaction. It will still have to go through the pre-clinical and clinical development phases, and there is no guarantee that the AI-derived molecules will result in success in those phases. Third, one of the challenges with diffusion-based architecture is model hallucinations, where insufficient training data causes the tool to produce incorrect or non-existent predictions. Finally, unlike the previous versions of AlphaFold, DeepMind has not released the code for AlphaFold 3, restricting its independent verification, broad utilisation and use for protein-small molecule interaction studies.

What about India?

Developing new AI tools for drug development requires large-scale computing infrastructure, especially ones with fast Graphics Processing Units (GPUs) to run multiple tasks with longer sequences. GPU chips are expensive, and with newer and faster ones being produced by hardware makers every year, they have a quick expiration date. India needs such large-scale computing infrastructure. That, along with a lack of skilled AI scientists, unlike in the U.S. and China, is the second reason why researchers in India could not establish a first-mover advantage in developing AI tools for drug development despite the country having a rich history in protein X-ray crystallography, modelling and other fields of structural biology. However, with a growing number of pharmaceutical organisations, India can lead the way in applying AI tools in target discovery, identification, and drug testing.

Binay Panda is Professor at JNU, New Delhi and posts at @ganitilabs.

THE GIST

▼ The process of developing a drug starts with identifying and validating a target. A target is a biological molecule (usually a gene or a protein) to which a drug directly binds in order to work.

▼ AI has the potential to revolutionise target discovery and understand drug-target interaction by drastically cutting down time, increasing the accuracy of prediction of interaction between a drug and its target, and saving money.

▼ The development of two AI-based prediction tools, AlphaFold and RoseTTAFold, developed by researchers at DeepMind, a Google company, and the University of Washington, U.S., respectively, has provided a major scientific breakthrough in the area of computational drug development.



AI in drug discovery & development

Aggregating and synthesizing information



- Combines new RNA sequencing technologies with proprietary machine learning
- Mine data to help quickly identify the direct targets of a novel drug

TRL 5

Understanding disease mechanisms



- Analysis of genome-wide screens
- Identify proteins involved in regulating the cell cycle
- Discovery of the next generation of therapies against cancer.

TRL 3



- Training computer vision and machine learning models on cryo-EM data
- Provide detailed spatial 3D structure of proteins and molecular complexes
- CryoSPARC System™ software enables reconstructions of research and drug targets.

TRL 8

Generating novel drug candidates



- Structure-based deep CNN
- Predict bioactivity of small molecules
- Predict new active molecules for targets with no previously known modulators
- Development of agricultural pesticides (partnered with Monsanto)

TRL 5



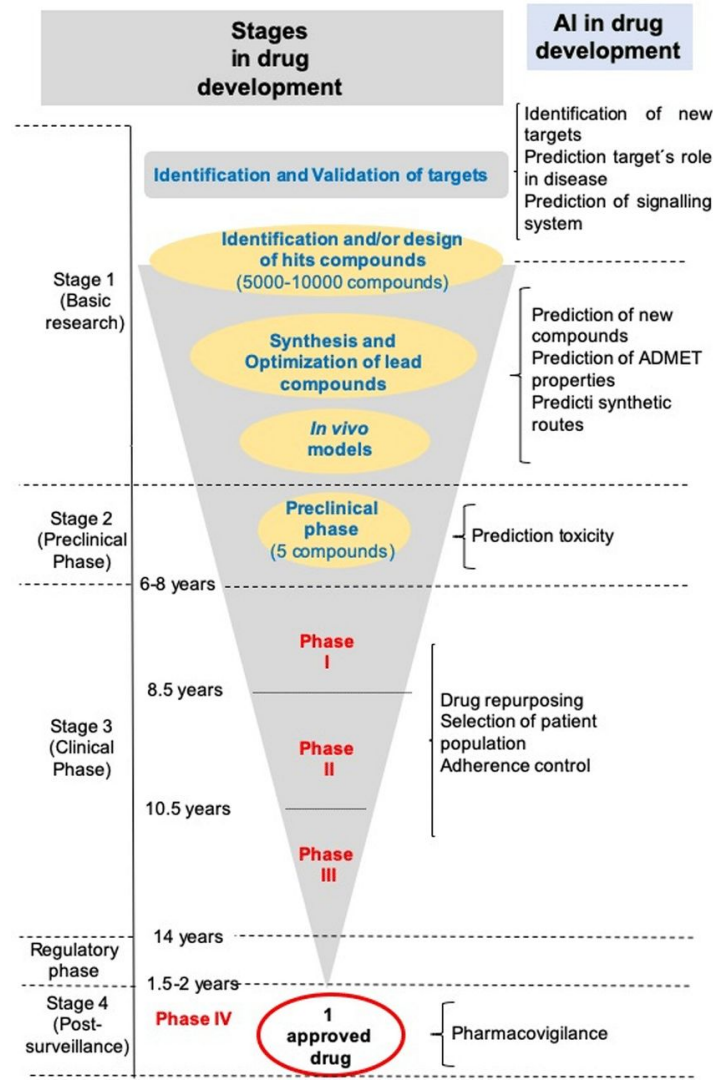
- Screen compound libraries for efficacy against a disease
- Identify biologic targets
- Uncover novel disease biology hypotheses supported by real world data.

TRL 4

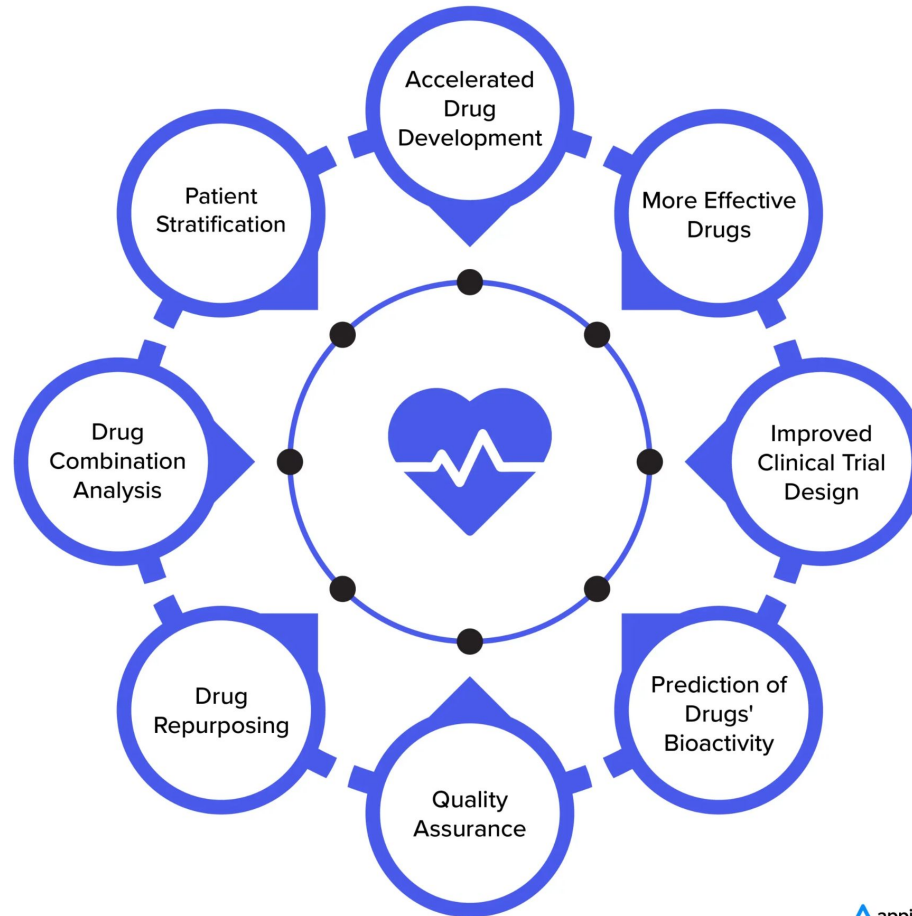


- Network-based machine learning approach
- Measure metabolite masses fast and inexpensively
- Predict the identity of each metabolite mass
- Integrate data with other large-scale molecular datasets

TRL 3



Ways in Which AI Transforms Drug Discovery



How can AI help this process?

- **AI has the potential to revolutionise target discovery and understand drug-target interaction by drastically cutting down time, increasing the accuracy of prediction of interaction between a drug and its target, and saving money.**
- **The development of two AI-based prediction tools, AlphaFold and RoseTTAFold, developed by researchers at DeepMind, a Google company, and the University of Washington, U.S., respectively, has provided a major scientific breakthrough in the last four years in the area of computational drug development. Both tools are based on deep neural networks**

- **AlphaFold 3 (developed jointly by Isomorphic Labs, a DeepMind spinoff) and RoseTTAFold All-Atom, respectively, take the capability of these tools to an entirely new level.**
- **The significant difference between the upgraded versions and their previous forms is their capability to predict not just static structures of proteins and protein-protein interactions but also their ability to predict structures and interactions for any combination of protein, DNA, and RNA, including modifications, small molecules and ions.**

About GPU

- What does GPU stand for?
- Graphics processing unit, a specialized processor originally designed to accelerate graphics rendering.
- GPUs can process many pieces of data simultaneously, making them useful for machine learning, video editing, and gaming applications.
- GPUs may be integrated into the computer's CPU or offered as a discrete hardware unit.

Can parties be de-recognised or de-registered?

Does the Election Commission have the power to de-recognise a political party for violation of the MCC?

Rangarajan. R

The story so far:

The Election Commission of India (ECI) in its report on enforcement of Model Code of Conduct (MCC) has stated that it expects star campaigners to lead by example and not vitiate the fabric of society. This has raised a debate about ECI powers to rein in MCC violations.

What are registered parties?

Section 29A of the Representation of the People Act, 1951 (RP Act) lays down the requirements for registration of a political party with the ECI. Any political party that seeks registration should submit a copy of its memorandum/constitution. Such document should declare that the party shall bear true faith and allegiance to the Constitution of India. It should also bear allegiance to the principles of socialism, secularism and democracy, and uphold the sovereignty, unity and integrity of India. Registered political

parties enjoy the following legal benefits - (a) tax exemption for donations received under Section 13A of the Income Tax Act, 1961, (b) common symbol for contesting general elections to the Lok Sabha/State Assemblies, and (c) twenty 'star campaigners' during election campaign. As per the ECI, there are 2,790 active registered political parties in India.

What are recognised parties?

A registered party is referred to as a Registered Unrecognised Political Party (RUPP). Political parties are recognised as a 'national' or 'State' party under the provisions of The Election Symbols (Reservation and Allotment) Order, 1968 (Symbols Order) by the ECI. The criteria for recognition at the 'national' or 'State' level consists of winning requisite number of seats and/or obtaining required percentage of votes in a general election to Lok Sabha or State Assembly. At present, there are six 'national' parties, and sixty-one 'State' parties that have been recognised. These recognised

parties enjoy additional concessions of having a reserved symbol during elections and forty 'star campaigners'.

What are the issues?

It has been noticed that less than a third of RUPPs contest elections. The RP Act does not confer explicit powers on the ECI to de-register any political party if it fails to contest elections, conduct inner-party elections or lodge requisite returns. The Supreme Court in *Indian National Congress versus Institute of Social Welfare & Ors* (2002) had held that the ECI does not have power to de-register any political party under the RP Act. It may de-register only under exceptional circumstances like registration being obtained by fraud or the political party ceasing to have allegiance to the Constitution or if it is declared unlawful by the Government. The RUPPs that don't contest elections raise concerns over the possible misuse of income tax exemption and donations collected being used for money laundering.

The MCC prohibits using caste and communal feelings to secure votes, and bribing or intimidation of voters. Recognised political parties are guilty of violating the MCC on various occasions. However, it has been observed that the ECI on such occasions at best bars leaders from campaigning for a short period of two to three days.

What needs to be done?

The ECI in its memorandum for electoral reforms (2016) has suggested amendment to the law that would empower the ECI to deregister a party. The Law Commission in its 255th report (2015) on 'Electoral reforms' has also recommended amendments for de-registration of a political party if it fails to contest elections for 10 consecutive years. These recommendations should be implemented. Under Paragraph 16A of the Symbols order, the ECI has the power to suspend or withdraw recognition of a recognised political party for its failure to observe MCC or follow lawful directions of the Commission. It has probably been used only once for three weeks in 2015 when the recognition of National People's Party was suspended for failure to follow the directions of the ECI. Strict action under this provision would have a salutary effect in ensuring adherence to the MCC.

Rangarajan R is a former IAS officer and author of 'Polity Simplified'. He trains civil-service aspirants at 'Officers IAS Academy'. Views expressed are personal.



THE GIST

Section 29A of the Representation of the People Act, 1951 (RP Act) lays down the requirements for registration of a political party with the ECI.

The Supreme Court in *Indian National Congress versus Institute of Social Welfare & Ors* (2002) had held that the ECI does not have power to de-register any political party under the RP Act.

The ECI in its memorandum for electoral reforms (2016) has suggested amendment to the law that would empower the ECI to deregister a party.

EC - Registered vs Recognised party

- **The Election Commission of India (ECI) in its report on enforcement of Model Code of Conduct (MCC) has stated that it expects star campaigners to lead by example and not vitiate the fabric of society.**

What are registered parties?

- **Section 29A of the Representation of the People Act, 1951 (RP Act) lays down the requirements for registration of a political party with the ECI.**
- **Any political party that seeks registration should submit a copy of its memorandum/constitution.**
- **Such document should declare that the party shall bear true faith and allegiance to the Constitution of India.**

- **It should also bear allegiance to the principles of socialism, secularism and democracy, and uphold the sovereignty, unity and integrity of India.**
- **Registered political parties enjoy the following legal benefits – (a) tax exemption for donations received under Section 13A of the Income Tax Act, 1961, (b) common symbol for contesting general elections to the Lok Sabha/State Assemblies, and (c) twenty ‘star campaigners’ during election campaign.**

What are recognised parties?

- A registered party is referred to as a **Registered Unrecognised Political Party (RUPP)**.
- Political parties are recognised as a ‘national’ or ‘State’ party under the provisions of **The Election Symbols (Reservation and Allotment) Order, 1968 (Symbols Order)** by the ECI.
- The criteria for recognition at the ‘national’ or ‘State’ level consists of winning requisite number of seats and/or obtaining required percentage of votes in a general election to Lok Sabha or State Assembly.

- **At present, there are six ‘national’ parties, and sixty-one ‘State’ parties that have been recognised.**
- **These recognised parties enjoy additional concessions of having a reserved symbol during elections and forty ‘star campaigners’.**

What are the issues?

- **It has been noticed that less than a third of RUPPs contest elections.**
- **The RP Act does not confer explicit powers on the ECI to de-register any political party if it fails to contest elections, conduct inner-party elections or lodge requisite returns.**
- **The Supreme Court in Indian National Congress versus Institute of Social Welfare & Ors (2002) had held that the ECI does not have power to de-register any political party under the RP Act.**

- **It may de-register only under exceptional circumstances like registration being obtained by fraud or the political party ceasing to have allegiance to the Constitution or if it is declared unlawful by the Government.**
- **The RUPPs that don't contest elections raise concerns over the possible misuse of income tax exemption and donations collected being used for money laundering.**

- **The MCC prohibits using caste and communal feelings to secure votes, and bribing or intimidation of voters.**
- **Recognised political parties are guilty of violating the MCC on various occasions.**
- **However, it has been observed that the ECI on such occasions at best bars leaders from campaigning for a short period of two to three days.**

What needs to be done?

- **The ECI in its memorandum for electoral reforms (2016) has suggested amendment to the law that would empower the ECI to deregister a party.**
- **The Law Commission in its 255th report (2015) on ‘Electoral reforms’ has also recommended amendments for de-registration of a political party if it fails to contest elections for 10 consecutive years.**
- **These recommendations should be implemented. Under Paragraph 16A of the Symbols order, the ECI has the power to suspend or withdraw recognition of a recognised political party for its failure to observe MCC or follow lawful directions of the Commission.**

Overcapacity claims by U.S., Europe are 'trade protectionism', says China



Reuters

BEIJING

China said on Thursday that U.S. and European assertions of excess capacity were “naked trade protectionism” and that efforts to constrain new energy exports from the World’s No.2 economy would frustrate global efforts to tackle climate change.

Growing alarm over Chinese industrial overcapacity flooding the European Union with cheap products is opening a new front in the West’s trade war with Beijing, which kicked off with Washington’s import tariffs in 2018.

“A country cannot be labelled as having excess capacity just because it has



Tricks of the trade: Supply and demand need to match and be adjusted according to a global perspective, a spokesperson said. AFP

more capacity than it needs,” He Yadong, a Commerce Ministry spokesperson said.

“Production and consumption are global, and supply and demand need to match and be adjusted

according to a global perspective.”

Steep tariff

On Tuesday, the Biden administration unveiled steep tariff increases on \$18 billion of exports, in-

cluding a quadrupling of tariffs on Chinese new energy vehicles.

“Demand for new energy products will continue to expand in this global green transformation,” Mr. Yadong said, comparing China’s dominance in green technologies to Boeing and Airbus’ duopoly in the global aviation market.

He asserted that global new energy vehicle sales needed to increase if the international community is to achieve carbon neutrality by 2030.

“The countries concerned are worried about their competitiveness and market share,” Mr. Yadong added.

“Overcapacity is not a product, it is an anxiety.”

Trade Protectionism

1. Trade protectionism refers to government policies and actions taken to restrict or limit international trade in order to protect domestic industries from foreign competition.
2. It involves the implementation of various measures to shield domestic producers from foreign competitors and safeguard local employment and industries.
3. The primary objective of trade protectionism is to promote and support domestic industries, improve the trade balance, and preserve national economic interests.
4. Trade protectionist measures can take different forms, including:

5.

Tariffs: Imposing taxes or duties on imported goods, making them more expensive and less competitive compared to domestic products.

Import quotas: Limiting the quantity or value of specific goods that can be imported into a country during a specified period.

Subsidies: Providing financial assistance or incentives to domestic industries to make their products more competitive and reduce their production costs.

Regulatory barriers: Implementing strict regulations, standards, or certifications that foreign products must meet, creating additional hurdles for imports.



Embargoes and sanctions: Completely banning or restricting trade with specific countries for political or economic reasons.

Currency manipulation: Artificially devaluing a country's currency to make exports more competitive and imports more expensive.

Domestic content requirements: Mandating a certain percentage of domestic components or labor in products sold within the country.

YEREVAN

Armenia, Azerbaijan agree deal on disputed sections of shared border



AFP

Armenia and Azerbaijan said on Thursday they had agreed a deal on disputed sections of their shared border, a new step towards normalising ties between the historic rivals. The deal between the two Caucasus nations includes the return to Azerbaijan of four border villages seized by Armenia in the 1990s. AFP

Azerbaijan-Armenia Conflict

TRT WORLD



Source: Wikipedia, BBC

Violence rages in New Caledonia as France rushes security forces to islands

Associated Press

PARIS

Violence raged across New Caledonia for the third consecutive day on Thursday, hours after France imposed a state of emergency in the French Pacific territory, boosting security forces' powers to quell deadly unrest in the archipelago where some residents have long sought to break free from France.

French authorities in New Caledonia and the Interior Ministry in Paris re-

ported that five people, including two police officers, have been killed in the violence after protests earlier this week over voting reforms pushed by President Emmanuel Macron's government turned deadly.

At least 60 members of the security forces were injured and 214 people were arrested in the Thursday's clashes with police, arson and looting, according to the territory's top French official, High Commissioner Louis Le Franc.

Two members of the is-

At least 60 members of the security forces were injured and 214 people were arrested in the clashes

land's Indigenous Kanak community were among the five dead, French Interior and Overseas Territories Minister Gerald Darmanin said on Thursday.

Mr. Darmanin said 10 people, all alleged members of the pro-independence movement known

as The Field Action Coordination Unit, have been placed under house arrest. In April, the group had backed several protests against French authorities on the island.

The National Council of Chiefs of the Indigenous Kanak people condemned "all acts of vandalism and gun violence" as "unjustifiable," but rejected the allegations that members of The Field Action Coordination Unit have been involved in the deadly violence.



Stay invested

India should not tailor its ties with Iran to U.S. foreign policy changes

By signing a 10-year agreement with Iran to develop and operate the Chabahar port, India has taken its infrastructure and trade partnership with the Islamic Republic to the next level despite tensions in West Asia. India will invest \$120 million and offer a credit facility of \$250 million to further develop the terminal it operates in Chabahar's Shahid Beheshti port and related projects. However, after the deal was signed, the U.S. State Department said entities considering business deals with Iran "need to be aware that they are opening themselves up to and the potential risk of sanctions". In the past, American sanctions on Iran had delayed the project. Conceived in 2003, the project did not take off for years after the U.S. and the UN imposed sanctions on Tehran over its nuclear programme. India signed a memorandum of understanding in 2015 after Washington eased sanctions on Iran following that year's nuclear agreement, and in 2016, the contract was executed during Prime Minister Narendra Modi's Iran visit. The U.S.'s unilateral withdrawal from the nuclear deal in 2018 and reimposition of sanctions on Iran raised questions on India's continued cooperation with Tehran. But India managed to win a carve-out from U.S. sanctions that allowed it to operate the port through ad hoc measures.

The Chabahar port is critical for India's connectivity plans. First, it offers an alternative route to Afghanistan and Central Asia by bypassing Pakistan, allowing better trade with Central Asia. And, Chabahar is expected to be connected to the International North-South Transport Corridor (NSTC), bringing India closer to Europe through Iran, Azerbaijan and Russia. An alternative to the Suez route, a fully operational NSTC would reduce the time and money spent on inter-continental trade. The port, roughly 200 km from Pakistan's Gwadar, where China is developing a port as part of its BRI, would also help India expand its geopolitical influence in Central Asia. But the U.S. seems to have taken a narrow view of the project over its hostility with Iran. America's interests in the region have also changed. In 2018, when U.S. forces were backing the Islamic Republic government in Afghanistan, it gave a sanctions waiver to India as Kabul also stood to benefit from the port project. Today, U.S. troops are out of Afghanistan, the Taliban has replaced the Islamic Republic, and the U.S.'s focus is on containing Iran. India, in the past, had taken U-turns in its Iran engagement depending on the policy changes in Washington DC. It should not do that any more. It should stay invested in Chabahar and seek to improve its trade and connectivity projects with Central Asia, which is essential for India's continued rise.





AFGHANISTAN

KABUL

IRAN

PAKISTAN

NEPAL

GWADAR

INDIA

Myanmar

CHABAHA
PORT

MUMBAI

Saudi Arabia

Oman

Yemen

Bay
of
Bengal

72 KM

Distance
between the
Chabahar &

Chabahar Port



- **Signing a 10-year agreement with Iran to develop and operate the Chabahar port, India has taken its infrastructure and trade partnership with the Iran to the next level despite tensions in West Asia.**
- **India will invest \$120 million and offer a credit facility of \$250 million to further develop the terminal it operates in Chabahar's Shahid Beheshti port and related projects.**
- **However, after the deal was signed, the U.S. State Department said entities considering business deals with Iran "need to be aware that they are opening themselves up to and the potential risk of sanctions".**

- **The U.S.'s unilateral withdrawal from the nuclear deal in 2018 and reimposition of sanctions on Iran raised questions on India's continued cooperation with Tehran.**
- **The Chabahar port is critical for India's connectivity plans.**
- **First, it offers an alternative route to Afghanistan and Central Asia by bypassing Pakistan, allowing better trade with Central Asia.**
- **And, Chabahar is expected to be connected to the International North-South Transport Corridor (NSTC), bringing India closer to Europe through Iran, Azerbaijan and Russia.**

- **An alternative to the Suez route, a fully operational NSTC would reduce the time and money spent on intercontinental trade.**
- **The port, roughly 200 km from Pakistan's Gwadar, where China is developing a port as part of its BRI, would also help India expand its geopolitical influence in Central Asia.**
-

- **America's interests in the region have also changed.**
- **In 2018, when U.S. forces were backing the Islamic Republic government in Afghanistan, it gave a sanctions waiver to India as Kabul also stood to benefit from the port project.**
- **Today, U.S. troops are out of Afghanistan, the Taliban has replaced the Islamic Republic, and the U.S.'s focus is on containing Iran.**

Forest Fire

Causes of Forest Fire

Forest fires are caused by Natural causes as well as Man made causes

- **Natural causes - Many forest fires start from natural causes such as lightning which set trees on fire. However, rain extinguishes such fires without causing much damage. High atmospheric temperatures and dryness (low humidity) offer favorable circumstance for a fire to start.**
- **Man made causes - Fire is caused when a source of fire like naked flame, cigarette or bidi, electric spark or any source of ignition comes into contact with inflammable material.**

Classification of Forest Fire

Forest fire can broadly be classified into three categories;

- **Natural or controlled forest fire.**
- **Forest fires caused by heat generated in the litter and other biomes in summer through carelessness of people (human neglect) and**
- **Forest fires purposely caused by local inhabitants**

Types of Forest Fire

The types of forest fire are as follows

- **Surface Fire** - A forest fire may burn primarily as a surface fire, spreading along the ground as the surface litter (senescent leaves and twigs and dry grasses etc) on the forest floor and is engulfed by the spreading flames.
- **Underground Fire** - The fires of low intensity, consuming the organic matter beneath and the surface litter of forest floor are sub-grouped as underground fire. In most of the dense forests a thick mantle of organic matter is found on top of the mineral soil. This fire spreads in by consuming such materials. These fires usually spread entirely underground and burn for some meters below the surface. This fire spreads very slowly and in most of the cases it becomes very hard to detect and control such type of fires. They may continue to burn for months and destroy vegetative cover of the soil. The other terminology for this type of fire is Muck fires.

●

- **Ground Fire** - These fires are fires in the sub surface organic fuels, such as duff layers under forest stands, Arctic tundra or taiga, and organic soils of swamps or bogs. There is no clear distinction between underground and ground fires.
- The smoldering under ground fires sometime changes into Ground fire.
- This fire burns root and other material on or beneath the surface i.e. burns the herbaceous growth on forest floor together with the layer of organic matter in various stages of decay.
- They are more damaging than surface fires, as they can destroy vegetation completely. Ground fires burn underneath the surface by smoldering combustion and are more often ignited by surface fires.

●

- **Crown Fire** - A crown fire is one in which the crown of trees and shrubs burn, often sustained by a surface fire.
- A crown fire is particularly very dangerous in a coniferous forest because resinous material given off burning logs burn furiously.
- On hill slopes, if the fire starts downhill, it spreads up fast as heated air adjacent to a slope tends to flow up the slope spreading flames along with it.
- If the fire starts uphill, there is less likelihood of it spreading downwards.

- **Firestorms** - Among the forest fires, the fire spreading most rapidly is the firestorm, which is an intense fire over a large area.
- As the fire burns, heat rises and air rushes in, causing the fire to grow.
- More air makes the fire spin violently like a storm.
- Flames fly out from the base and burning ember spew out the top of the fiery twister, starting smaller fires around it.
- Temperatures inside these storms can reach around 2,000 degrees Fahrenheit.

Vulnerability

- **The youngest mountain ranges of Himalayas are the most vulnerable stretches of the world susceptible to forest fires.**
- **The forests of Western are more frequently vulnerable to forest fires as compared to those in Eastern Himalayas.**
- **This is because forests of Eastern Himalayas grow in high rain density. With large scale expansion of chirr (Pine) forests in many areas of the Himalayas the frequency and intensity of forest fires has increased.**

- **During the British period, fire was prevented in the summer through removal of forest litter all along the forest boundary.**
- **This was called "Forest Fire Line" This line used to prevent fire breaking into the forest from one compartment to another.**
- **The collected litter was burnt in isolation. Generally, the fire spreads only if there is continuous supply of fuel (Dry vegetation) along its path.**

Precautions

The followings are the important precautions against fire:

- **To keep the source of fire or source of ignition separated from combustible and inflammable material.**
- **To keep the source of fire under watch and control.**
- **Not allow combustible or inflammable material to pile up unnecessarily and to stock the same as per procedure recommended for safe storage of such combustible or inflammable material.**
- **To adopt safe practices in areas near forests viz. factories, coalmines, oil stores, chemical plants and even in household kitchens.**
- **To incorporate fire reducing and fire fighting techniques and equipment**



But in memory Without a permanent place to stay, a single source of income, and knowledge of the local language, migrant workers in Hyderabad live on the edge while the bricks they lay become landmarks in cities, villages, towns.

The death and disappearance of migrant workers

Lakhs of marginalised people, often from Scheduled Castes and Scheduled Tribes, from Bihar, Uttar Pradesh, Chhattisgarh and West Bengal come to Hyderabad every year to do out a living at construction sites. They live hard lives, and are the unseen workers of a city driven by money and power. **Indu Siddharth Kumar Singh**

In May 15, Uddhava, a 27-year-old migrant worker, sat outside the memory of the government-run Gandhi Hospital in Secunderabad, he was waiting for the post-mortem results of his relatives, who were victims of a construction site wall collapse at Bachupally in Hyderabad, after the recent rains.

Seven people, including a four-year-old child, died on May 8, after the wall collapsed on the migrant workers' settlements. All of them hailed from Odisha, Chhattisgarh, and West Bengal. It has put the spotlight on the risks that migrant workers are forced to take, when they leave their homes and come to work, unprotected by state or employer, in chaotic urban centres.

"It has been some days since the accident, yet the building owner where we were employed, has not reached out with any assistance. I earn ₹500 daily, but today, I could not work as I have been here at the hospital. I am not sure how will I make it for this loss," Uddhava says.

By 9 p.m., the doctors handed over the bodies to the police, who in turn gave them to the friends and families of the deceased. Transporting the bodies to their hometowns would take ₹50,000.

One worker remarked, "If I labour on a site for six months, this is all I will be able to save." The families and fellow workers of the victims were unable to proceed and transport a single body due to the exorbitant transportation expenses.

While the workers engaged in dialogue with the police, a man approached them and handed over a letter written by the building owner. The letter stated that the workers were not responsible for the accident and they were not entitled to any compensation.

According to the letter, on behalf of the 'Twain Cities' Contractors' Association, the building owner offered his condolences and proposed a compensation of ₹1.5 lakh per victim.

Immediate assistance of ₹50,000 will be provided to facilitate the transportation of bodies to their native villages, with the remaining ₹1 lakh to be disbursed to cheque upon presentation of a family member's identity proof," a policeman said, while reading the letter out loud.

Finally, after spending about 12 hours outside the mortuary, the workers left.

This is not the first time that migrant workers had died in Hyderabad. In March 2022, up to 11 men from Bihar were killed in a house at a timber de-

pot. Today, it is difficult to find the site of the five buildings that claimed their lives. There are no memorials, nothing to remember them by.

Without a permanent place to stay, a regular source of income, and knowledge of the local language, migrants live on the edge while the bricks they lay become landmarks in cities. The lives of migrant workers remain unchanged, whether they are hired to construct a three-store apartment or a towering 40-storey high-rise.

Telling from dawn to dusk: Work on a construction site begins at 5 a.m., extending up to 5 p.m. mostly, and does not stop for temperatures soaring to 40 degrees Celsius. Basic amenities—clean water, sanitation, and electricity—are missing, leaving them vulnerable to disease and discomfort. Piling 11 to 12 hours they cannot afford a single day off from work can mean a missed meal for their families. At a construction site, where babies lie in the sun, heat and dust are everywhere.

According to Telangana's Department of Labour, Employment Training and Fisheries, there are an estimated 1.5 to 1.6 lakh migrant workers currently employed in different parts of the state. The number was eight to 10 lakh before the COVID-19 pandemic, and an official.

On the Yousufulla Madhava Nagar road, hundreds of labourers congregate along the roadside, hopeful of a contractor offering them some work, emerging a day's sustenance. These labour-

ers not only include construction workers but also individuals skilled in carpentry, painting, and plumbing.

"I live in Krishna Nagar with my husband and his two brothers. We come here daily hoping for work, but, not every day brings us joy," shared Smita, a labourer hailing from Samastipur, Bihar. "In this relentless heat, we endure hours of waiting until someone approaches us with work."

She highlighted the challenges faced by women: "It's difficult for everyone, but men have the advantage of diversifying into painting and carpentry. In contrast, women like us are often given the repetitive task of transporting materials from one location to another. Also, we are paid less than men."

Amresh Shah, who hails from Tekamgarh in Uttar Pradesh, is presently employed as a worker at a 40-storey, residential project at Akhils. "If we work on such sites and don't have alternative accommodation, we are typically provided shelter within the premises," he explained. "For us, it becomes a home for the next few years as these projects usually take two to three years until completion."

However, the issue of wage payment, Amresh said, has his role as a Painter of Paint (PO) worker, while integral to the site, is not directly tied to construction progress, leading to lower wages. He earns ₹500 per day. "My work involves site maintenance, while others are prepared, and because of this, individuals in this line of work are paid less compared to other construction workers," he said.

Now 25 years old, he recalled his journey since leaving his hometown at 20, to settle in Hyderabad. "Back then, Hyderabad wasn't providing the emergence of such towering structures, and developers in builders were primarily used to provide support for workers like us," he reminisced.

"When I started working, my daily wage was ₹100-120. After 15 years of labour across different cities, I now earn ₹500 per day, but then ₹65 was sufficient to make ends meet, unlike today's ₹500 per day," he added.

Amresh currently lives in a rented accommodation at Bhanu Nagar with his wife and their five-year-old child. "I've been alone, I could consider staying at the construction site, but I can't expose my wife and child to the constant dust and pollution there," he explained. "Our house rent is ₹2,000 per month. Initially, his wife too worked at a construction site, but with no one to take care of their child, she now stays home with him."

On his last visit to his hometown, Amresh's 23-year-old cousin, Saham, joined him in Hyderabad to work together at the Akhils site. "I arrived in Hyderabad only six months ago, and since I am currently working as a site helper, my daily wage is ₹200," Saham said.

Saham finished school in his hometown, but was unable to pursue higher studies due to financial constraints. Prior to arriving in Hyderabad, he engaged in various odd jobs in small towns near his village. "Initially, I stayed with Amresh, but later, being single, I opted to move into the accommodation provided at the construction site," he said.

Most of these workers did not visit their hometowns to vote for the Lok Sabha elections, citing the impracticality of such a decision when it comes to their livelihoods. The primary problems were the long travel time and logistical challenges. For instance, workers from Uttar Pradesh or Bihar would need to endure a two-day train journey to reach cities like Gurgaon or Patna, and then proceed to their hometowns, before reporting the same arduous journey back to Hyderabad. "Moreover, with peak travel seasons, even those who make reservations 120 days in advance, struggled to secure tickets," a worker said.

Workers move In 2016, the Telangana Building and Other Construction Workers Welfare Board (TBWCWB) was established by the state government in accordance with Section 8 (i) of the Building and Construction Workers Welfare Boards Act, 1947. The primary objective of the board is to provide for the welfare of construction workers, ensuring they are provided with safe working conditions and financial benefits. Additionally, the board extends support for healthcare services and offers

The board has classified 54 types of workers under the term "construction workers," whereby registration with the board renders them eligible for various welfare schemes. A total of 11 such schemes are offered to these registered workers. These include financial assistance such as ₹20,000 under the Marriage Gift Scheme for the wives of male workers, ₹1 lakh in relief for fatal accidents, and ₹10,000 in relief for fatal accidents for unemployed workers.

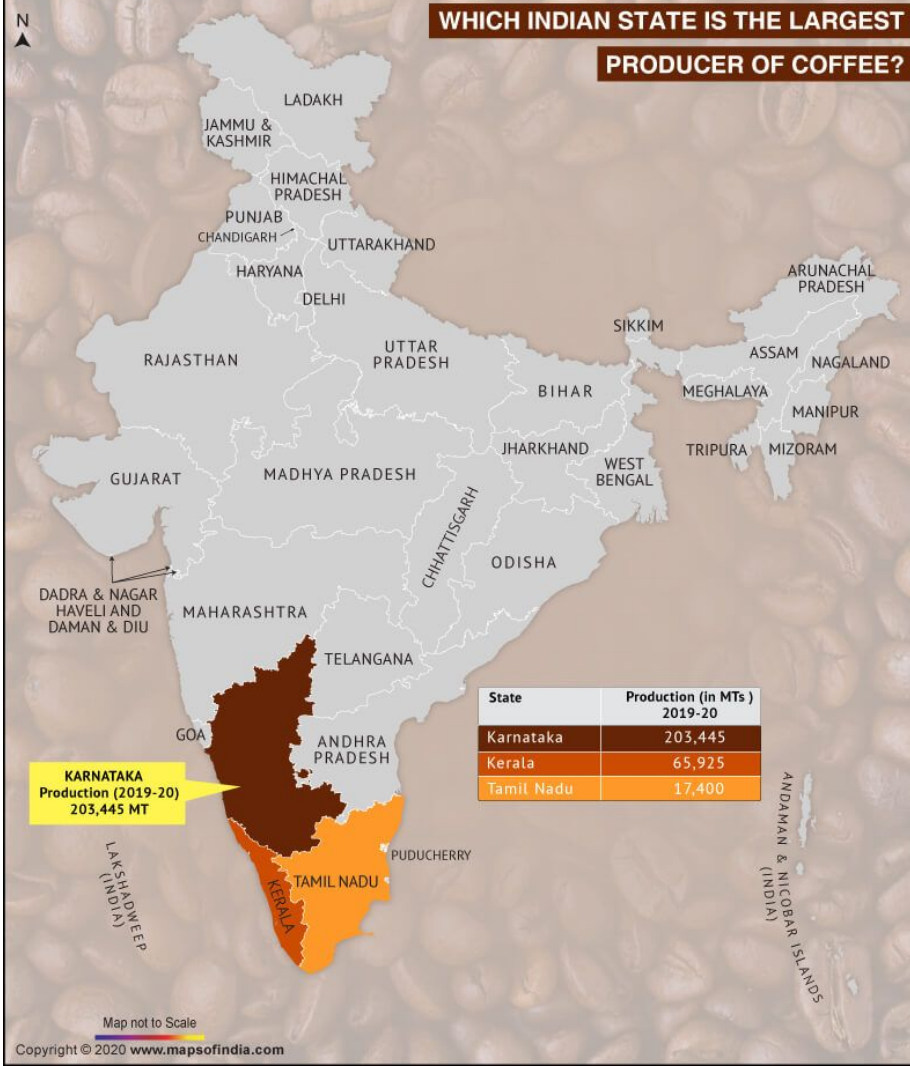
Amresh said, "In the Bachupally accident, the deceased workers were not registered with the board. Therefore, the government provided ₹50,000 as compensation along with ₹20,000 towards funeral expenses.

To register with the board, a worker only needs to pay ₹50 for a one-time membership, with an additional ₹60 for a five-year subscription, including ₹10. He can thereby encourage contractors and builders associations in Hyderabad and throughout the state to ensure their workers are registered with us. Additionally, we conduct routine inspections at construction sites to verify compliance with the prescribed rules and regulations," said the officer.

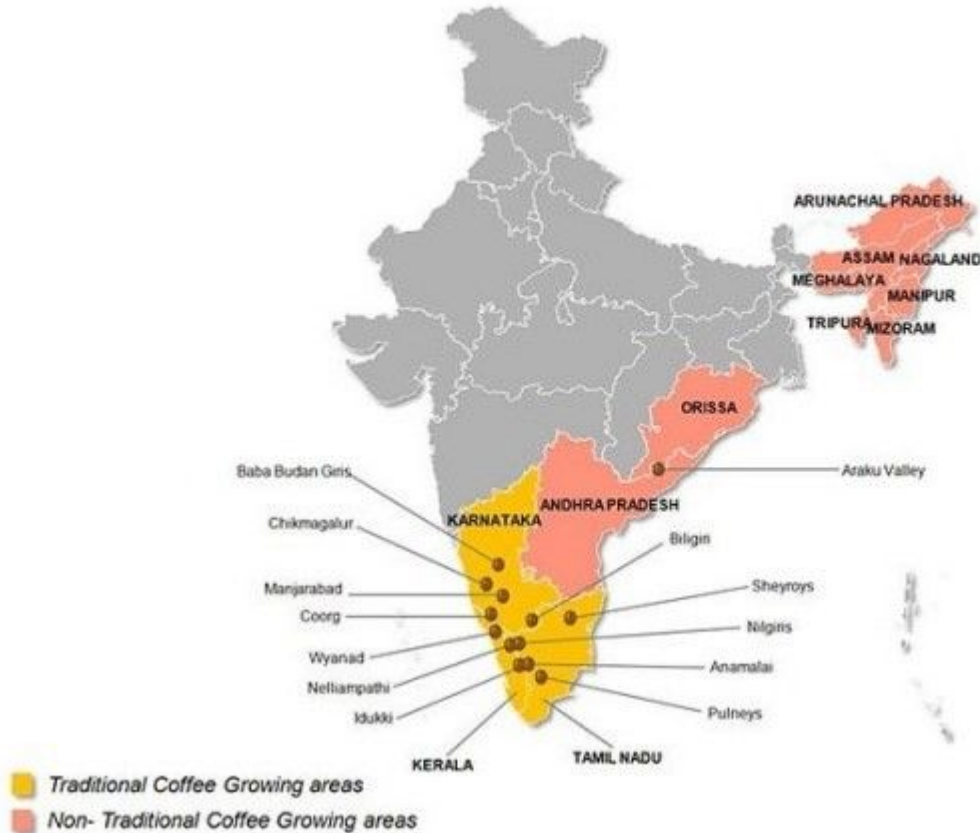


WHICH INDIAN STATE IS THE LARGEST

PRODUCER OF COFFEE?



Coffee Producing Areas of India



Coffee growing regions in India can be grouped under three distinct categories:



Traditional areas representing the southern states of Karnataka, Kerala and Tamil Nadu.



Non-traditional areas comprising Andhra Pradesh and Orissa in the Eastern Ghats of the country.



Traditional areas representing the southern states of Karnataka, Kerala and Tamil Nadu.

The plantations in the south are the cradle of Indian coffee. They include the Bababudangiris in Karnataka, known as the birthplace of coffee in India. The Eastern Ghats and the North Eastern states are newly developed areas of coffee.

Factors	Arabica	Robusta
Soils	Deep, fertile, rich in organic matter, well drained and slightly acidic (Ph6.0-6.5)	Same as Arabica
Slopes	Gentle to moderate slopes	Gentle slopes to fairly level fields
Elevation	1000-1500m	500-1000m
Aspect	North, East and North- East aspects	Same as Arabica
Temperature	15 ^o C – 25 ^o C ; cool, equable	20 ^o C – 30 ^o C; hot, humid
Relative humidity	70-80%	80-90%
Annual rainfall	1600-2500 mm	1000-2000 mm
Blossom showers	March- April (25-40mm)	February – March (25-40 mm)
Backing showers	April-May (50-75 mm) well distributed	March-April (50-75 mm) well distributed

'China-Russia partnership is not directed against anyone'

An emerging multipolar world is now taking shape before our eyes, says Russian President Vladimir Putin as he concludes his two-day visit to China; he praises talks with Xi as substantive

Associated Press

BEIJING

Russian President Vladimir Putin concluded a two-day visit to China on Friday, emphasising the countries' burgeoning strategic ties as well as his own personal relationship with Chinese leader Xi Jinping as they sought to present an alternative to U.S. global influence. Mr. Putin praised the growth in bilateral trade while touring a China-Russia Expo in the northeastern city of Harbin. He met students at the Harbin Institute of Technology, which is said to work closely with the People's Liberation Army.

Harbin, capital of China's Heilongjiang pro-



Vladimir Putin and Xi Jinping holding an informal meeting at the Zhongnanhai leadership compound in Beijing on Thursday. AFP

vince, was once home to many Russian expatriates and retains some of that history in its architecture, such as the central St. Sophia Cathedral, a former Russian Orthodox church.

Speaking to reporters, Mr. Putin thanked Xi and praised their talks as "sub-

stantive," saying he spent "almost a whole day, from morning till evening" with the Chinese leader and other officials in Beijing the previous day.

The partnership between China and Russia "is not directed against anyone," Mr. Putin said in a

veiled reference to the West. "It is aimed at one thing: creating better conditions for the development of our countries and improving the well-being of the people of China and the Russian Federation."

Rebuke for U.S.

But he still had a backhanded rebuke for the U.S., and others who oppose the Moscow-Beijing relationship, saying an "emerging multipolar world ... is now taking shape before our eyes".

"And it is important that those who are trying to maintain their monopoly on decision-making in the world on all issues ... do everything in their power to ensure that this process goes naturally," he said.

Zhongnanhai



- Zhongnanhai is a compound that houses the offices of and serves as a residence for the leadership of the **Chinese Communist Party (CCP)** and the **State Council**.
- It was a former imperial garden, and is located adjacent to the **Forbidden Palace** in **Beijing**.
- The term *Zhongnanhai* is often used as a **metonym** for China's central government and its leadership at large.
- The **state leaders**, including the president, general secretary of the CCP, and other top party and state **leadership figures** carry out many of their day-to-day administrative activities inside the compound, such as meetings with foreign dignitaries.



Back there: A lynx released during the first experimental reintroduction of two Iberian lynxes in Spain. AFP

Endangered Iberian lynx population doubles in 3 years

Agence France-Presse

MADRID

The number of endangered Iberian lynx in the wild in Spain and Portugal has nearly doubled since 2020 to surpass 2,000 last year, the Spanish government said on Friday.

A total of 722 lynx were born in 2023 bringing their total number in the two countries to 2,021, a record high since monitoring of the species began and up from 1,111 just three years earlier, Spain's environment Ministry said in a statement. This rise "allows us to continue to be optimistic about the reduction of the risk of extinction of the Iberian lynx," it added.

Known for its pointy ears, long legs and leopard-like spotted fur, the species was on the brink of extinction just two decades ago due to poaching, road accidents, as well as a dramatic decline due to disease in wild rabbits numbers, the lynx's main prey. When the first census of the spotted nocturnal cat was carried out in 2002, there were fewer than 100 specimens in the Iberian Peninsula.

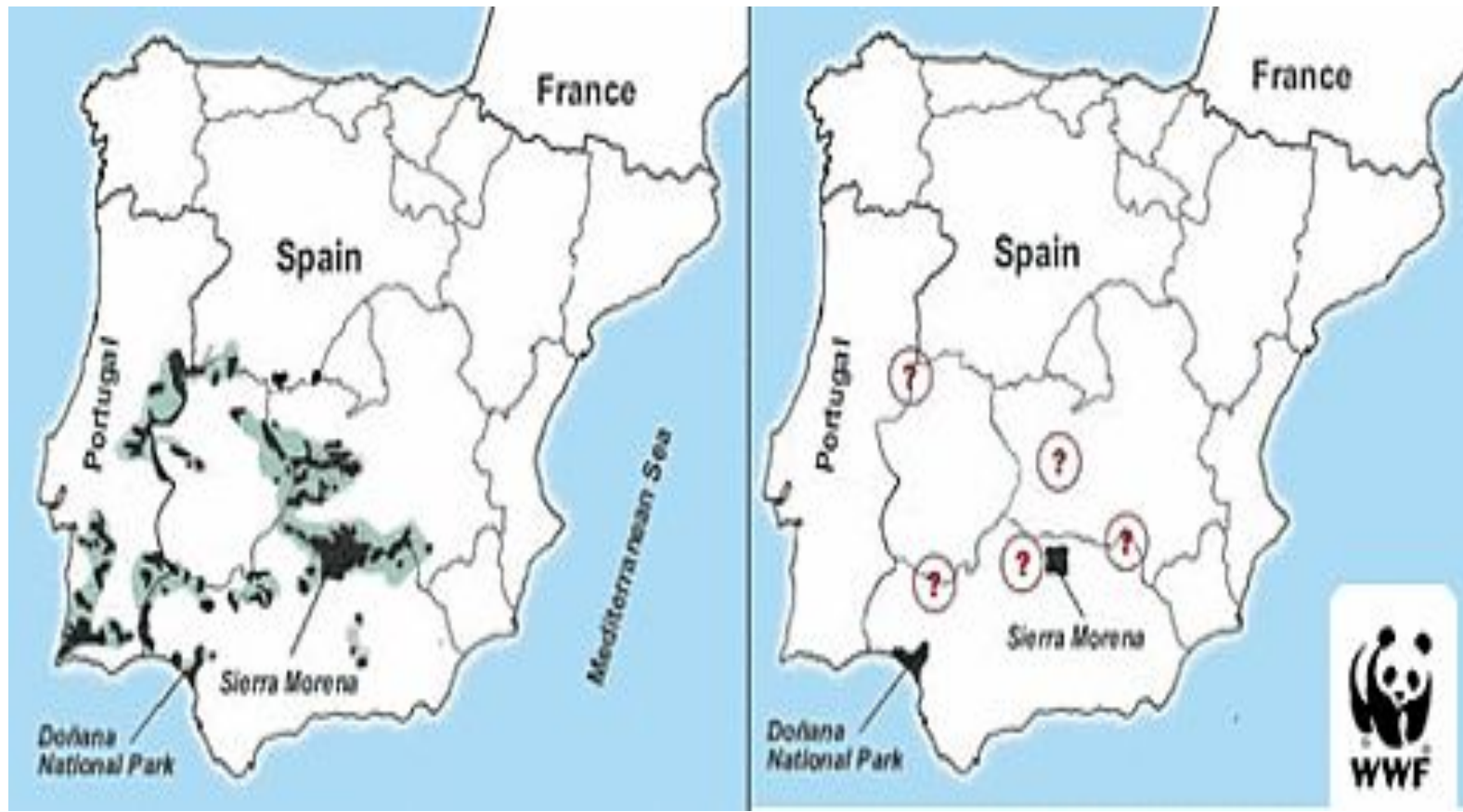
The Ministry party attributed the boom in lynx numbers to the success of a captive breeding and reintroduction programme launched in 2011. "The recovery of the Iberian lynx population in Spain and Portugal constitutes one of the best examples of conservation actions for endangered species in the world," it said. The Ministry said the Iberian lynx population had continued to rise since 2015 when the International Union for Conservation of Nature downgraded the threat level to "endangered" from "critically endangered" – its highest category before extinction in the wild.

Iberian lynx

- **The number of endangered Iberian lynx in the wild in Spain and Portugal has nearly doubled since 2020 to surpass 2,000 last year, the Spanish government .**
- **Known for its pointy ears, long legs and leopard-like spotted fur, the species was on the brink of extinction just two decades ago due to poaching, road accidents, as well as a dramatic decline due to disease in wild rabbits numbers, the lynx's main prey**

Physical Description

The Iberian lynx is heavily spotted and weighs about half as much as the Eurasian species, with long legs and a very short tail with a black tip. Its coat is tawny with dark spots and it bears a characteristic "beard" around its face and prominent black ear tufts.



The Iberian lynx has been brought to the brink of extinction because of a combination of threats:

- **Decreasing food base**
- **Car hits**
- **Habitat loss and degradation**
- **Illegal Hunting**

Pilgrims' progress



Pilgrims of the Triana brotherhood gather prior to crossing the Quema river in Villamanrique, Spain, on their way to the village of El Rocio for the pilgrimage. Thousands gather in traditional outfits as they make their way on horseback and on board decorated carriages. AFP

Quema River

- Pilgrims cross the Quema River on their way to the shrine of El Rocio in Villamanrique, southern Spain 2009 during the annual pilgrimage in which hundreds of thousands of devotees of the Virgin del Rocio converge in and around the shrine.

Topics

- **Lion-tailed macaques**
- **Critical Priority Pathogens**
- **Synuclein alpha (SNCA)'**
- **Stellar nucleosynthesis**
- **Generalized System of Preferences (GSP)**
- **Segara Kerthi,**
- **Human papillomavirus (HPV)**
- **The sea otter**
- **Tomography**
- **Mains**



By saurabh Pandey





With food scarce, lion-tailed macaques leave forest canopies for the urban jungle

Wilson Thomas
COIMBATORE

At 6 a.m., Valparai town in Coimbatore district of Tamil Nadu is a typical hill station with roads largely free of vehicles and people. But there is a bustle of activity near the Sree Muruga temple in the heart of the town. Monkeys with silver-white manes contrasting with shiny coats of black fur and tufted tails have parked themselves on the roofs of buildings, railings and platforms of shops. They are busy looking for something to eat, even food waste or rotten fruits and vegetables. Some look for bits and pieces of biscuits and chips in discarded packets.

While the town comes alive with the arrival of morning buses and tourist vehicles around 7 a.m., the monkeys cross the road, clinging to television cables, to go behind a temple, before eventually heading to their natural habitat at Puthuthottam, around four km from the town.

This is a glimpse of how the lion-tailed macaque

(*Macaca silenus*), an arboreal primate endemic to select rainforests of the Western Ghats, are forced to rummage through urban waste and grab food from houses, while they are supposed to be a shy and largely frugivorous primate that prefer upper canopies of rainforests.

"Six-seven years ago, one wouldn't see these monkeys near Valparai town. Now they are regular visitors and rummage through waste dumped in parts of the town. They also raid workers' quarters and houses for food just as the common monkeys [bonnet macaques] do," says Valparai resident S.P. Murugaiyaya.

The Valparai plateau, known for vast swathes of tea and coffee estates interspersed with forest patches that fall under the Anamalai Tiger Reserve, is one of the 40-odd populations of the lion-tailed macaque in the Western Ghats, spread across Tamil Nadu, Kerala, and Karnataka.

The lion-tailed macaque was reassessed and classified as an 'endangered' species in the IUCN Red

List in 2020, with about 2,500 mature individuals distributed in the Western Ghats hill ranges between the Kalakkad Hills in the south and Sirsi-Honnavaara in the north. The Wildlife (Protection) Act, 1972 gives it the highest conservation priority by listing it under Schedule-I.

Biologists say their current numbers in the wild could range between 3,000 and 3,500. The Valparai plateau is believed to have around 500, making it one of the important populations.

Honnavaalli N. Kumara, Principal Scientist at the Salim Ali Centre for Ornithology and Natural History, who has been studying them for over two decades, says the population at Puthuthottam is at the top of the entire population of the very shy primate in terms of the behavioural change.

"In 1996, there was only one group of 32 individuals at Puthuthottam. The population increased and two groups were formed in 1998. Now there are five groups comprising a little over 200 individuals, of



New pastures: A group of lion-tailed macaques resting on the roof of a building at Valparai in Coimbatore, Tamil Nadu. M. PERIASAMY

which one group is entering Valparai town while another group has got accustomed to human habitations at Rottikadai. A separate group has now started appearing at Iyerpadi on the Pollachi-Valparai road," Dr. Kumara says.

Lack of food

Wildlife biologist Ashni Kumar Dhawale, who studied the groups at Puthuthottam for several years, says the lack of natural food such as fruits throughout the year in their habitats has also pushed the primates to look for alternatives. Most of the fruits in

their diet are seasonal.

The Agumbe ghat section in Shivamogga district in Karnataka, Vellimalai in Theni district in Tamil Nadu and Nelliampathy in Kerala are among the places where they are observed to have lost fear for humans and exhibiting similar behavioural trends, reasons for which include habitat degradation, roads passing through their habitats, increased vehicular movement, food offered by tourists and improper waste management.

"When easily available food in clumped distribution is available, they tend

to prefer them. This attracts them to human settlements and then to town," Dr. Dhawale says.

P.S. Easa, former Director of the Kerala Forest Research Institute and Chairman of the Care Earth Trust, feels roads passing through LTM habitats, which cut off canopy connectivity, force them to come down to the roads to pass to the other side. During the process, people provide them with food and slowly they get accustomed to human food.

"At Nelliampathy, road widening has cut off canopy connectivity for lion-tailed macaques, an endangered species considered to be almost cent per cent arboreal. They come to the road and wait for people, expecting food. But they have not moved to the town as in Valparai," says Dr. Easa, who wanted authorities to address the worrying trend.

Canopy corridors

At the Agumbe ghats, the Karnataka Forest Department has tasked frontline staff with preventing people from feeding them and

driving out those monkeys that come to the road. In Valparai, Tamil Nadu Forest Department staff and persons appointed by the Nature Conservation Foundation are taking similar steps and aiding them to cross the road safely. The NCF has also established canopy corridors across roads that pass through their habitats and is planning to add more.

"This trend is worrying and requires immediate management plans as groups in other populations might also start losing fear and come to roads and human settlements. There can be an increase in road-kill and people's attitude towards them might also change when they start stealing food and causing nuisance," Dr. Kumara says.

By a Tamil Nadu Forest Department estimation, more than 15 lion-tailed macaques were killed in vehicle hits and by electrocution in the past 20 years.

Dr. Dhawale says road accidents claimed three lion-tailed macaques on the Valparai plateau in the past month alone.

"As per studies, the mortality rate of lion-tailed macaques at Puthuthottam is more than 5%," says Dr. Dhawale, who also wanted local bodies to give more focus on waste management, so that endangered animals do not scavenge waste.

Tamil Nadu, in its State Budget this year, announced it will establish a Tamil Nadu Endangered Species Conservation Fund with a corpus of ₹50 crore. The lion-tailed macaque is one of the species to be covered under the fund.

Supriya Sahu, Additional Chief Secretary, Environment, Climate Change and Forest, said the Tamil Nadu Forest Department will take up a study on the lion-tailed macaque. "We will also try and see if we can do the population estimation and then decide the conservation strategy," she said.

The ATR administration, under the leadership of Field Director S. Ramasubramanian, has also sent a proposal to the Forest Department to conduct a study, by roping in experts.

Lion-tailed macaques

Geographic Range

Lion-tailed macaques (*Macaca silenus*) are found only in India in the Western Ghats mountains.

Habitat

Macaca silenus lives in evergreen and semi-evergreen rainforests and monsoon forests.

They typically are associated with broadleaf trees, and can be found at elevations as great as 1,500 m.



- **This species is polygynous. Groups of *M. silenus* typically contain one male and several females and juveniles.**
- **Lion-tailed macaques are arboreal and diurnal.**
- **Lion-tailed macaques are the only macaques in which males use calls to advertise their territorial boundaries**
- **Male macaques are territorial and generally give off a loud call to let entering troops know they are in the area.**

- **Macaques have extensive patterns of communication, typical of diurnal primates. They rely heavily on vocal communication.**
- **"Lion-tailed macaques have 17 different vocal patterns and many types of body movements used to express communication**
- **Lion-tailed macaques are omnivorous but their diet consists mainly of fruit.**
- **They also eat a wide variety of vegetation such as leaves, stems, flowers, buds, and fungi.**
- **They occasionally eat meat from insects, lizards, tree frogs, and small mammals**

Because of their frugivory and their ability to carry fruits in their large cheek pouches, it is likely that these monkeys play some role in seed dispersal.

[IUCN Red List](#) →

Endangered

[More information](#) →

[IUCN Red List](#) →

Endangered

[More information](#) →

[US Federal List](#) →

Endangered No special status

[CITES](#) →

Appendix I

Critical priority pathogens continue to pose threat: WHO

Bindu Shajan Perappadan

NEW DELHI

Critical priority pathogens present major global threats due to their high burden, and ability to resist treatment and spread resistance to other bacteria, noted the latest Bacterial Pathogens Priority List (BPPL) updated by the World Health Organization (WHO). This includes gram-negative bacteria resistant to last-resort antibiotics, and *Mycobacterium tuberculosis* resistant to the antibiotic Rifampicin. The list features 15 families of antibiotic-resistant bacteria grouped into critical, high, and medium categories for prioritisation.

Seven years since it published the last such list, the WHO stated that high-priority pathogens, including salmonella and shigella, are of particularly high burden in low- and middle-income countries, along with *Pseudomonas aeruginosa* and *Staphylococcus aureus*, which pose significant challenges in health-care settings. Antimicrobial Resistance (AMR) occurs when bacteria, viruses, fungi, and parasites

no longer respond to medicines, increasing the risk of disease spread, illness and deaths. "AMR is driven in large part by the misuse and overuse of antimicrobials," the document says.

Other high-priority pathogens such as antibiotic-resistant *Neisseria gonorrhoeae* and *Enterococcus faecium*, present unique public health challenges, including persistent infections and resistance to multiple antibiotics, necessitating targeted research and public health interventions.

"By mapping the global burden of drug-resistant bacteria and assessing their impact on public health, this list is key to guiding investment and for grappling with the antibiotics pipeline and access crisis. Since the first Bacterial Priority Pathogens List was released in 2017, the threat of antimicrobial resistance has intensified, eroding the efficacy of numerous antibiotics and putting many of the gains of modern medicine at risk," Yukiko Nakatani, the WHO's Assistant Director-General for Antimicrobial Resistance *ad interim*, said.

Critical Priority Pathogens



- **Critical priority pathogens present major global threats due to their high burden, and ability to resist treatment and spread resistance to other bacteria, noted the latest Bacterial Pathogens Priority List (BPPL) updated by the World Health Organization (WHO).**
- **This includes gram-negative bacteria resistant to last-resort antibiotics, and Mycobacterium tuberculosis resistant to the antibiotic Rifampicin.**
- **The list features 15 families of antibiotic-resistant bacteria grouped into critical, high, and medium categories for prioritisation**

- **WHO stated that high priority pathogens, including salmonella and shigella, are of particularly high burden in low- and middle income countries, along with Pseudomonas aeruginosa and Staphylococcus aureus, which pose significant challenges in healthcare settings.**
- **Antimicrobial Resistance (AMR) occurs when bacteria, viruses, fungi, and parasites no longer respond to medicines, increasing the risk of disease spread, illness and deaths.**

- **“AMR is driven in large part by the misuse and overuse of antimicrobials,”.**
- **Other high-priority pathogens such as antibiotic-resistant *Neisseria gonorrhoeae* and *Enterococcus faecium*, present unique public health challenges, including persistent infections and resistance to multiple antibiotics, necessitating targeted research and public health interventions**

Balancing two forms of SNCA protein could help manage Parkinson's

Today, Parkinson's is treated symptomatically by increasing the levels of dopamine or, more drastically, by grafting new neurons in place of dead ones. A solution based on the SNCA protein is more desirable because it will offer a more sustainable resolution

Somdatta Karak

Synuclein alpha (SNCA) is a mysterious protein. It's present in healthy cells but we don't know what it does there. It is notorious for its involvement in age-related neurodegenerative diseases. Twenty-seven years ago, researchers first associated SNCA with Parkinson's disease. People with this disease lose neurons that communicate with each other using dopamine as a neurotransmitter in a part of their brains.

These dopaminergic neurons have been found to contain aggregated masses of proteins called Lewy bodies. Most of these proteins are SNCA.

Since then, researchers have reported SNCA in similar aggregates in the brains of people with other neurodegenerative diseases as well. But its presence is most prominent in brains with Parkinson's.

SNCA is abundant in neurons, especially in dopaminergic neurons. It is found near the nuclei of these cells and at the junctions between two neurons. It's capable of misfolding as well as forming filamentous structures. So unlike most other proteins, which take up predictable three-dimensional structures, SNCA can fold in multiple ways. Misfolded proteins don't function correctly.

But beyond these observations, researchers don't understand the dynamics of the formation of these aggregates and how exactly they affect neurons.

Two populations

A recent study from Swasti Raychaudhuri's lab at the CSIR-Centre for Cellular and Molecular Biology, Hyderabad, published in the *Journal of Cell Science*, reported two ways in which SNCA is present as aggregates in cells: one that interferes with the structural integrity of cells' nuclei and another that allows the cell to degrade misfolded proteins. The researchers found that the former are related to diseased states while the latter is important for healthy cells.

As such, the study highlights the importance of striking a balance between these two SNCA populations to manage Parkinson's disease.

The researchers cultivated neurons outside a living body, providing them with nutrients in a laboratory setup. In these neurons, they artificially created structures resembling Lewy bodies by adding some amount of misfolded SNCA, called seeds.

Over time, they found two SNCA populations in the cells: one was around the nuclei, shaped like filaments tens of



A protein called synuclein alpha is notorious for its involvement in age-related neurodegenerative diseases. GETTY IMAGES/ISTOCKPHOTO

micrometres long, much like Lewy bodies. The other population was also around the nuclei but as much smaller clumps called aggresomes. Such aggresomes are formed when cells localise misfolded proteins into a small bunch (like collecting the trash in a corner) for further processing.

Breaching the nucleus

They noticed that the Lewy-body-like structures formed very slowly. Most of the time, the aggresomes took up the SNCA proteins and didn't allow the Lewy-body-like structures to grow. But in their experiment, when the researchers repeatedly seeded neurons with misfolded SNCA, the Lewy-body-like structures formed faster and became big enough to affect other parts of the cell. At one point, they became too populous for the aggresomes to mitigate their prevalence.

The enlarged Lewy-body-like structures were situated at the periphery of the nuclei of the cells, and the researchers have argued that this damages the nuclear envelope. Sometimes, the structures also entered the ruptured nucleus.

A nucleus is the control centre of the cell. It contains the cell's genetic material, and is the seat of upkeep of this genetic material and its utilisation to make proteins. So it is logical that the accumulation of misfolded SNCA would render the nucleus dysfunctional and eventually kill it. In addition, Lewy-body-like structures can pass from one cell to another, so the effect could cascade to neighbouring cells as well.



Twenty-seven years ago, researchers first associated SNCA with Parkinson's disease. People with this disease lose neurons that communicate with each other using dopamine as a neurotransmitter in their brains

Dr. Raychaudhuri's team was able to cross-check its findings in mice with Lewy-body-like structures in their brains. They reported that the increasing prevalence of these structures induced conditions mimicking Parkinson's disease. They also found that all the cells so affected also had damaged nuclear envelopes.

A therapeutic target?

Many Parkinson's disease researchers are focused on reducing the prevalence of SNCA in neurons as a therapeutic measure. Researchers are going about this in various ways, but haven't yet found one that has been approved for sale.

One way is to reduce the cells' SNCA content. A smaller population of SNCA means fewer misfolded SNCA, too. Researchers have achieved this by stopping the SNCA gene from expressing itself or by destroying the SNCA protein inside cells, once the cells make them. However, either of these interventions needs to happen only in select locations: if all the SNCA everywhere is taken away, the animal body will die.

Another workable solution has been to

use a gene-silencing tool, like CRISPR-Cas9, at a precise location. Researchers have tried this method in cell cultures and model animals. But a significant challenge is to cross the blood-brain barrier, a liquid that filters the blood that goes into the brain, and which would also prevent a component CRISPR from passing through.

To surmount this barrier, some researchers have tried to inject molecules that inhibit the SNCA gene through the skull, directly into the desired brain region. Others have used small molecules like modified viruses to beat the barrier. Some researchers have also identified enzymes that degrade proteins in select brain cells, but with varying efficacy.

Another possibility is to stop SNCA from forming large aggregates. Dr. Raychaudhuri has suggested balancing the SNCA population between aggresomes and Lewy bodies. The more SNCA that goes into the aggresomes, the less there will be available to make Lewy bodies. How this can be achieved is still being worked out.

Even if any one of these methods succeeds, it will transform the way Parkinson's disease is treated today. Today, Parkinson's is treated symptomatically by increasing the levels of dopamine or, more drastically, by grafting new neurons in place of dead ones. An SNCA-based solution is more desirable because it offers a more sustainable resolution.

Somdatta Karak, PhD, heads science communication and public outreach at CSIR-Centre for Cellular and Molecular Biology.)

THE GIST

SNCA is abundant in neurons, especially in dopaminergic neurons. It is found near the nuclei of these cells and at the junctions between two neurons. It's capable of misfolding as well as forming filamentous structures. Misfolded proteins don't function correctly

A study reported two ways in which SNCA is present: one that interferes with the integrity of cells' nuclei and another that allows the cell to degrade misfolded proteins. The former are related to diseased states while the latter is important for healthy cells

A smaller population of SNCA means fewer misfolded SNCA. Researchers achieved this by stopping the SNCA gene from expressing itself or by destroying the SNCA inside cells. Either of these interventions needs to happen only in select locations: if all the SNCA is taken away, the body will die

Synuclein alpha (SNCA)



- **Synuclein alpha (SNCA) is a mysterious protein. It's present in healthy cells but we don't know what it does there.**
- **It is notorious for its involvement in age-related neurodegenerative diseases.**
- **Twenty-seven years ago, researchers first associated SNCA with Parkinson's disease.**
- **People with this disease lose neurons that communicate with each other using dopamine as a neurotransmitter in a part of their brains.**

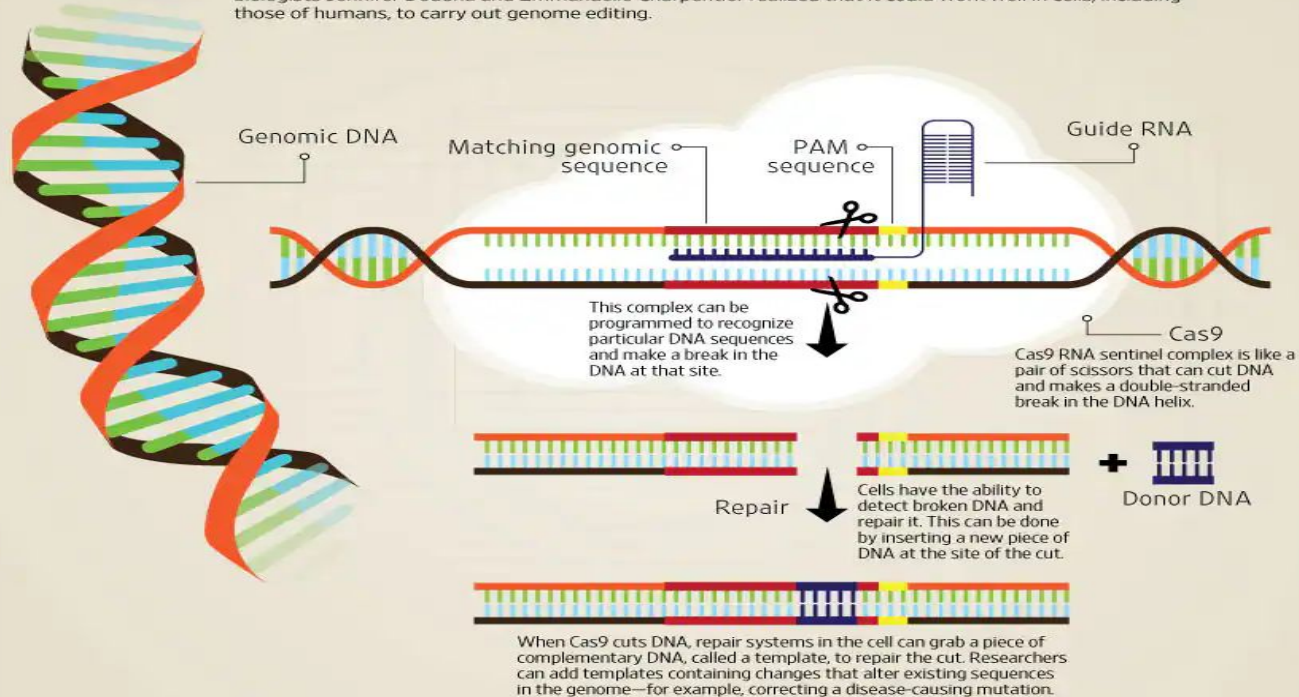
- **SNCA is abundant in neurons, especially in dopaminergic neurons.**
- **It is found near the nuclei of these cells and at the junctions between two neurons.**
- **It's capable of misfolding as well as forming filamentous structures. Misfolded proteins don't function correctly**
- **A study reported two ways in which SNCA is present: one that interferes with the integrity of cells' nuclei and another that allows the cell to degrade misfolded proteins.**
- **The former are related to diseased states while the latter is important for healthy cells A smaller population of SNCA means fewer misfolded SNCA.**



- **Researchers achieved this by stopping the SNCA gene from expressing itself or by destroying the SNCA inside cells.**
- **Either of these interventions needs to happen only in select locations: if all the SNCA is taken away, the body will die**
- **Another workable solution has been to use a gene-silencing tool, like CRISPR-Cas9, at a precise location**

HOW CRISPR WORKS

CRISPR-Cas9, abbreviated from clustered regularly-interspaced short palindromic repeats, is a hybrid of protein and ribonucleic acid (RNA) which works as an efficient hunt-and-cut system in bacteria. Molecular biologists Jennifer Doudna and Emmanuelle Charpentier realized that it could work well in cells, including those of humans, to carry out genome editing.



- When viruses infect a cell, they inject their DNA. In bacterium, the CRISPR system allows that DNA to be plucked out of the virus and inserted in little bits

- into the chromosome of the bacterium.
- These integrated bits of viral DNA get inserted at a site in the bacteria.

- CRISPR allows cells to record over time the viruses that they have been exposed to, so that cells are protected from those viruses.

Nucleosynthesis: the element factory

Karthik Vinod

Stellar nucleosynthesis is the process by which stars forge elements inside their cores. The only element not formed in this way is hydrogen, the most abundant and lightest element in the universe: it was formed in the initial aftermath of the Big Bang.

The cores of stars have crushing pressures and temperature. For example, the sun's core temperature is about 15 million degrees C. In these harsh conditions, the nuclei of atoms undergo nuclear fusion.

The hydrogen nucleus is just one proton. Inside the core, these nuclei come together to form helium nuclei (two protons and two neutrons). This is the p-p (short for proton-proton) process.

In more massive stars, however, stellar nucleosynthesis treads a different path — one dictated by the availability of energy. More massive stars have a higher core temperature. There, in the so-called carbon-nitrogen-oxygen (CNO) cycle, the nuclei of these elements come together in different ways to form elements from helium onwards.

When a star runs out of nuclei to fuse, its core contracts. This in



The cores of stars have crushing pressures and temperature. Representative image. GETTY IMAGES/ISTOCKPHOTO

return increases its temperature, triggering nuclear fusion yet again. This process goes back and forth until the star starts to produce iron in its core. Iron is the lightest element for which fusion consumes more energy than it releases. Elements heavier than iron can only be synthesised outside a star when it goes supernova.

For feedback and suggestions

for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'

Stellar nucleosynthesis



- **Stellar nucleosynthesis is the process by which stars forge elements inside their cores.**
- **The only element not formed in this way is hydrogen, the most abundant and lightest element in the universe: it was formed in the initial aftermath of the Big Bang.**
- **The cores of stars have crushing pressures and temperature.**
- **For example, the sun's core temperature is about 15 million degrees C.**
- **In these harsh conditions, the nuclei of atoms undergo nuclear fusion.**

- **The hydrogen nucleus is just one proton. Inside the core, these nuclei come together to form helium nuclei (two protons and two neutrons).**
- **This is the p-p (short for proton-proton) process.**
- **In more massive stars, however, stellar nucleosynthesis treads a different path — one dictated by the availability of energy. More massive stars have a higher core temperature.**

- **There, in the so-called carbon-nitrogen-oxygen (CNO) cycle, the nuclei of these elements come together in different ways to form elements from helium onwards. When a star runs out of nuclei to fuse, its core contracts.**
- **This in return increases its temperature, triggering nuclear fusion yet again.**
- **This process goes back and forth until the star starts to produce iron in its core. Iron is the lightest element for which fusion consumes more energy than it releases.**

Renew the generalised system of preferences



In the pantheon of obscure international trade terminology, the “generalised system of preferences,” or GSP, has a special place. GSP refers to an approach that has been adopted by nearly all developed countries for roughly the last half-century to offer incentives for economic reform in developing countries through lower tariffs. Each developed country has customised its own GSP programme to identify qualification criteria it deems important in economic reform, although all ensure that their programmes are constructed to avoid harm to domestic production. In short, it is the oldest and most far-reaching approach to “aid for trade” in the modern multilateral trading system, embodied in the World Trade Organization.

Renewing GSP

What is unique about the GSP programme in the U.S. is that its authorising legislation periodically expires until Congress sees fit to renew the programme. New legislation is never an easy proposition, especially in a polarised environment, making bipartisan legislation a herculean endeavour. That is the case with GSP now. The U.S. programme expired in 2020 and despite repeated assurances of bipartisan support, it remains in limbo.

GSP can play a vital role in establishing stable market access for developing countries that otherwise struggle to tap into global trade flows. It can be especially valuable for small businesses and women-owned enterprises, thus helping to empower them beyond limited domestic markets. More recent analysis suggests that GSP is vital in offering alternatives to Chinese imports and providing an advantage to suppliers in trusted developing country markets. GSP criteria promote reforms on labour and environmental sustainability and intellectual property rights protection. GSP



Mark Linscott

is a Senior Advisor at the U.S.-India Strategic Partnership Forum and a former Assistant U.S. Trade Representative in the Bush, Obama, and Trump administrations

It is clear there needs to be higher ambition on trade in order to take the U.S.-India strategic relationship even further

imports also help reduce the tariff bills paid by American companies, many of which are small- and medium-sized enterprises.

The coalitions of support in the U.S. are diverse. Last November, a bipartisan group of Florida members of the House penned a letter expressing their strong support for GSP renewal on an urgent basis, highlighting its importance in sourcing away from China and lowering the tariff bill for Florida’s consumers and manufacturers. In an era of friendshoring and nearshoring, GSP can be an effective tool in pursuing new supply chain objectives. Surprisingly, there is even strong bipartisan support for restarting GSP talks with India.

U.S.-India trade relationship

While there should be no need to offer additional arguments in favour of renewing GSP without further delay, the U.S.-India trade relationship may help to put support over the top. It is accepted wisdom that GSP renewal would offer an avenue for wide-ranging U.S.-India trade negotiations that can help in vaulting the bilateral trade relationship from the \$200 billion it is presently at to a much higher level. It is clear there needs to be higher ambition on trade in order to take the U.S.-India strategic relationship even further.

Before the expiration of the GSP programme in 2020, negotiations between the Office of the U.S. Trade Representative and the Indian Ministry of Commerce and Industry had come close to sealing a wide-ranging deal. Estimates at the time suggested that an unprecedented bilateral trade agreement between the U.S. and India might cover as much as \$10 billion in trade, including medical devices, several agricultural commodities, corn-based ethanol used for fuel, and information technology products.

The U.S. and India have already come a long distance in their trade relationship. Yet the tools they have available to achieve this increase in trade are limited. Even

though India has gone into overdrive in negotiating free trade agreements (FTAs) with a wider circle of trading partners, including the European Union, the U.K., the European Free Trade Association, Australia, and the UAE, the Biden administration is clear that the U.S. will not negotiate FTAs with any country for the moment. There are several trade dialogues between the two, but these lack the leverage for a hard-nosed trade negotiation that can shoot for ambitious results. The private sectors in both countries are teaming up to increase investments in high-profile sectors across critical and emerging technologies from smartphone manufacturing to semiconductor production, but they lack the stability in regulatory certainty and ease of doing business that a strong, enforceable trade agreement can bring.

This is where GSP should come into the picture. Each side would have much to gain through negotiations on India’s GSP benefits when the U.S. Congress acts to renew the programme. Short of a change in U.S. administration policy on negotiating FTAs again, no other trade tool or policy could be more effective with India than GSP. Depending on what qualification criteria the Congress includes in the final renewal legislation, a GSP negotiation could cover trade in goods and services, protections for internationally accepted labour rights and restrictions on child labour, enforcement of environmental laws, and provisions on good regulatory practice and other areas relevant to ease of doing business.

As the U.S.-India strategic partnership continues to grow and the two countries play critical, collaborative roles in the Indo-Pacific, they should aim much higher in their trade relationship. GSP is not the full answer to comprehensively achieving this, but it would be a strong statement of their mutual desire to be on this path.

Generalized System of Preferences (GSP)



- **U.S. trade preference programs such as the Generalized System of Preferences (GSP) provide opportunities for many of the world's poorest countries to use trade to grow their economies and climb out of poverty.**
- **GSP is the largest and oldest U.S. trade preference program.**
- **Established by the Trade Act of 1974, GSP promotes economic development by eliminating duties on thousands of products when imported from one of 119 designated beneficiary countries and territories.**

- **GSP boosts economic growth and development in many developing countries.**
- **In the GSP arrangement, certain imports from beneficiary countries are allowed concessions such as zero tariffs.**
- **GSP involves reduced/zero tariffs of eligible products exported by beneficiary countries to the markets of GSP providing countries.**

Clean-up ritual



Turtle tradition: Men carry a turtle to be released into the sea during the *Segara Kerthi*, a ritual which seeks to physically and spiritually clean the sea, held as part of the opening of the 10th World Water Forum in Serangan Island in Bali in Indonesia on Sunday. REUTERS

Segara Kerthi,

- **Segara Kerthi, a ritual which seeks to physically and spiritually clean the sea, held as part of the opening of the 10th World Water Forum in Serangan Island in Bali in Indonesia.**
- **The Segara Kerthi ritual is carried out to seek blessings from the Almighty for a physically and spiritually clean sea as a source of water.**

HPV vaccine prevents cervical cancer in deprived groups: study

The Hindu Bureau

The human papillomavirus, or HPV, vaccine is cutting cases of cervical cancer right across the socio-economic spectrum, with most cases being prevented in more deprived groups, according to a major study funded by Cancer Research UK.

Until now, there had been concerns that the HPV vaccine could have an unequal impact across society. After carrying out

the longest follow-up on the effectiveness of the HPV vaccine, researchers at Queen Mary University of London concluded the HPV vaccination programme in England is helping to close some inequalities in cervical cancer. The results were published in the journal *BMJ*.

Public interventions

Due to a typically higher incidence of cervical cancer in more deprived groups, researchers found

that more cases were prevented in the most deprived group (around 190), compared to the least deprived group (around 60) in a study that included approximately 6,50,000 people offered vaccination aged 12-18 years in each of the five deprivation groups.

The study reflected the huge success of the school-based vaccination programme, showing that well-executed public health interventions can

help to reduce health inequalities.

The study adds even more weight to the evidence that HPV vaccination works. Researchers found that over a 12-year period, the vaccine reduced cervical cancer incidence rates by nearly 90% and pre-cancerous conditions by around 95% in women who were offered routine vaccination at 12-13 years old in England. The study shows that the vaccine is much more effective

when taken up by children aged eight years (12-13 years) than later in life.

Although the life-saving HPV vaccine currently reaches people from all backgrounds, Cancer Research U.K. warns that some inequalities remain in cervical cancer incidence, and more work is needed to improve the health of the most deprived groups. Overall, cervical cancer rates are higher in people from deprived backgrounds across the

U.K. Researchers said this is partly due to people being at greater risk from HPV and barriers that can drive lower screening attendance.

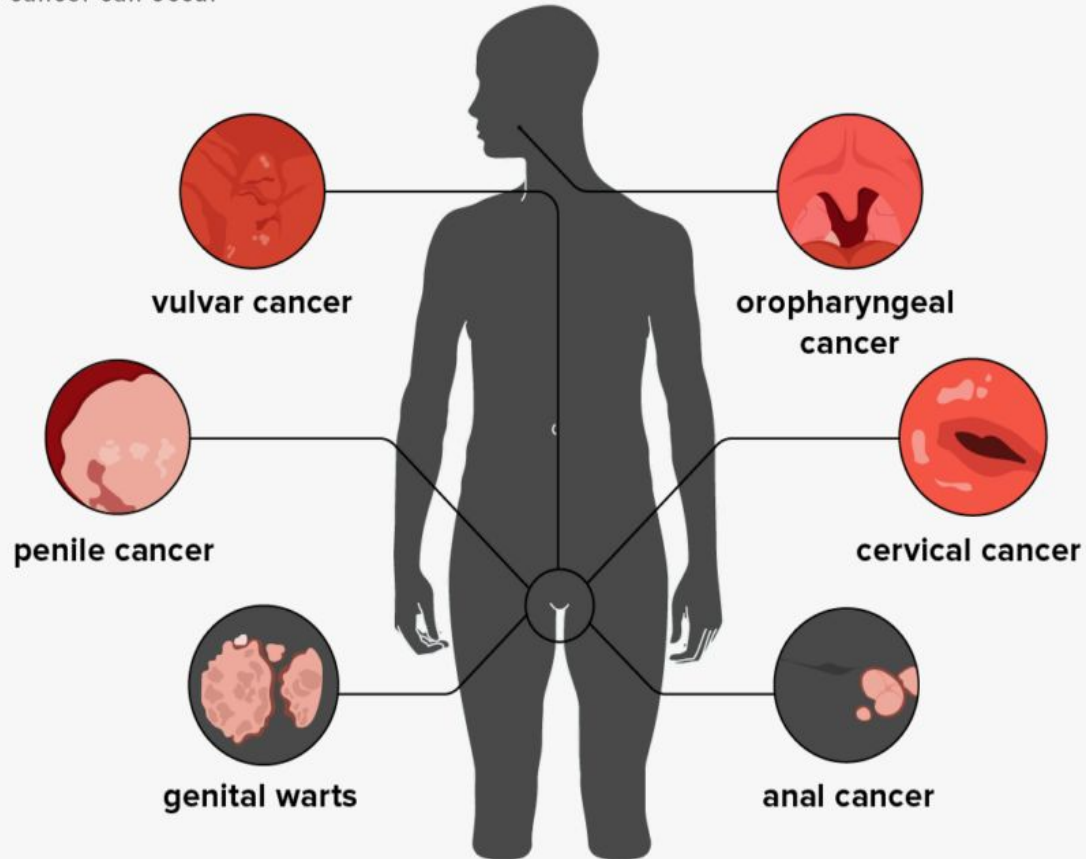
Cancer Research U.K. scientists helped to prove the link between HPV and cervical cancer 25 years ago. Cervical cancer rates in the U.K. have fallen by almost a third since the early 1990s. The HPV vaccination programme was first introduced to England in 2008.

Human papillomavirus (HPV)

- Human papillomavirus (HPV) is a small, non-enveloped deoxyribonucleic acid (DNA) virus that infects skin or mucosal cells.
- The circular, double-stranded viral genome is approximately 8-kb in length.
- Two prophylactic HPV vaccines have been available since 2006.
- Both vaccines are prepared from virus-like particles (VLPs) produced by recombinant technology.

High Risk Papillomavirus (HPV)

Where cancer can occur





Tool use promotes foraging success in sea otters

Using tools, like shells and rocks, to open their often thick-shelled mollusk prey increases foraging success in sea otters and protects their teeth from damage by allowing the animals to eat prey that would otherwise be difficult to obtain. The findings suggest that this behaviour is a necessity for the survival of some otters in environments where preferred prey is in short supply. The tool-use frequency enabled the use of a variety of prey, which led to higher energy consumption rates and reduced tooth wear.



The sea otter

The sea otter can live its entire life without leaving the water.

Its fur is the densest of any animal on Earth—an estimated 1 million hairs per square inch. That's because, unlike its fellow marine mammals, it has no blubber to keep it warm.

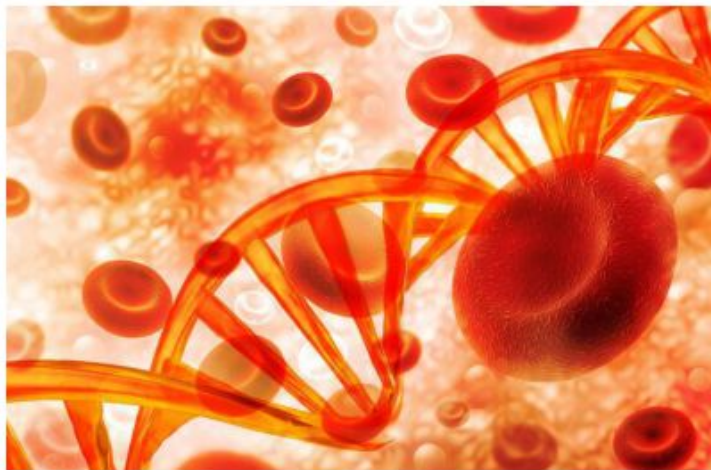
. The sea otter is one of the few mammal species on Earth to use a tool to help it hunt and feed.

It wedges a rock between its chest and the “armpit” of a foreleg and pounds shells against it to open them up.

- **The sea otter also hammers rocks against strongly gripping abalone shells to pry them off of rocks and feed on their tasty insides.**
- **The sea otter is the only marine mammal capable of flipping over boulders on the sea floor—in this case to search out food.**
- **And the only marine mammal to catch fish with its forepaws and not its mouth**

- If a sea otter's fur becomes dirty, it has trouble absorbing the air needed to keep it warm.
- Therefore, sea otters are obsessive about keeping their fur clean, and groom themselves practically non-stop when they're not eating or sleeping.
- International Union for the Conservation of Nature (IUCN) as "endangered."
- polar bears in the Arctic, sea otters are considered keystone species in their ecosystems, because they affect great influence on their environments.

- **For instance, they plentifully eat sea urchins, which eat kelp in great abundance.**
- **When the sea urchins' populations are controlled by sea otters, vital kelp forests can flourish**



Miniaturised probe help track blood clots in tiny arteries

Researchers have engineered a tiny, snake-like imaging probe – a miniaturised endovascular neuro optical coherence tomography – that can navigate the labyrinth of tiny arteries in the brain, offering a tool to guide medical interventions for strokes and other artery conditions. In a human trial, the probe captured disease-linked features in blood vessels, supporting its diagnostic and clinical utility. The probe successfully captured 3D images of the patients' arteries and various artery segments.

Tomography



Tomography is an x-ray technique in which shadows of superimposed structures are blurred out by a moving x-ray tube.



Topics

- HC0+
- Baobab
- Radical democracy
- Windfall tax,
- Brent crude
- Scarborough Shoal
- Political Apathy
- Mains



By saurabh Pandey



An overlooked molecule could solve the Venus water mystery

That Venus is 100,000-times drier than earth is an anomaly that deserves an explanation. Is Venus abnormally dry? Is the earth abnormally wet? Depending on which one is the exception, the implications for planetary habitability are different, a planetary scientist said

Karthik Vinod

More than four billion years ago, Venus had enough water to cover its surface with an ocean 3 km deep. Today, the planet only has enough for this ocean to be 3 cm deep.

Scientists have been able to account for a lot of the water Venus lost in this time – but not all of it. Now, a team of scientists in the U.S. may have made a crucial advance.

The team's findings, reported in a paper in *Nature*, could plug a long-standing gap between the amount of water scientists expected Venus to have lost in the last 4.5 billion years and how much satellite observations say the planet has actually lost, which is a lot more.

"We have a pretty cool thing here," co-author Iryn Gangi, a planetary scientist at the University of Colorado Boulder, told *The Hindu*. "And it was time to release it into the community and see what they make of it."

"The bigger picture is about planetary habitability, and more specifically the history of water on Venus compared to the earth," Emmanuel Marq, a planetary scientist at France's Laboratoire Atmosphères, Milieux, Observations Spatiales, who was not involved in the study, said.

Following the water trail

There are two reasons why Venus lost its water. The first is its hellish atmosphere – a result of its carbon dioxide-rich composition, which causes a strong greenhouse effect. The planet's surface is hotter than water's boiling point, simmering at 450 degrees C. So water can only exist as vapour in Venus' atmosphere.

Second, water was a victim of the planet's proximity to the Sun. The Sun's heat and ultraviolet radiation combined to shred water molecules into their constituent hydrogen and oxygen atoms in Venus's ionosphere – the upper region of the atmosphere, where charged atoms, molecules, and their electrons zoom around at high speeds.

However, we don't know the rates at which these processes happened. "There's a couple different theories about how [water levels] changed over time," Dr. Gangi said. The two theories broadly blame thermal and non-thermal processes for the water loss.

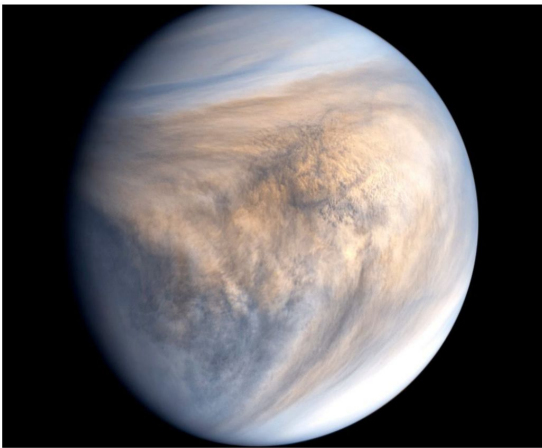
The thermal process refers to hydrodynamic escape. As the Sun heated Venus's outer atmosphere, it expanded, allowing hydrogen gas to leak to space. This escape lasted until the outer atmosphere sufficiently cooled, by about 2.5 billion years ago.

Dr. Gangi and her colleagues' research focused on how water loss occurs in the present day, specifically via a non-thermal process.

They focused on hydrogen atoms escaping Venus to space. Water levels drop as a result because the oxygen atoms left behind have fewer hydrogen atoms with which to form water.

However, estimates of the water loss rate before Dr. Gangi's study suggested the planet had more water than what satellite observations indicated.

Dr. Gangi and her colleagues reported that the discrepancy vanished when they accounted for a chemical reaction that,



Scientists have been able to account for a lot of the water Venus lost, but not all of it. *newH. GALL (C. R. 2.0)*

according to a statement accompanying the paper, the scientific community had overlooked for more than five decades.

The key findings

Dr. Gangi first encountered the formyl cation (HCO⁺) – a positively charged molecule – during her PhD days, when she was studying water loss in Mars' atmosphere.

Scientists have known for a while that HCO⁺ molecules drive hydrogen escape on Mars. According to Dr. Gangi, the Venusian and the Martian upper atmospheres are similar, so she and her colleagues decided to model the same underlying reactions in Venus' ionosphere. On Venus, the team found that a particular reaction, called the HCO⁺ dissociative recombination reaction (DR) occurs in bulk at an altitude of about 125 km, above the clouds made of sulphuric acid.

HCO⁺ is created when a carbon monoxide molecule (CO) loses an electron while absorbing an hydrogen atom. DR is the reverse reaction: HCO⁺ absorbs an electron and breaks up into CO and an hydrogen atom. These energetic hydrogen atoms then escape into space.

The team built models to simulate the influence of this reaction on the upper atmosphere, and found that a accelerated water decline once the hydrodynamic escape of hydrogen gas ended.

Specifically, the researchers found HCO⁺ DR could have doubled the rate at which Venus lost water by hydrogen escape.

This means if Venus had oceans in the past, they could have lasted longer than



The planet's surface is hotter than water's boiling point, simmering at 450 degrees C. So water can only exist as vapour in Venus's atmosphere

expected – because the faster rate of hydrogen escape means the planet could have lost more water in the same amount of time.

Further, the model predicted that the amount of water on Venus would have stayed roughly the same from nearly 2 billion years ago. This is because, as a non-thermal process, the HCO⁺ DR reaction would've gone on indefinitely and drained all the water. (The thermal process was time-bound because the upper atmosphere returned to thermal equilibrium.) Yet Venus still has some water today. According to Dr. Marq, one way water could have been replenished was by comet impacts.

The missing molecule

However, we have no proof that HCO⁺ ions existed in Venus's atmosphere in the first place – let alone proof that they participated in the HCO⁺ DR process.

The authors wrote in their paper that past space missions had neglected looking for HCO⁺ ions, and that orbiters sent to Venus couldn't decipher the chemical signatures of HCO⁺ DR from afar. These missions instead paid attention to other important atmospheric chemical reactions that scientists were interested in. According to Dr. Gangi, there would

have had to be a connection between HCO⁺ DR and water loss on Venus for scientists to have drawn interest.

This said, she said the team's analysis of data collected by the NASA Pioneer Venus orbiter (launched 1978) contained some indirect evidence of HCO⁺ DR.

"By looking at the other molecules that are important in the chemistry to form it, we saw that those are present in an amount that would imply [HCO⁺] should be there," Dr. Gangi said.

Future Venus missions

Dr. Marq referred to a *Nature Astronomy* paper published in April in which scientists reported finding a signature of carbon ions escaping Venus in data collected by the BepiColombo spacecraft. "At least qualitatively, it seems to support the [HCO⁺ DR] model," Dr. Marq said. The quantitative evidence remains wanting.

Dr. Gangi implored scientists working on future Venus missions to look for HCO⁺ in the planet's upper atmosphere. She referred to NASA's MAVEN mission to Mars as an example of a mission dedicated to probing the upper atmosphere. "If we had a similar mission to Venus, I think we could learn a lot."

Most upcoming Venus missions are focused on the lower atmosphere instead.

"The fact that Venus is [100,000-times] drier than the earth is – an anomaly that deserves an explanation," Dr. Marq said. "Is Venus abnormally dry? Is the earth abnormally wet? Depending on which one is the exception, the implications for planetary habitability are different."

Karthik Vinod is an intern with *The Hindu*.

HCO⁺



- formyl cation (HCO⁺) — a positively charged molecule.
- HCO⁺ molecules drive hydrogen escape on Mar
- Dissociative recombination reaction (DR) occurs in bulk at an altitude of about 125 km, above the clouds made of sulphuric acid.
- HCO⁺ is created when a carbon monoxide molecule (CO) loses an electron while absorbing an hydrogen atom. DR is the reverse reaction: HCO⁺ absorbs an electron and breaks up into CO and an hydrogen atom.
- These energetic hydrogen atoms then escape into space



The baobab lineage originated in Madagascar roughly 12 million years ago. REUTERS

The baobab's journey from Madagascar to Africa and Australia

Reuters

The baobab tree is a distinctive sight on the landscape. When its contorted branches are leafless during the dry season, they resemble jumbled roots emanating from a thick trunk, making it appear as if someone had yanked the tree from the ground, flipped it on its head, and jammed it back into the earth.

But the origins and history of the baobab, found in Madagascar and parts of Africa and Australia, have been something of a mystery. A new study has resolved this based on genomic analyses of 48 eight recognised species as well as ecological and geological data.

The baobab lineage originated in Madagascar roughly 21 million years ago and reached Africa and Australia sometime in the past 12 million years, the researchers found. Madagascar, an island off Africa's southeastern coast, is a biodiversity hot spot and home to unusual flora and fauna.

Two baobab lineages went extinct in Madagascar, but not before establishing themselves elsewhere, one in Africa and one in Australia, the study found.

The tale of how a tree crossed the Indian Ocean to put down roots in two distant destinations is dramatic. It appears baobab seed pods floated from

The dispersal to Australia was probably facilitated by the Indian Ocean gyre which likely picked up baobab seed pods as it moved past Madagascar

Madagascar to mainland Africa, located about 400 km to the west, and to Australia, situated more than nearly 7,000 km to the east.

"The plants almost certainly got to Africa and Australia floating on or with vegetation rafts," said botanist Tao Wan of the Wuhan Botanical Garden in China, one of the authors of the study published on May 14 in the journal *Nature*.

"The long-distance dispersal to Australia was probably facilitated by the Indian Ocean gyre, which is an oceanic current that circulates south past Madagascar, where it probably picked up baobab seed pods, before the current swings east to Australia, where it delivered the pods. The current then circulates north and then swings west past Mauritius and to Africa once again, where it completes the gyre," Dr. Wan added.

Baobabs, found in dry savannah habitats, provide food, shelter and nesting sites for wildlife. Their fruits also provide nutrients and medicines for people, and the leaves are edible. The trees produce large, sweet-smelling flowers whose sugary nectar attracts nocturnal pollinators as well as two types of primates, lemurs in Madagascar and bush babies in Africa.

"They can reach huge dimensions ... in both height and diameter, and are reported to live for thousands of years. The root systems are also massive, which are considered to play an important ecological role, helping to slow down soil erosion and enabling nutrient recycling," plant geneticist and study co-author Ila Letch of the Royal Botanic Gardens Kew in London said.

Baobab

origins and history of the baobab, found in Madagascar and parts of Africa and Australia.

The baobab lineage originated in Madagascar roughly 21 million years ago and reached Africa and Australia sometime in the past 12 million years, the researchers found.

Madagascar, an island of Africa's southeastern coast, is a biodiversity hot spot and home to unusual □ Flora and fauna.

Baobabs are long-lived deciduous, small to large trees from 5 to 30 m (20 to 100 ft) tall with broad trunks and compact crowns.



- **Two baobab lineages went extinct in Madagascar, but not before establishing themselves elsewhere, one in Africa and one in Australia, the study found.**
- **The tale of how a tree crossed the Indian Ocean to put down roots in two distant destinations is dramatic. It appears baobab seed pods □ floated from Madagascar to mainland Africa, located about 400 km to the west, and to Australia, situated more than nearly 7,000 km to the east**

- **Baobabs, found in dry savannah habitats, provide food, shelter and nesting sites for wildlife.**
- **Their fruits also provide nutrients and medicines for people, and the leaves are edible.**
- **The trees produce large, sweet-smelling ☐ flowers whose sugary nectar attracts nocturnal pollinators as well as two types of primates, lemurs in Madagascar and bush babies in Africa.**

Radical democracy: why is it still relevant today?

Scientific humanism and its political correlate offer a philosophical perspective of human freedom based on scientific knowledge in an age harangued by orthodoxy and regression

Prathmesh Kher

Periods of crisis call attention to the necessity for a radical reorganisation of society. This was the case with 19th century liberal democracy, which had degenerated into exploitation under capitalism, forcing revolutionaries to seek out a better alternative. In time, a large number of these radicals came under the influence of new collectivist doctrines, which offered a transitional dictatorship and centralised economic planning as a remedy to solve the defects of liberal democracy and capitalist exploitation.

The initial enthusiasm of that revolutionary age came to a close when the "spectre of communism" that had once threatened capitalist hegemony had itself degenerated into a dictatorship. The concurrent rise of 20th century fascism led to the development of a political situation where there were outright dictatorships on one end and what some called, the mere panacea of democratic formalities on the other. With the concluding period of the Second World War, millions were dead and the world was in a state of chaos. Many who had been champions of solving humanity's problems saw dictatorship as no solution at all. However, the question of reconciling the aspirations of freedom, and the desire for justice, continued to remain a quandary as before.

During this period of social crisis, the Indian freedom fighter and humanist philosopher Mahabendra Nath Roy, and his Marxist colleagues, developed a theory which they felt offered a solution—they referred to it as radical democracy.

A new orientation

Before a contour of a radical democratic political economy can be laid out, a scientifically consistent philosophical outlook must be iterated. To this end, Roy and his colleagues developed the philosophy of new humanism.

Humanism, the radicals argued, was as ancient as human beings, and could only be enriched by the new discoveries in scientific thought. A humanism enriched by these new developments in the understanding of the natural world would be best described as 'scientific' or 'new' Humanism.

Human behaviour includes the capacity for rational thought, the radicals argued. "Morality results from man's intelligent response to his surroundings. Therefore, it can be derived from his innate rationality. Since rationality is inherent in human nature, it is only necessary to remind him of his biological heritage, and he will regain faith in himself and undo the harm done to him," Roy writes in his *Reason, Romanticism and Revolution*. The realisation of the possibility of a secular rational morality opens up a new perspective before the modern world. The concepts of human dignity, sovereignty, and creativity, have meaning only when they arise, not as a token to divine writ, but from the rational faculty of the individual.

To that end, Roy proposes in his *New Orientation*, "Revolution is not inevitable... Fundamental changes in the structure of society take place only when there is a group of individuals who feel



ISTOCKPHOTO

the necessity, who see the possibility of fulfilling it, and who can develop an adequate amount of will to bring about the changes which are both necessary and possible." That is, women and men, cognisant of their own capacity for reason, and driven to reshape the conditions around them, can do so by cooperating with each other to develop a just and free society.

A radical approach to elections

Democracy, if it is to mean a mere regularised counting of votes is not much more than deception, particularly if the voters have not had a chance to raise themselves up in dignity. In parliamentary democratic conventions, demagogues take power, by promising utopia to a hapless electorate; though once in power the demagogue is evidently unable to deliver, and must invariably resort to strongarm tactics to ensure retaining political power.

The decay of liberal democracies encouraged the rise of various collectivist doctrines which denied the possibility of individual freedom, ridiculing it as an empty abstraction. These doctrines, in turn, proclaimed that in order to be free the individual must merge himself in the mass. This also favoured political demagogues who preferred a mob that acts on appeals to passions. It was easier to sway voters by calls to their sentiments than to their reason. The more backward a populace is, the more easily they could be swayed by appeals to emotional prejudices. "The character of a party is to be judged not by its ability to catch votes, but by the merit of its proclaimed principles and published programme. The people should be asked to vote not

for professions and promises, but by judging the record of a government...

Under the formal parliamentary system, unscrupulous demagogues can always come to the top," he writes.

A conscious will to freedom, a sense of responsibility and the ability to critically examine the promises and programmes put before the people by parties and politicians are the preconditions for any successful democracy. One must become a judge as to whether such conditions exist in a given society. "To ensure that elections reflect an intelligent public opinion, there has to be an intelligent public opinion first," Roy writes.

The radical democratic approach to election begins with people in their localities meeting in local or regional conferences for discussions. Having come to understand political questions and economic problems for themselves, the people will see that they need not merely vote for this or that party to solve their problems. This would also cultivate the ability for independent judgement and as such the people could choose to elect candidates of their own choice, from amongst themselves.

These candidates would enjoy greater independence since they would not be dependent on any political outfit; they can rely on their own conscience and be directly responsible to the electorate. This would do away with the mechanical nature of party politics and the demagoguery and corruption that comes in as it is taken to sway voters by calls to their sentiments. They would only have the ability to pick independent candidates from amongst themselves but also eventually become the focus of a principled democracy. Empowered with the right of recall and the ability to hold

referendums, these organised local democracies would wield a direct and effective control of the mechanics of the State. A progressive democratic movement can occur only with the intelligent and conscious participation of the individuals who constitute a society. As such, the more individuals choose to think about and participate in the democratic process the more organically democratic it becomes.

A humanist economics

"It is indeed a stupendous task to plan the economic life of a fifth of the human race," Roy had written in his *People's Plan for Economic Development*. Centralisation of politics is concurrent with the centralisation of economics. Under the so-called 'free-market' economies this is done by capitalist concentration of wealth, and under nationalised economies it reverts to State capitalism.

Capitalism produces goods not with the primary consideration of supplying the needs of the people, but of selling them at a profit. When goods cannot be sold with sufficient profit, capitalists will curtail production. This is compounded in the case of countries like India where a large and continually expanding population is seen as detrimental to the economic development of the country. Rapid industrialisation is offered as a solution to many of these problems. However, industries can succeed only on the basis of a home market. A healthy export trade begins only when the home market is satisfied.

"Modernisation of agriculture is the greatest need of the economic life of our country if production of wealth is to be increased. But this is more a matter of organisation of rural economy than of mechanisation," Roy said in a 1940 lecture in Patna. Given the primacy for agriculture, the radical democrats cite three problems that need to be overcome in that regard. Firstly, a lack of irrigation which must be countered by the development of wells, reservoirs, canals, et al. Secondly, an improvement for the fertility of the land which could be incentivised by the State. Thirdly, the development of new roads, and the repair of old ones for the countryside. Finally, an organisation of rural consumers and local industries on a co-operative basis in order to provide employment and income for the rural populace.

A radical democratic programme includes provision for unemployment insurance, old age pension, and other provisions for the upliftment of the citizens. But these must be made with the principle that economic produce is in line with use and with reference to human needs, with a specific focus on the development of health infrastructure, housing and education.

Why radical democracy?

The conditions of the contemporary world present a dismal picture for those who desire for freedom and do not see it as a contradiction to justice. Even as humanity is the most aware it has been about the cosmos and the laws that govern it, it is simultaneously the closest it has ever been to disintegration.

The way out must be one that harkens to the principles of scientific thought and humanist philosophy. Roy writes in *New Humanism*, "The brain is the means of production, and produces the most revolutionary commodity. Revolutions presuppose iconoclastic ideas. An increasingly large number of men and women, conscious of their creative power, 'peccated' by an indomitable will to remake the world, moved by the adventure of ideas, and fired with the ideal of a free society, can create the conditions under which democracy will be possible."

Radical democracy

- **Radical democracy is a type of democracy that advocates the radical extension of equality and liberty.**
- **Radical democracy is concerned with a radical extension of equality and freedom, following the idea that democracy is an unfinished, inclusive, continuous and reflexive process**

- **Radical democracy implies returning to the roots of democracy and its core values**
- **The radical democratic approach to election begins with people in their localities meeting in local or regional conferences for discussions.**
- **Having come to understand political questions and economic problems for themselves, the people will see that they need not merely vote for this or that party to solve their problems.**
- **This would also cultivate the ability for independent judgement and as such the people could choose to elect candidates of their own choice, from amongst themselves**

North Sea energy firms look beyond U.K. after tax squeeze

NEWS ANALYSIS

Reuters
LONDON

North Sea oil and gas producers are merging and shifting overseas as Britain's windfall tax slashes profits and as the opposition Labour Party threatens more tax if it wins the next general election.

The change of strategy could accelerate the decline of domestic production, risking increased dependency on imports, greater vulnerability to higher consumer prices and more job losses.

Oil majors such as Shell, Chevron and Exxon Mobil have long since pulled back from the ageing basin in pursuit of more profitable

oilfields, divesting assets to smaller producers such as Harbour Energy, Ithaca Energy and Serica Energy.

These independent oil and gas producers are now looking further afield and merging to cut costs and boost revenue.

"Unfortunately, the U.K. government has turned the U.K. North Sea into a very harsh business environment," Gilad Myerson, executive chairman of Ithaca Energy, one of the largest North Sea producers, told Reuters last month.

In 2022, the U.K. imposed a 25% Energy Profit Levy on the sector after a jump in energy prices resulting from Russia's invasion of Ukraine swelled profits as consumers faced higher prices, following si-



Lower supplies: Stifel projects that the UK's oil and gas output would halve by 2030. REUTERS

milar measures in other European countries.

Finance Minister Jeremy Hunt subsequently extended the levy until 2029 and raised it to 35%, bringing the total tax burden to

75%, among the highest in the world. The levy, however, exempts most profits that are re-invested in oil and gas production, in what is known as the investment allowance.

"The temporary windfall tax on oil and gas firms actively encourages investment to create jobs and grow the economy—the more investment they make the less tax they will

pay," a spokesperson for the U.K. Treasury said.

The tax wiped out most profits for producers last year and many, including Harbour Energy, the largest North Sea producer pared back investments and cut hundreds of jobs.

Serica acquired smaller rival Tailwind Energy and is eyeing neighbouring North Sea countries.

"We're more interested in doing something that diversifies us outside of the U.K. right now, because that's probably our biggest risk," said David Latin, Chairman of Serica Energy, highlighting opportunities in Norway.

Ithaca, which has stakes in two of the largest remaining undeveloped oil fields in the North Sea, has agreed to combine its oper-

ations with the U.K. assets of Italy's Eni.

"When you have a fiscal challenge, the bigger you are, the stronger you are," Ithaca's Myerson said, adding the company was looking to expand overseas to Norway, Denmark and elsewhere.

Harbour Energy, meanwhile, agreed in December to acquire oil and gas assets from Wintershall Dea in an \$11.2 billion deal which will drastically cut its dependence on the U.K.

Rapid decline

Production in the North Sea has declined to around 1.2 million barrels of oil equivalent per day (boed) in recent years from a peak of over 4.5 million boed in 1999.

Analysts at brokerage

Stifel estimate that over the remaining lifespan of the North Sea basin, a higher tax rate and removal of the investment allowance would lower investment by 30 billion pounds (\$38 billion) a year than its current estimates, leading to a faster decline in output.

Under that scenario, Stifel projects that by 2030, the U.K.'s oil and gas output would halve, and it could be paying around 2.5 billion pounds (\$3.2 billion) a year to import 80% of its gas.

Serica's finance chief Martin Copeland said the recent consolidation in the North Sea has been significantly driven by tax optimization, calling it "a sign of huddling together for warmth against a very, very chill backdrop."

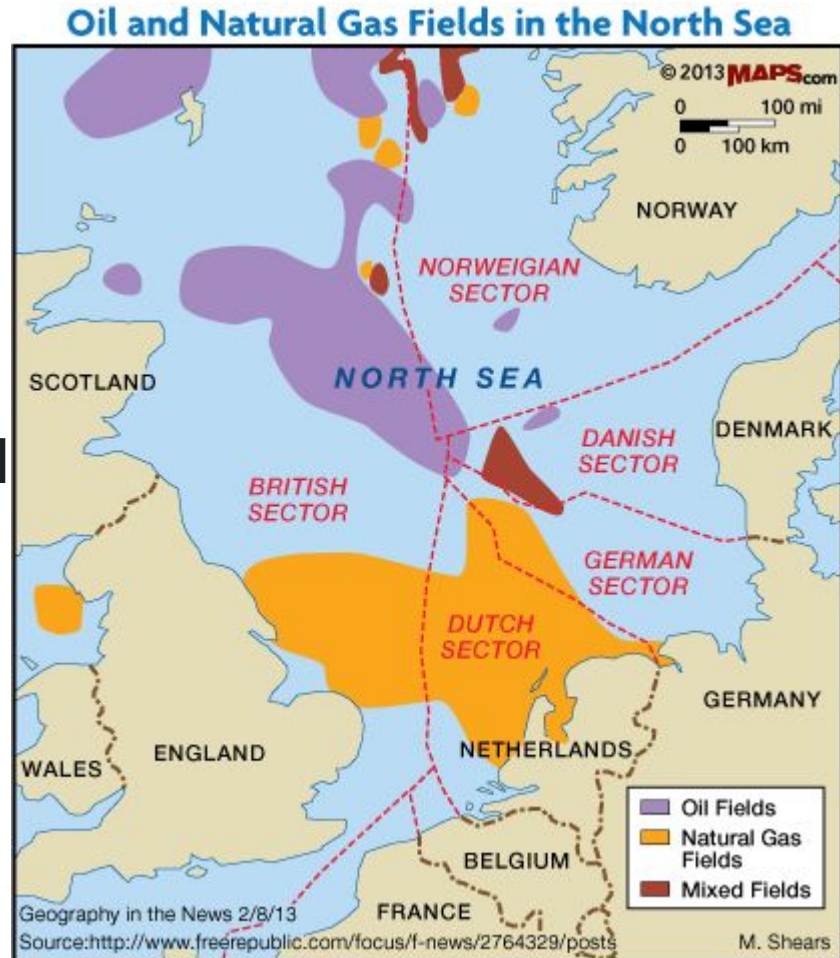
What is Windfall Tax?

A windfall tax is a higher tax levied by the government on specific industries when **they experience unexpected and above-average profits.**

e.g. Petrol prices in India when barrel prices increase.



Brent Crude may refer to any or all of the components of the Brent Complex, a physically and financially traded oil market based around the North Sea of Northwest Europe



Philippines blames China for loss of giant clams in disputed shoal



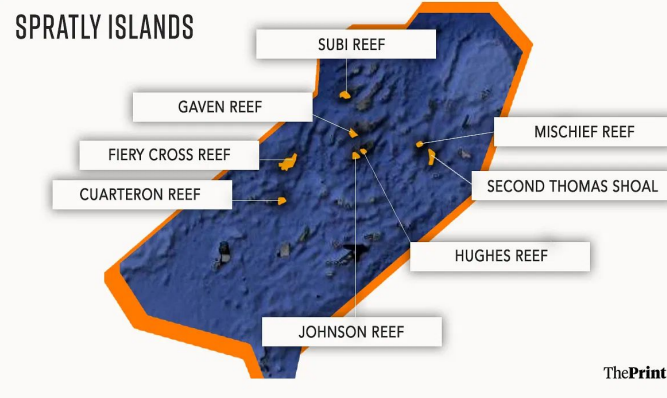
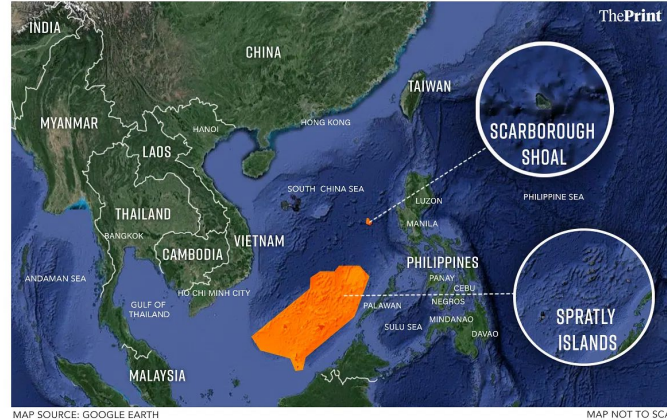
AP

Presenting surveillance photographs, the Philippines blamed Chinese fishermen on Monday for a massive loss of giant clams in the disputed Scarborough Shoal controlled by China's coast guard in the South China Sea and called for an international inquiry into the amount of environmental damage in the area. AP

Scarborough Shoal

- **Scarborough Shoal and the Spratly Islands.** The former is about **120 nautical miles (222 km)** west of the Philippine island of **Luzon** and is considered a part of the Philippines' Exclusive Economic Zone (EEZ).
- **The Spratly Islands** are a group of over **100 islands and reefs**, and while the Philippines claims some parts, China lays claim to the entire archipelago.

China calls the Scarborough Shoal ‘Huangyan Dao’ while the Filipino name for it is ‘Panatag Shoal’ or ‘Bajo de Masinloc’.



- **Located in the middle of the South China Sea and near shipping lanes carrying an estimated \$3.4 trillion of annual commerce, its position is strategic for Beijing.**
- **There are concerns China might one day build a manmade island there, as it has on submerged reefs in the Spratly islands, some equipped with radar, runways and missile systems.**

WHO DOES THE SHOAL BELONG TO?



- **The Philippines and China lay claim to the shoal but sovereignty has never been established and it remains effectively under Beijing's control.**
- **A landmark 2016 ruling on the South China Sea by the Permanent Court of Arbitration, which went largely in favour of the Philippines was not tasked with establishing sovereignty. It ruled China's blockade of the shoal violated international law and said the area was a traditional fishing ground for several countries.**

- **China seized the shoal in 2012 after a standoff with the Philippines and has since maintained a constant deployment of coastguard and fishing trawlers, some accused by Manila of being maritime militia**

'Urban apathy' drives down polling to 60.4%

Election Commission has flagged low turnout in cities such as Mumbai, Thane, Nashik, Lucknow

Maharashtra records the lowest turnout in Phase 5 at 54.33%, West Bengal logs highest at 76.05%

Incidents of violence mar polling in West Bengal with the EC saying it received 1,036 complaints

Sreeparna Chakrabarty
NEW DELHI

The fifth phase of the Lok Sabha election on Monday saw a 60.48% voter turnout till 11.50 p.m., amid reports of minor incidents of violence from West Bengal.

Maharashtra recorded the lowest turnout at 54.33%, while West Bengal saw the highest at 76.05%.

The voting percentage in Bihar was 54.85, Jharkhand 63.09, Odisha 69.34, Uttar Pradesh 57.79 and Lakshadweep 69.62.

The Election Commission (EC) said in a statement that "parliamentary constituencies in various cities such as Mumbai, Thane, Nashik and Lucknow continued the trend of urban apathy as noticed in 2019."

With this phase, polling has ended in all 48 seats of Maharashtra.

Alleging mismanagement by the EC, Shiv Sena (UBT) chief Uddhav Thackeray said the poll body was attempting to sabotage the election and benefit the BJP by less voting.

Polling in West Bengal, which saw the highest turnout, was marred by scattered incidents of violence. Workers of the Trinamool Congress and the BJP clashed in various parts of Barrackpore, Bongaon, and Arambagh.

The EC said it had received 1,036 complaints from different political parties alleging malfunctioning of electronic voting machines (EVMs) and agents being stopped from entering booths.

Clashes broke out between supporters of the Trinamool and the BJP in the Khanakul area of the Arambagh constituency.

In Hooghly, BJP MP and candidate Locket Chatter-



Patient wait: People wait to cast their votes in the Lok Sabha election in Saran of Bihar on Monday. PTI

jee was allegedly heckled when she was on her way to a booth. Violence was also reported from various parts of the Howrah constituency. In the Bongaon constituency, a local BJP leader was allegedly beaten up by Trinamool supporters outside a booth.

EVM glitches were reported from some booths in Odisha and West Bengal.

Rae Bareilly in Uttar Pradesh saw a turnout of 57.85%, while neighbouring Amethi saw 54.15% turning out to vote.

EVM malfunctions

The Congress claimed EVM malfunctioning and accused the BJP of not allowing people to cast votes in certain booths in Rae Bareilly. "Booth number 5, Ra-

sulpur in Sareni in Rae Bareilly is closed since 8 a.m. (and) voters are going back. So this is how (the target of) 400 (seats) will be crossed!" the Uttar Pradesh Congress said in a post on X.

It also alleged that Samajwadi Party candidate from Gonda, Shreya Verma, complained to the EC that fair polling was not

Baramulla polls at 58.17%, highest count since 1996

BARAMULLA

The Baramulla seat in Kashmir Valley logged 58.17% polling by 11.50 p.m. on Monday, breaking its previous record of 46.65% in 1996. An unprecedented number of women, relatives of active militants and cadres of banned Jamaat-e-Islami turned up to cast their votes. » PAGE 5

taking place at two booths in the Mankapur area of the constituency.

Voters of Hisampur Madho village in Kaushambi boycotted the polls.

Voting took place for five Lok Sabha seats and 35 Assembly seats in Odisha.

Some unidentified persons allegedly hacked an autorickshaw driver to death near Sarsara in Bar-

garh district of the State. The deceased was carrying some voters to a polling booth. While the family members claimed it was a political murder, police say personal enmity was the reason behind the crime.

Of the 49 Lok Sabha seats which went to the polls on Monday, the BJP had won 32 while the Congress won only Rae Bareilly in 2019. This time, the BJP is contesting in 40 seats, while the Congress has limited itself to just 18 seats, leaving the rest to its allies.

This phase has 695 candidates, including 82 women, in the fray. With the fifth phase, the polling process in 25 States and Union Territories will be over. The next two phases will be on May 25 and June 1 while the counting of votes will be on June 4.

MORE REPORTS

» PAGES 2, 5 & 6

political apathy

- **political apathy is a lack of interest or apathy towards politics.**
- **This includes voter apathy, information apathy and lack of interest in elections, political events, public meetings, and voting.**

Focus on Increased participation

- **Clean** electoral roll
- **Low Turnout Polling Stations** identified in each Assembly
- Intensive and targeted outreach by respective DEOs in such PSs

Targeting URBAN APATHY

- MoUs with Departments & organizations having direct connect with people
- Organizations with 500+ employees to appoint Nodal Officer for awareness sessions for leave taking & non-voting employees.
- Focus on Young Voters – Special outreach campaign in Colleges/Universities



URBAN APATHY



भारत निर्वाचन आयोग
Election Commission of India



Mission 300 - 5 lowest turnout polling stations per AC identified for intensive SVEEP Campaign

Outreach programme through Traditional Heads (Rangbah Shnong) & Youth Organizations (Seng Samla) to target young voters

Mobile Studios with RJs to motivate voters to enrol and vote

Educational campaign to motivate voters

Newly registered first time voters felicitated with certificates and medals

Topics

- X Chromosome linked disease
- Why a waterfall appears white ?
- 'Water, air pollution and carbon footprints of conspicuous/luxury consumption in India' Report
- FAME -II Scheme
- Kangei Maru
- Mains



By saurabh Pandey



X-chromosome revival in older women increases risk of autoimmune disease

Researchers have suggested for a while that a number of immune diseases – including systemic lupus erythematosus, rheumatoid arthritis, and Sjögren's syndrome – are more common in females than males. Of particular note are autoimmune diseases in which antibodies act against specific proteins

Sridhar Sivasubbu
Vinod Scaria

In mammals, the females have two copies of the X chromosome, while the males carry a single copy. The X chromosome is more significant for its role in determining sex. Recent genomic studies have shed light on the fundamental biological processes the X chromosome modulates and the genes it encodes. The gathering evidence suggests, in fact, that it plays a part in a variety of biological functions as well as controlling the sex-specific susceptibility to certain diseases.

The human X chromosome encodes around 800 genes, which in turn code for proteins. A loss of function for these genes could thus lead to a variety of genetic diseases. Broadly, the diseases whose onset and/or progression the X chromosome influences can be grouped into three types: (i) X-linked genetic diseases, (ii) diseases influenced by XCI escape, and (iii) those linked to X-chromosome aneuploidy.

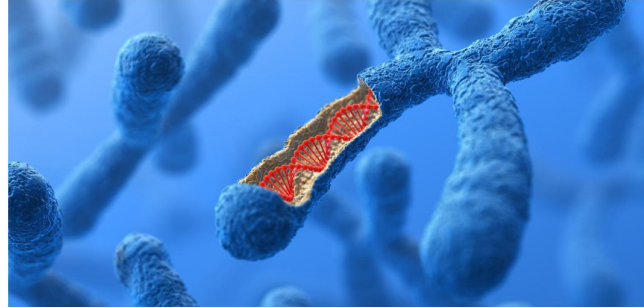
There are more than 500 X-linked genetic diseases, and they mostly affect males. Many of the X-linked traits and diseases are not uncommon in the general population. For example, red-green colour blindness is X-linked, and affects around 8% of males. Duchenne muscular dystrophy, caused by mutations in the dystrophin gene and affecting 1 in every 3,500-5,000 boys born in India and agammaglobulinemia, an immunodeficiency disorder that affects around 1 in 200,000 live births, are also X-linked.

Scientists are also aware of numerical abnormalities – or aneuploidies – of the X chromosome. For example, Klinefelter syndrome is characterised by an extra X chromosome (XXY) and Turner's syndrome by a loss of one X chromosome in females (X instead of XX).

Inactivation of X chromosome

In mammalian species, females typically carry two X chromosomes, while males possess one X and one Y chromosome. Each of the X chromosomes is inherited from the parents. In 1961, an English geneticist named Mary Frances Lyon argued that since females have two copies of the X chromosome, one of the X chromosomes is randomly inactivated during early embryonic development, in a process called X chromosome inactivation (XCI), to prevent the overexpression of X-linked genes in females.

In this process, epigenetic changes



In 1961, Mary Frances Lyon argued that one of the X chromosomes in females is randomly inactivated during early embryonic development to prevent the overexpression of X-linked genes. Representative image. BLACKJACK3D/GETTY IMAGES

silence most genes on one X chromosome (epigenetics refers to the processes by which genes are influenced by the environment in which they operate). XCI ensures a balance in gene expression, but scientists are also learning that it plays a role in various genetic disorders. Issues such as incomplete inactivation (a.k.a. escape) or skewed inactivation can lead to the abnormal expression of genes, which contributes to diseases including X-linked disorders, certain cancers, and autoimmune conditions.

Three decades after Dr. Lyon's hypothesis, researchers unravelled the molecular mechanisms of X inactivation when they discovered Xist, a non-protein-coding RNA. The body deactivates the X chromosome with the help of Xist and another non-protein-coding RNA, called Tsix (reverse of Xist). The differential regulation of these two genes means that in the X chromosome that is to be deactivated, the Xist RNA is overexpressed such that it coats or covers the chromosome.

However, inactivation of the X chromosome is not absolute. As many as a fourth of all genes encoded by the X chromosome could escape inactivation and express themselves, as researchers at the Whitehead Institute in the U.S. reported in a paper published in the journal *Cell Genomics* last year.

Autoimmune diseases

Researchers have suggested for a while that a number of immune diseases – including systemic lupus erythematosus,



The human X chromosome encodes around 800 genes, which in turn code for proteins. A loss of function for these genes could thus lead to a variety of genetic diseases

rheumatoid arthritis, and Sjögren's syndrome – are more common in females than males. Of particular note are autoimmune diseases, in which antibodies act against specific proteins.

In a paper published on May 3 in *Science Advances*, French researchers perturbed the expression of Xist – which triggers XCI – in female mice, and found that previously inactive genes on the inactive X chromosome were reactivated. This was particularly true of genes involved in the Toll-like receptor 7 signalling pathway in immune cells. The result was the spontaneous development of lupus-like inflammatory signs in the female mice, including an increased level of autoantibodies and altered immune cell populations.

The reactivation of specific X-linked genes in response to XCI alteration varies across immune cell types, which is to say diverse molecular pathways are affected. The resulting effects in autoimmune diseases are likely due to a combination of reactivation events in different cell types and global changes in gene expression. The findings reinforce the molecular link

between altered XCI and autoimmune diseases, and pave the way for possible new drugs to treat them in the future.

X and Alzheimer's disease

Another disease with a sex bias and linked to the X chromosome is Alzheimer's disease. Women seem to have a higher risk of getting it; worldwide, almost twice as many women have Alzheimer's as men. In a study published in the journal *Cell* in October 2022, researchers from Case Western Reserve University in the U.S. suggest a gene called ubiquitin-specific peptidase 11 (USP11), involved in a protein-modifying process, encourages tau protein to accumulate in the brain. Based on studies of mice brains, the researchers suggested the gene escapes X inactivation and is expressed more in females. This also opens new avenues to develop treatments for Alzheimer's.

In humans, the Y chromosome has been shrinking over time, so the X chromosome is possibly evolution's best bet and thus plays a pivotal role in human health and disease. Its evolutionary genomics and emerging insights into its participation in biological processes illuminate the complex interplay between genetic inheritance, epigenetic modifications, and disease manifestation. Cracking all this to get the full picture could also lead us to new drugs and therapies.

(The authors are senior consultants at the Vishwamith Cancer Care Foundation and adjunct professors at IIT Kanpur and Dr. D.Y. Patil Vidyapeeth.)

THE GIST



There are more than 500 X-linked genetic diseases, and they mostly affect males. Many of the X-linked traits and diseases are not uncommon in the general population. For example, red-green colour blindness is X-linked, and affects around 8% of males.



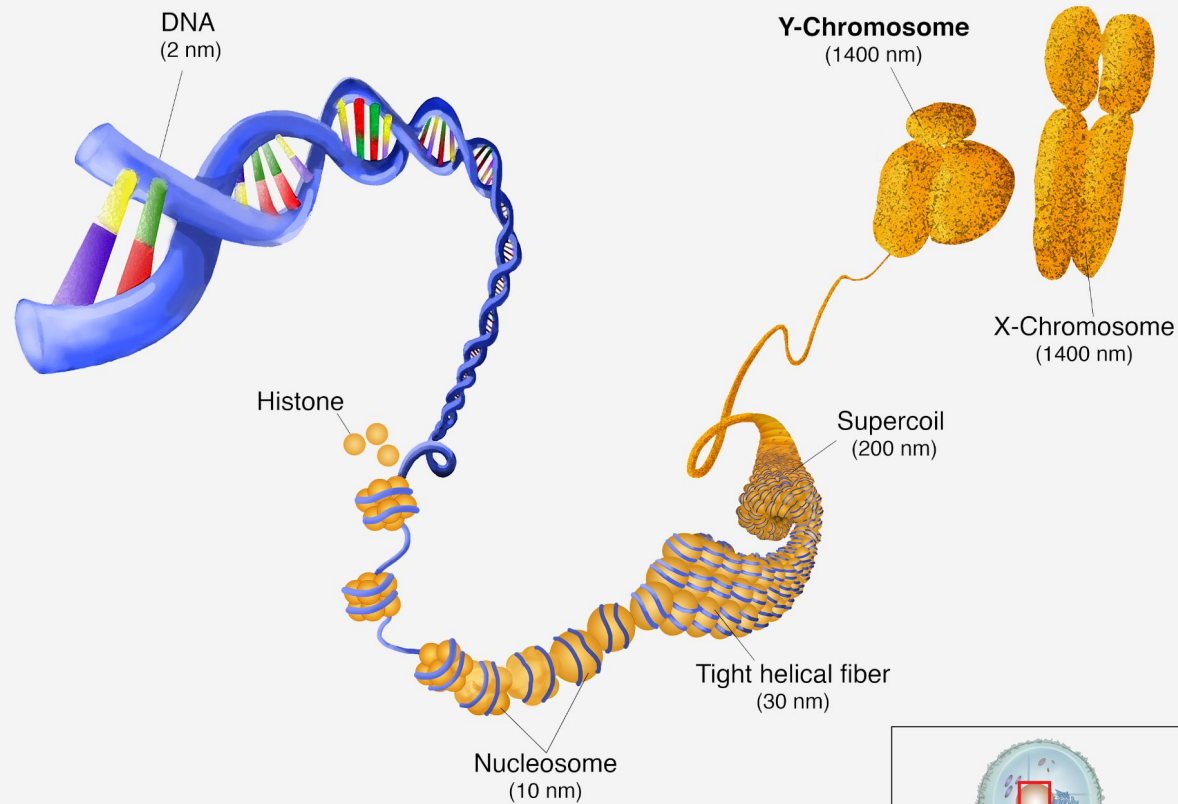
Researchers unravelled X inactivation when they discovered Xist. The body deactivates X using Xist and another non-protein-coding RNA, called Tsix. The regulation of these two genes means that in the X chromosome that is to be deactivated, the Xist RNA is overexpressed such that it coats the chromosome.



French researchers perturbed the expression of Xist in female mice, and found that previously inactive genes on the inactive X chromosome were reactivated. The result was the spontaneous development of lupus-like inflammatory signs in the female mice.

X Chromosome linked diseases

- In mammals, the females have two copies of the X chromosome, while the males carry a single copy.
- The X chromosome is more significant for its role in determining sex.
- Recent genomic studies have shed light on the fundamental biological processes the X chromosome modulates and the genes it encodes.
- The gathering evidence suggests, in fact, that it plays a part in a variety of biological functions as well as controlling the sex-specific susceptibility to certain diseases.



Illustrator - Anna Guerrero

- **There are more than 500 X-linked genetic diseases, and they mostly affect males.**
- **Many of the X-linked traits and diseases are not uncommon in the general population.**
- **For example, red-green colour blindness is X-linked, and affects around 8% of males. Researchers unravelled X inactivation when they discovered Xist.**
- **The body deactivates X using Xist and another non-protein-coding RNA, called Tsix.**

- **The regulation of these two genes means that in the X chromosome that is to be deactivated, the Xist RNA is overexpressed such that it coats the chromosome**
- **French researchers perturbed the expression of Xist in female mice, and found that previously inactive genes on the inactive X chromosome were reactivated.**
- **The result was the spontaneous development of lupus-like inflammatory signs in the female mice**

Why a waterfall appears white



Q: Why does water appear white in a waterfall even though it is colourless?

A: When all

colours are reflected from the surface of an object, it appears white. In a waterfall, water drops can be thought of as being suspended in air and as an inhomogeneous mixture of water and air.

We know that when light enters from a lighter medium (air) into a denser medium (water), some of it is reflected by the surface and the rest is refracted. In a waterfall, light suffers numerous such reflections and refractions.

The light refracted by a layer on top would also contribute to reflection at the next layer of drops. As a result, most of the light is reflected by the waterfall.

This leads to whiteness.

Mist, paper, water vapour, colloidal solutions, clouds, talcum powder, snow, white paint, and sugar also appear white because of the same reason.

(There are no white pigments in white paint. White paint has transparent oxides of zinc, lead, and titanium suspended in a transparent solution.)



When all colours are reflected from the surface of an object, it appears white. SLNC/UNSPLASH

To see a waterfall white, light should not be directional, i.e. it should be coming from all directions. If it is directional, one would see colours as in a rainbow.

(S. Mukund, Chennai)



For feedback and suggestions

for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'

Why a waterfall appears white ??

- **When all colours are reflected from the surface of an object, it appears white.**
- **In a waterfall, water drops can be thought of as being suspended in air and as an inhomogeneous mixture of water and air.**
- **We know that when light enters from a lighter medium (air) into a denser medium (water), some of it is reflected by the surface and the rest is refracted.**

- **In a waterfall, light suffers numerous such reflections and refractions.**
- **The light refracted by a layer on top would also contribute to reflection at the next layer of drops.**
- **As a result, most of the light is reflected by the waterfall.**

Analysing local environmental footprints

What is the importance of evaluating household environmental footprints? Which are the three footprints analysed in this study? Do these footprints associated with luxury consumption show an increase as one analyses households that are richer and affluent? What should policymakers do?

EXPLAINER

Soumyajit Bhar

While climate change is a global concern, issues such as water scarcity and air pollution are often localised or regionalised. For example, excessive water use in one region may not directly affect water scarcity elsewhere. Focusing on local environmental issues is crucial; and herein comes the importance of understanding household environmental footprints.

How are household environmental footprints distributed in India?

A recent study titled 'Water, air pollution and carbon footprints of conspicuous/luxury consumption in India', of which the author is one of the contributors, highlights the environmental impact of affluent individuals, particularly those who engage in consumption beyond basic needs. This study specifically examines the CO₂, water, and particulate matter (PM_{2.5}) footprints associated with luxury consumption choices among households in India across different economic classes. The analysis contrasts these luxury consumption footprints with those associated with non-luxury consumption. The luxury consumption basket includes various categories such as dining out, vacations, furniture, social events etc.

How were environmental impacts assessed in this study?

Methodologically, the study employed an input/output analysis of the entire economy to map or link different components of household consumption to the resources or materials involved in their production. This approach enabled the capture and aggregation of the (indirect or embedded) environmental impacts associated with each stage of production. For example, the water footprint was utilised to quantify water



GETTY IMAGES

usage throughout various stages of production of different goods and services, as well as direct water usage by households. The PM_{2.5} footprint encompassed both embedded emissions and direct emissions from household activities such as the use of fuelwood, kerosene, and vehicular fuels. Similarly, the CO₂ footprint was used to capture both embedded and direct CO₂ emissions associated with household consumption.

What were the key findings?

The study reveals that all three environmental footprints increase as households move from poorer to richer economic classes. Specifically, the footprints of the richest 10% of households are approximately double the overall average across the population. A notable surge in footprints is observed from the ninth to the 10th decile, with the air pollution footprint experiencing the

highest increase at 68% in the 10th decile compared to the ninth. Conversely, the rise in the water footprint is the lowest at 39%, while CO₂ emissions stand at 55%. This suggests that Indian consumers, particularly those in the top decile, are still in the 'take-off' stage, with only the wealthiest segment exhibiting substantial increases in consumption-related environmental footprints. The heightened footprints in the 10th decile are primarily attributed to increased expenditure on luxury consumption items.

What are the key contributors?

The study identifies eating out/restaurants as a significant contributor to the rise in environmental footprints, particularly in the top decile households, across all three footprints. Additionally, the consumption of fruits and nuts is highlighted as a factor driving the increase in water footprint in the 10th decile. Luxury consumption

items such as personal goods, jewellery, and eating out contribute to the rise in CO₂ and air pollution footprints. Notably, the presence of fuels like firewood in the consumption baskets of poorer households is emphasised, showcasing contrasting impacts of modern energy transitions. While transitioning from biomass to LPG reduces direct footprints, the lifestyle choices associated with affluence lead to a rise in PM_{2.5} footprints (and subsequently, the CO₂ footprint).

The average per capita CO₂ footprint of the top decile in India, at 6.7 tonnes per capita per year, is noted to be higher than the global average of 4.7 tonnes in 2010 and the annual average of 1.9 tonnes CO₂e/cap required to achieve the Paris agreement target of 1.5°C. While still below the levels of the average citizen in the U.S. or U.K., this disparity underscores the need for urgent attention from policymakers. Given the influence of elite lifestyles on broader societal aspirations, policymakers should prioritise efforts to nudge consumption levels of affluent households downwards to align with sustainability goals.

What are the implications?

The study emphasises that while sustainability efforts often focus on global climate change, global environmental footprints do not necessarily align with local and regional scale footprints. However, local and regional environmental issues exacerbated by luxury consumption disproportionately affect marginalised communities. For instance, water scarcity and air pollution disproportionately impact marginalised groups, further marginalising them, while affluent sections can afford protective measures such as air-conditioned cars and air purifiers. This underscores the importance of multi-footprint analysis in addressing environmental justice concerns and ensuring equitable sustainability efforts.

Soumyajit Bhar is Assistant Professor at the School of Liberal Studies of BML Munjal University, Gurugram.

THE GIST

▼ A recent study highlights the environmental impact of affluent individuals, particularly those who engage in consumption beyond basic needs.

▼ The study identifies eating out/restaurants as a significant contributor to the rise in environmental footprints, particularly in the top decile households, across all three footprints.

▼ The study emphasises that while sustainability efforts often focus on global climate change, global environmental footprints do not necessarily align with local and regional scale footprints.

‘Water, air pollution and carbon footprints of conspicuous/luxury consumption in India’ Report



- **A recent study titled ‘Water, air pollution and carbon footprints of conspicuous/luxury consumption in India’, of which the author is one of the contributors, highlights the environmental impact of affluent individuals, particularly those who engage in consumption beyond basic needs.**
- **This study specifically examines the CO₂, water, and particulate matter (PM_{2.5}) footprints associated with luxury consumption choices among households in India across different economic classes.**

- **Specifically, the footprints of the richest 10% of households are approximately double the overall average across the population.**
- **A notable surge in footprints is observed from the ninth to the 10th decile, with the air pollution footprint experiencing the highest increase at 68% in the 10th decile compared to the ninth.**
- **Conversely, the rise in the water footprint is the lowest at 39%, while CO2 emissions stand at 55%.**
- **This suggests that Indian consumers, particularly those in the top decile, are still in the ‘take-off’ stage, with only the wealthiest segment exhibiting substantial increases in consumption-related environmental footprints.**

Key contributors

- **The study identifies eating out/restaurants as a significant contributor to the rise in environmental footprints, particularly in the top decile households, across all three footprints.**
- **Additionally, the consumption of fruits and nuts is highlighted as a factor driving the increase in water footprint in the 10th decile.**
- **Luxury consumption items such as personal goods, jewellery, and eating out contribute to the rise in CO₂ and air pollution footprints.**

- **Given the influence of elite lifestyles on broader societal aspirations, policymakers should prioritise efforts to nudge consumption levels of affluent households downwards to align with sustainability goals.**

- **local and regional environmental issues exacerbated by luxury consumption disproportionately affect marginalised communities.**
- **For instance, water scarcity and air pollution disproportionately impact marginalised groups, further marginalising them, while affluent sections can afford protective measures such as air-conditioned cars and air purifiers**

FAME-II 'violations' could put e2W firms in the blacklist

S. Ronendra Singh

NEW DELHI

Three electric two-wheeler companies – Hero Electric, Okinawa and Benling India – can be de-registered or blacklisted from future government schemes if they do not pay back the money they owe to the government under the Faster Adaption of Manufacturing of Electric Vehicles (FAME)-II scheme, sources have said.

The companies earned ₹300 crore in violation of FAME-II scheme norms. The government has demanded this amount be paid back as per norms.

In April last year, the MHI had fined Hero Electric ₹133.8 crore, Okinawa Autotech ₹116.85 crore, and Benling India ₹48.42 crore for violating the FAME-II guidelines.

“The next step is debarment from all schemes of the Ministry (MHI). That has also been done for Benling and Hero Electric. It didn't happen for Okinawa because they were in court at the time. The next step is blacklisting from all schemes under the GoI. That has not happened so far because the Ministry of Finance gives the approval for debarment from all the Ministries' schemes/ policies for any company,” a senior government official told *businessline*.

“The whole matter is under the scrutiny of the Delhi High Court. We would not like to comment on any matter that is sub-judice,” Amit Kumar, Chief Executive Officer, Benling India, told *businessline*.

(The writer is with *The Hindu businessline*)

FAME -II Scheme

Government has approved Phase-II of FAME Scheme with an outlay of Rs. 10,000 Crore for a period of 3 years commencing from 1st April 2019.

Out of total budgetary support, about 86 percent of fund has been allocated for Demand Incentive so as to create demand for xEVs in the country.

This phase aims to generate demand by way of supporting 7000 e-Buses, 5 lakh e-3 Wheelers, 55000 e-4 Wheeler Passenger Cars (including Strong Hybrid) and 10 lakh e-2 Wheelers.

Only advanced battery and registered vehicles will be incentivized under the scheme.

With greater emphasis on providing affordable & environment friendly public transportation options for the masses, scheme will be applicable mainly to vehicles used for public transport or those registered for commercial purposes in e-3W, e-4W and e-bus segments.

However, privately owned registered e-2Ws are also covered under the scheme as a mass segment.

Death knell for whales



Crew members board Japan's new whaling mothership, the *Kangei Maru*, in Shimonoseki city. The 9,300-tonne ship set sail on its maiden hunting voyage on Tuesday, heralding a new era for the controversial practice defended by the government as a part of national culture. AFP

Kangei Maru

- The new Kangei Maru set off from Shimonoseki, the first new ship of its kind to sail from Japan in over 70 years. The ship can process and store whale meat on board.
- Kangei Maru replaces a previous lead vessel, Nisshin Maru, which was retired last year.
- This is a new ship for a new era, symbolic of the new period of resumed commercial whaling,”

Japan was a member of the International Whaling Commission (IWC) before its moratorium on commercial whaling in 1985

International Whaling Commission (IWC)

The IWC was established in 1946 as the global body responsible for management of whaling and conservation of whales.

Today the IWC has 88 member countries.

The mandate has not changed but many new conservation concerns exist and the IWC work programme now also includes bycatch & entanglement, ship strikes, ocean noise, pollution and debris, and sustainable whale watching

Topics

- L & D WARSAW MECHANISM
- **Amazon Forest**
- China -Russia
- Form 17C?
- **Exchange traded fund**
- BIMSTEC AS Legal personality
- Mains



By saurabh Pandey



What is the value of attributing extreme events to climate change?

Climate models are bad at capturing normal rainfall and worse at extreme ones. They are better at capturing temperatures, but only at regional scales, not at very local scales. Climate scientists need to address these challenges in the process of assigning probability changes to events in the past

Raghu Murtugudde

Just a couple of decades ago, the U.N. Intergovernmental Panel on Climate Change (IPCC) argued that individual weather events could not be attributed to climate change. The science has since evolved, albeit with all its attendant uncertainties, and now we regularly hear of researchers having been able to attribute some individual extreme events to climate change.

Many scientific and data challenges persist in this exercise even as its outcomes are argued to be usable for estimating richer countries' historic liability for climate-related "loss and damage" and the legal liability of governments and corporations in precipitating adverse events like floods and droughts. However, researchers have used a variety of methods to evaluate attributability, which raises questions about whether attribution science is mature enough to be used in courts and multilateral fora.

Value of extreme-event attribution

While no formal cost-benefit analysis of an attribution exercise has been reported, many experts have argued that attributions are critical for the 'loss and damage' (L&D) process. L&D doesn't have a unique definition but its place in climate talks under the U.N. Framework Convention on Climate Change has come a long way in the last decade.

Economically developing countries, in particular those that are 'particularly vulnerable', have demanded the L&D fund to pay for the havoc climate change wreaks within their borders. Obviously, the criteria by which 'particularly vulnerable' countries are to be identified are crucial.

For example, India is a developing country in the tropics and is highly vulnerable to climate change's impacts. But it is unlikely that India will qualify for L&D funding, and herein lies the rub: should climate finance and green funds focus on adaptation and mitigation alone or should they administer L&D funds separately? If the latter, then will attribution exercises help? The developed world is opposed to the idea of being held legally accountable in court for any extreme events since that could open a floodgate of lawsuits.

Against this background, our understanding of whether attribution reports can actually hold up in court as evidence of culpability is very important. A good case in point is a recently published report on heatwaves in Asia.

Attribution of Asian heatwaves

Last week, a team of climate scientists called World Weather Attribution (WWA) reported that heatwaves across Asia, from the west to the southeast, had been rendered nearly 45 times more likely by climate change.

It is worth understanding how these 'rapid extreme event attributions' are performed. The most important concept is the change in probability: in this case, the climate scientists contrasted the conditions in which the heatwaves occurred against a counterfactual world in which climate change did not happen. The conditions that prevail in the counterfactual world depend on the availability of data from our world. When there isn't enough data, the researchers



The dried-up catchment area of the Meenkar dam, in Kerala's Palakkad. K.K. MUSTHAFA.

run models for the planet's climate without increasing greenhouse gas emissions and other anthropogenic forcings. Where there was sufficient data, they used trends in the data to compare conditions today with a period from the past in which human effects on the planet were relatively minimal.

This said, the data are hardly ever sufficient, especially for rainfall, and almost never for extreme rainfall events. Climate models are also notoriously bad at properly capturing normal rainfall and worse at extreme ones. Thus, climate scientists need to address these challenges in the process of assigning probability changes to events in the past. The climate models are better at capturing temperatures and temperature-related events – but again, only at regional scales, not at very local scales.

If, some day, climate scientists are able to perform reliable hyperlocal attribution exercises, they will still be confronted by a moral question: what actions should follow? Because right now, even though the L&D fund and climate jurisprudence are becoming more visible, attribution exercises are happening as if disconnected from governments' adaptation and mitigation strategies.

Put another way: will people and businesses move away if a place is seen as being a hotspot of extreme events? This is not just a question of science. Governments need to be able to respond to such decisions, and attribution science should in turn, be sufficiently reliable.

Picking extreme events to attribute
Another significant challenge in attribution exercises, is how scientists



While no formal cost-benefit analysis of an attribution exercise has been reported, many experts have argued that attributions are critical for the 'loss and damage' process.

choose the extreme events for which they will perform attribution exercises.

When evaluating the Asian heatwaves, the WWA scientists used regional scales and different definitions for different regions. They also arbitrarily considered daily, three-day, or monthly average temperatures for attributing likelihoods.

Heatwaves can be exacerbated by natural factors such as an El Niño event or human factors like urbanisation and deforestation. There is also a debate as to whether irrigation affects heatwaves as well.

Further, no weather event will occur in exactly the same form twice in a place, which means an extreme event occurring in that place will likely have no precedent. This is why it is easier to reliably attribute heatwaves at the subcontinent scale but not those at the level of particular areas.

The kind of questions that climate scientists ask also matter. For example, the same analysis can produce different answers to the questions "was the intensity of a heatwave amplified by climate change?" and "was the frequency or return period of a heatwave altered by climate change?". In the WWA report, the scientists used multiple approaches in their attribution exercise to answer the

same question, and have added that the differences between them are immaterial. It is not clear whether these differences will be perceived to be material in a court of law.

Extreme events and human action

The actual impacts of extreme events depend not only on the hazard or the extreme event but also on the vulnerability and the exposure of the population affected. Similarly, the financial consequences are also affected by multiple factors. So, should an attribution exercise only focus on the hazard or should it consider the impacts as well?

This is not a trivial question, especially if L&D negotiations are to be served reliably by attributions.

Considering all these challenges, we must take stock of the international financial aspects of adaptation, mitigation, and L&D. In particular, governments should consider an agreement on historical responsibilities to fund developing countries, close adaptation gaps, build adaptation capacity, and finance mitigation for the global good.

The real world is severely resource-constrained. In a counterfactual world where human, financial, and computational resources are infinite, attribution exercises are a beautiful scientific challenge and could serve as a productive intellectual exercise. But in the real world, we need a cost-benefit analysis based on a clear role for attribution in the overall climate action landscape.

The author is a visiting professor at ITI Bombay, and emeritus professor at the University of Maryland.

L & D WARSAW MECHANISM

- **The COP established the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (Loss and Damage Mechanism), to address loss and damage associated with impacts of climate change, including extreme events and slow onset events, in developing countries that are particularly vulnerable to the adverse effects of climate change at COP19 (November 2013) in Warsaw, Poland.**

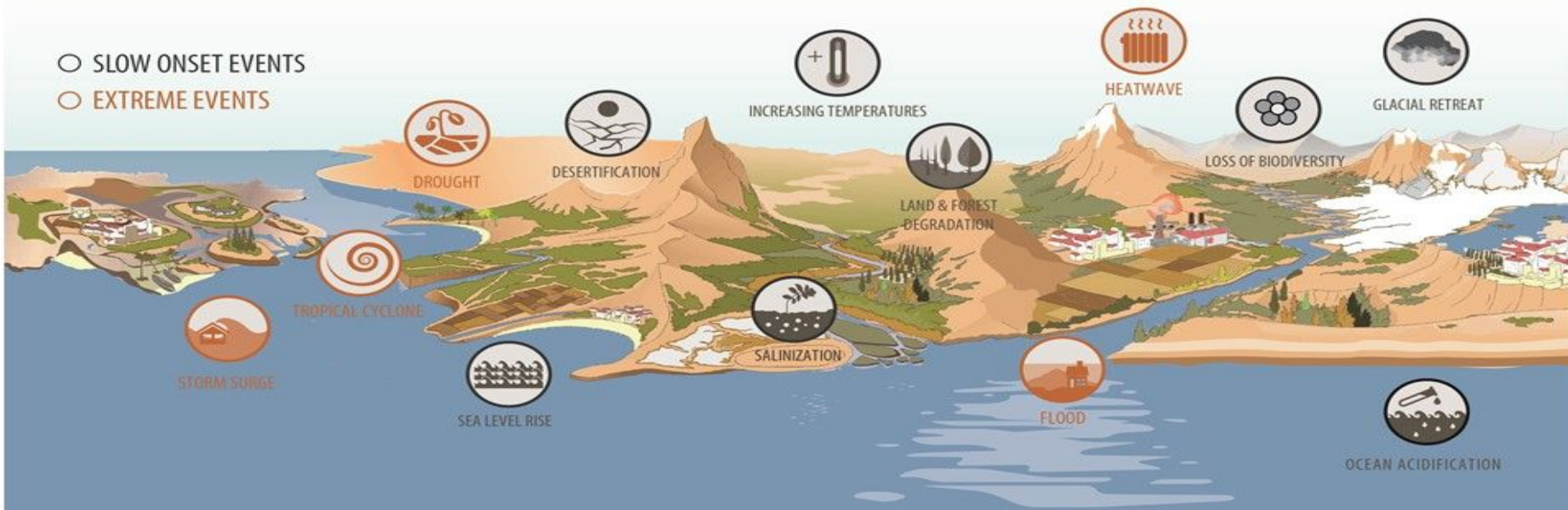
LOSS AND DAMAGE ASSOCIATED WITH THE IMPACTS OF CLIMATE CHANGE



United Nations
Framework Convention on
Climate Change

○ SLOW ONSET EVENTS

○ EXTREME EVENTS



ECONOMIC LOSSES

NON-ECONOMIC LOSSES

©UNFCCC

INCOME

PHYSICAL ASSETS

INDIVIDUALS

SOCIETY

ENVIRONMENT



LOSS & DAMAGE



The Paris Agreement has a separate article on loss and damage, and recognises the importance of averting, minimising, and addressing loss and damage through enhancing understanding, action, and support. It provides the list of areas of co-operation and facilitation on loss and damage, as follows:



- Early-warning systems
- Emergency preparedness
- Slow onset events
- Events that may involve irreversible and permanent loss and damage
- Comprehensive risk assessment and management
- Risk insurance facilities, climate risk pooling, and other insurance solutions
- Non-economic losses
- Resilience of communities, livelihoods, and ecosystems



Steps under warsaw mechanism

1. Enhancing knowledge and understanding of comprehensive risk management approaches to address loss and damage associated with the adverse effects of climate change, including slow onset impacts, by facilitating and promoting:

- **Providing leadership and coordination and, as and where appropriate, oversight under the Convention, on the assessment and implementation of approaches to address loss and damage associated with the impacts of climate change from extreme events and slow onset events associated with the adverse effects of climate change;**
- **Providing technical support and guidance on approaches to address loss and damage associated with climate change impacts, including extreme events and slow onset events;**
-



Burning vegetation in a coniferous in Yanomami Indigenous land, Roraima state, Brazil, recovers

Amazon fires off to record start in 2024

Reuters

Brazil's Amazon rainforest has experienced its largest blazes on record in the first four months of the year, with the environmental workers union on Monday placing partial blame on lower government spending on firefighting.

Brazil's President Lula da Silva has staked his international reputation on protecting the Amazon rainforest and restoring Brazil as a leader on climate policy.

The Amazon, the world's largest rainforest, is vital to curbing catastrophic global warming because of the vast amount of greenhouse gas it absorbs.

A record drought in the Amazon rainforest region, driven by the El Nino climate phenomenon and global warming, has helped contribute to dry conditions fueling fires this year.

More than 12,000 square kilometers of the Brazil's Amazon rainforest burned between January and April, the most in over two decades of data, according to Brazil's space research agency Inpe. That's an area larger than Qatar, or nearly the size of the U.S. state of Connecticut.

Fires in the Amazon generally do not occur naturally but are ignited by people, often seeking to clear land for agriculture.

Firefighting budget cuts are also partially to blame, environmental workers union Ascema said in a statement. They complained that this year's budget for environmental agency Ibama to fight fires is 24% lower than 2023.

In a statement, Brazil's environment ministry said that the Amazon land,

While the area burned is a record, it pales in comparison to peak dry season from August to November, when an area the same size can burn in a single month

which draws on donations from foreign governments, put 400 million reais (\$79.4 million) toward firefighting at the state level under Lula's current administration, which began in 2023.

The federal government sent about 380 firefighters to Roraima, the northern Amazon state that was hit the hardest by the fires, which were intensified by drought, the ministry said.

It did not respond to questions on cuts to Ibama's firefighting budget. The agency did not immediately respond to a request for comment.

Ibama agents have suspended field work since January amid tense negotiations with the federal government for better pay and working conditions.

Ascema has rejected the latest government offer and demanded larger salary rises after more than a decade of pay increases and downsizing staff.

While the area burned is a record for the first four months of the year, it pales in comparison to blazes in the peak dry season from August to November, when an area that size can burn in a single month.

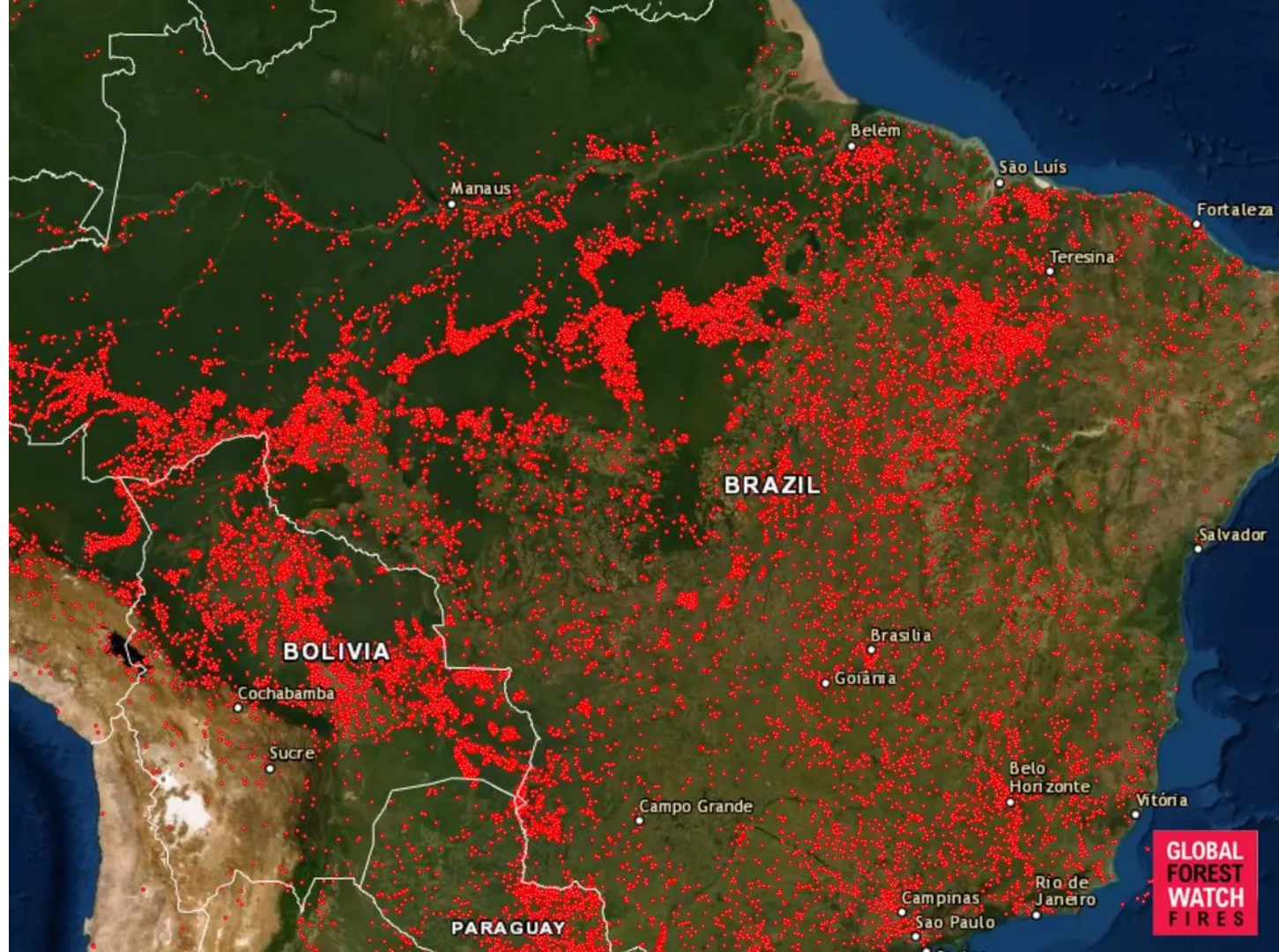
"The government needs to understand that without total engagement from environmental workers, the situation foreseen for this year is unprecedented catastrophic," said Ascema President Odeerson Zavalet.

"Prevention efforts, such as raising awareness about ignitions, creating firebreaks as strategic zones and

Amazon Forest

- **The Amazon, the world's largest rainforest, is vital to curbing catastrophic global warming because of the vast amount of greenhouse gas it absorbs.**
- **A record drought in the Amazon rainforest region, driven by the El Nino climate phenomenon and global warming, has helped contribute to dry conditions fueling ☐ fires this year.**
- **More than 12,000 square kilometers of the Brazil's Amazon rainforest burned between January and April.**







THE AMAZON

IS **ON FIRE** AND THIS IS WHAT IS AT RISK



Between

17 and **20%**

of the **planet's water**



6,7 million
km² of **FOREST**



The habitat
of more than

34 million people



10%

of the world's
BIODIVERSITY



At least

6%

of the **EARTH'S**

oxygen

- **Fires in the Amazon generally do not occur naturally but are ignited by people, often seeking to clear land for agriculture.**
- **"The government needs to understand that without total engagement from environmental workers, the situation foreseen for this year is unprecedented catastrophe**

A 'No-Limit' romance that is not just a bilateral matter



Having met each other over 40 times in the past 11 years, Russian President Vladimir Putin and Chinese President Xi Jinping are justified in calling each other "old friend". Yet, their Summit in Beijing (May 16-17, 2024), ostensibly to mark the 75th anniversary of bilateral diplomatic relations, stands out, arguably, as among their most consequential meetings. Given their geostrategic and geoeconomic hefts, their "no-limit" romance is not just a bilateral matter. It concerns the world at large including India, which has a significant yin-yang relationship with both.

The phases of Russia-China ties

Over the past two centuries, Russia-China relations have passed through at least five phases. During the 19th century, Czarist Russia took advantage of a weak China to expand to the Pacific, and the Soviet Union continued to hold these territories. A decade of "Comintern brotherhood" followed the establishment of the People's Republic of China (PRC) in 1949, but the bonhomie was upended by ideological and geopolitical differences, triggered, in part, by the Chinese attack on India, in 1962. Russia and China had armed clashes in 1969 over the Ussuri River border dispute.

The fourth phase commenced in 1972, with United States President Richard Nixon's dramatic visit to Beijing, aimed at weaning China from the Russia-led Eastern Bloc. In a paradigm shift, China tilted towards the West which supported Deng Xiaoping's "four modernisations", believing that "prosperity would make China a more liberal society". Despite China's violent suppression of the Tiananmen Square protests in 1989, the West continued to lavish China with investments, technology transfer, market access and diplomatic support over the next three decades, transforming China into the "World's Factory." Meanwhile, Moscow-Beijing ties withered as the Soviet Union imploded and the Russian Federation, its successor, shed most of its Central Asian Republics which became an arena for geo-political competition with China.

The current phase began in 2012, when China's growing assertiveness alarmed the U.S. into launching a "pivot Asia", unveiling hard-lined policies to stem China's rise and gradual economic decoupling. Growing friction with the West led China to return to Russia and the two famously declared after the Beijing Summit in February 2022 that their ties had "No Limits". Within weeks, Mr. Putin launched a "limited military operation" against Ukraine. The West responded angrily with hundreds of sanctions on Moscow to cripple Russia economically. This western blockade impelled Moscow further towards China which was also under economic pressure from the same quarters. Over the past two years, their convergence against the West has triggered a quantitative and qualitative surge in Russia-China ties. Their trade reached \$240



Mahesh Sachdev

is a former Indian Ambassador

The recent summit in Beijing between Russian President Vladimir Putin and Chinese President Xi Jinping has both short and long-term implications

billion in 2023, having grown 26% over 2022. Russia is now predominantly dependent on China as a market for its energy exports and a source of critical inputs, such as sanctioned items and those required to pursue its Ukraine war. Russia was the largest crude supplier to China with volume averaging 2.1 million barrels a day in 2023. However, despite decoupling attempts, China traded \$575 billion with the U.S. in 2023, more than twice its trade with Russia. In comparison, India's 2023-24 annual trade with the U.S. and China was \$118 billion each; it traded \$66 billion with Russia.

The message in the joint statement

Against this backdrop, the 7,000-word Joint Statement issued after the Putin-Xi Summit was conspicuously silent on bilateral economic, financial and military ties. This taciturnity could have one of two diametrically opposite motives: it was either to avoid invoking western opprobrium and sanctions or to paper over their mutual disagreement. It is relevant to note that during a Beijing visit in April, U.S. Secretary of State Antony J. Blinken met President Xi to reportedly warn against helping Russia militarily. The joint statement also omits any India-specific issues, including the United Nations reforms, and confines treatment of Europe to a sanitised version of the Ukraine conflict.

In contrast, the text reserves the choicest invectives for the U.S., accusing it of pursuing "dual containment" (of both Russia and China, calling it "unconstructive and hostile") and an "Indo-Pacific Strategy" with "a negative impact on the peace and stability of the region". With its stark polarity, the Joint Statement is a clear sign that the two strategic partners have gone on an anti-U.S. offensive.

The Beijing Summit's likely impact needs analysis in both the short and long terms. In the short run, it may lead to intensified, albeit understated, bilateral cooperation, particularly in the supply of the dual-use materials needed by Russia for its Ukraine campaign. In return, China may seek better terms for Russian raw materials, mining rights in Siberia and access to Russian know-how on a range of critical technologies such as avionics, nuclear power and space. China may also seek greater Russian acquiescence for its dominance over Central Asia.

Beijing may even have cynical motives for quietly supporting Russia: the continuation of the Ukraine war keeps a beleaguered Russia dependent on China and the U.S. preoccupied with eastern Europe, giving China the freedom to bully Asia.

In the longer run, the summit may have an even more profound fallout. While China would want to continue its profitable economic engagements with both Russia and the West, the inherent contradictions may eventually make this pursuit untenable.

On May 17, the U.S. State Department spokesman curtly told China, "You cannot have it

both ways." The continued western pressure may force it to play the Russian card in a high-stakes global poker. This, coupled with the Middle Kingdom's incessant quest for global dominance, could usher in a new Cold War aimed mostly at creating a credible alternative to the U.S.-dominated post-Second World War global eco-political architecture. The early contours of the incipient China-driven global construct, such as BRICS, the Shanghai Cooperation Organisation, the 109-member Asian Infrastructure Investment Bank and the 147-country, \$1 trillion outlay Belt and Road Initiative are already in place and just need ramping up. It could thus presage the opening overture of a new global polarisation.

The impact on India

The Beijing Summit would have far-reaching implications for India, presenting it with both challenges and opportunities. To begin with, India needs to carefully and objectively examine the depth and durability of the current phase of the ties between Russia and China, given their erratic past. Both have strong leaders, even as Russia's GDP is currently less than one-seventh of China's. This coupled with the Ukraine war and the sanctions makes Moscow less than an equal partner, perhaps for the first time in their bilateral history. Moscow's potential vulnerability to China's hegemony could concern India given its still overwhelming dependence on Russia for defence supplies particularly as it has border tensions with China. India being Russia's largest defence market, Moscow has an interest in retaining it. However, the reliability of Russian supplies may become subject to Chinese pressures.

While India has several reservations about the existing global architecture, it is by no means certain that Beijing's alternative would suit India better. New Delhi's best bet would perhaps be to press for a higher profile in the existing global order commensurate with India's size and potential.

In retrospect, during the last Cold War, India laudably pursued the high moral ground often eschewing its core national interests. Instead of focusing on its socio-economic development and the realpolitik it required, it adopted a doctrinaire approach to Non-Alignment and Third World solidarity. The rest is history and those who do not learn from history are doomed to repeat it.

The incoming global polarisation is likely to be differently nuanced with greater flux, driven mostly by the geo-economics and quest for new technologies. Unlike the first Cold War, India is now a major global player with hard-earned "strategic autonomy" providing it with real options. India should leverage its strengths judiciously, and adopt a sharper and nimbler approach. As new opportunities dawn, it needs to be clear-headed about its core long-term national goals, adopt a commensurate strategy and pursue it with single-mindedness.

China -Russia

- **. The West responded angrily with hundreds of sanctions on Moscow to cripple Russia economically.**
- **This western blockade impelled Moscow further towards China which was also under economic pressure from the same quarters.**
- **Over the past two years, their convergence against the West has triggered a quantitative and qualitative surge in Russia-China ties.**

- **Their trade reached \$240 billion in 2023, having grown 26% over 2022.**
- **Russia is now predominantly dependent on China as a market for its energy exports and a source of critical inputs, such as sanctioned items and those required to pursue its Ukraine war.**
- **Russia was the largest crude supplier to China with volume averaging 2.1 million barrels a day in 2023**

- **. The early contours of the incipient China-driven global construct, such as BRICS, the Shanghai Cooperation Organisation, the 109-member Asian Infrastructure Investment Bank and the 147-country, \$1 trillion outlay Belt and Road Initiative are already in place and just need ramping up.**
- **It could thus presage the opening overture of a new global polarisation**

The impact on India

- **The Beijing Summit would have far-reaching implications for India, presenting it with both challenges and opportunities.**
- **To begin with, India needs to carefully and objectively examine the depth and durability of the current phase of the ties between Russia and China, given their erratic past**

- **Moscow's potential vulnerability to China's hegemony could concern India given its still overwhelming dependence on Russia for defence supplies particularly as it has border tensions with China.**
- **India being Russia's largest defence market, Moscow has an interest in retaining it.**
- **While India has several reservations about the existing global architecture, it is by no means certain that Beijing's alternative would suit India better.**
- **New Delhi's best bet would perhaps be to press for a higher profile in the existing global order commensurate with India's size and potential.**

- **The incoming global polarisation is likely to be differently nuanced with greater flux, driven mostly by the geo-economics and quest for new technologies.**
- **Unlike the first Cold War, India is now a major global player with hard-earned “strategic autonomy” providing it with real options.**
- **India should leverage its strengths judiciously, and adopt a sharper and nimbler approach**

Concerns over voter turnout data

Why are Opposition leaders and civil society members demanding that Form 17C data, which contains the absolute number of votes polled in a booth, be published online? How has the Election Commission of India responded? Why has the Supreme Court's intervention been sought?

EXPLAINER

Anuratrika Bhanuik

The story so far:

The Supreme Court is slated to hear on May 24 a petition filed by the NGO Association for Democratic Reforms (ADR) seeking a direction to the Election Commission of India (ECI) to upload polling station-wise voter turnout data on its website within 48 hours of the conclusion of polling for each phase of the Lok Sabha elections.

What happened?

ADR has flagged a sizeable difference in the initial turnout figures released by the ECI soon after the conclusion of polling and the final voter percentages published subsequently. Such discrepancies have evoked sharp questions from the Opposition and civil society about the authenticity of the polling data available in the public domain and the possibility of manipulation at the counting stage. On May 20, an intervention application was also moved in the case by advocate Mehmood Pracha who contested polls from the Kampur Lok Sabha constituency as an independent candidate. He alleged that the concerned returning officer (RO) had not furnished copies of the Form 17C record of votes polled in his constituency as mandated by the Conduct of Election Rules, 1961 (DER Rules).

Echoing similar concerns, a group of civil society members have written to the apex poll body urging it to "immediately disclose" through its website, the authenticated record of voter turnout of every polling station as contained in Part I of Form 17C (account of votes recorded).

What is Form 17C?

As per the DER Rules, the ECI has to maintain two forms that have data on the number of electors and the votes polled — Forms 17A and 17C. While the former is used to record the details of every voter who comes into a polling booth and casts his or her vote, the latter is an account of all the votes recorded. Under Rule 49(2C), a presiding officer is mandated to furnish a copy of the entries made in Form 17C to the polling agents of the candidates at the close of polling.

Part I of Form 17C contains crucial information — the identification numbers of the EVMs used in the polling station, the total number of electors assigned to the polling station, the total number of voters as entered in the register for voters (Form 17A), the number of voters who decided not to record their votes after signing the register, the number of voters who were not allowed to vote, the total number of test votes and votes recorded per EVM. Whereas, Part II of the same form contains the results of the counting carried out on the stipulated day.

The data in Form 17C is used by candidates to verify the results on the counting day by matching it with the EVM count. An election petition can be moved in the concerned High Court in case of any discrepancies.

Why is the ECI under the scanner?

The ECI has come under scrutiny for not releasing the absolute number of votes polled in any constituency in this general election unlike in 2019. Only voting percentages have been published that too after significant delay — after 11 days of the first phase of polling held on April 19 and four days after the second phase of polling held on April 26.

On May 7, Congress president

Malikarjun Kharge wrote to leaders of the



Exercising their mandate: Voters stand in queue to cast their votes during the fifth phase of the Lok Sabha polls, at a polling station in Girdih on May 20, 2024.

INDIA bloc saying that the polling data released by the ECI "raises serious doubts". He flagged that apart from the delay, the voter turnout data released by the ECI "does not mention crucial yet related figures, such as the votes polled in each Parliamentary Constituency and in the respective Assembly Constituencies." He alleged that the "credibility of the Election Commission" was at an all-time low. He also expressed concerns that in his 52 years of electoral life, he had never witnessed such a high increment of voting percentages in the final published data. The provisional polling percentages for the first phase released by the ECI at 7 pm on April 19 was about 60% and for the second phase on April 26 was 62.06%. However, the final figures released on April 30 for the first phase stood at 66.14% (an increase of more than 5.5%) and 66.75% for the second phase (an increase of more than 5.74%).

The Congress chief further questioned what was precluding the poll body from publishing the exact voter turnout data of each polling station when such information was already available with the polling agents of the candidates through Form 17C. Since no data had been released about the number of eligible voters (electors) in each parliamentary constituency, it was impossible to calculate whether the absolute number of voters had increased or decreased, Mr. Kharge said. TMC leader and Lok Sabha candidate for Bengal's Krishnanagar constituency, Mahua Moitra also took to the social media platform X to highlight how she was able to compile the number of voters in her constituency within 24 hours of polling. She demanded to know why the ECI had failed to publish this information for the previous phases of polling.

How has the ECI responded?

In a scathing letter to Mr. Kharge, the ECI maintained that it has no legal obligation to publish online the absolute number of votes polled in every polling station.

"Copies of Form 17C are shared with polling agents present immediately, as the strongest measure of transparency. So candidates are aware and in possession of exact voter turnout data in absolute numbers even before it is known to the ECI", the letter stipulated.

Calling the allegations by Mr. Kharge an attempt to "create confusion, misdirection and impediments in the conduct of free and fair polls", the poll body pointed out how voters continue to vote even after 6:00 pm due to long queues at polling stations resulting in variations in the estimated data on the poll day.

Notably, in an affidavit filed before the apex court, the poll body claimed that disclosure of Form 17C data could cause 'confusion in the minds of voters' since it would also include postal ballot counts. This could be "used by persons with motivated interests to cast aspersions on the whole electoral process", it alleged. Casting aspersions on ADR's move, the ECI said that the NGO was approaching the top court with an agenda "to perpetually keep creating doubt in the mind of voters based on conspiracy theory". It also referred to ADR's unsuccessful challenge in the EVM-VVPAT cross-verification case.

What has the Supreme Court said?

The ADR has sought the Supreme Court's intervention to direct the ECI to upload scanned legible copies of Part I of Form 17C of all polling stations which contains the authenticated figures for votes polled within 48 hours of the close of polling. Saying that such information is "readily available" with the poll body, the NGO has also sought the publication of constituency and polling station-wise figures of voter turnout in absolute numbers.

"The inordinate delay in the release of final voter turnout data, coupled with the unusually high revision (of over 5%) in the EC press note of April 30 and the absence of disaggregated constituency and polling

station figures in absolute numbers, has raised concerns and public suspicion regarding the correctness of the data. These apprehensions must be addressed and put to rest" the petition said.

While seeking ECI's response to the plea on May 17, Chief Justice of India (CJ) D.Y. Chandrachud, heading a three-judge bench asked the poll body's counsel, "Every Polling Officer submits (voting records) by the evening, after 6 or 7 p.m., by which time the polling is completed. The Returning Officer would then have the data of the entire constituency. Why don't you upload it?"

What do experts have to say?

"The ECI always discloses absolute numbers of voter turnouts. This time they are only disclosing percentages, usually the turnouts are out within 24 hours of the end of polling unlike this time and the increase in voter turnout in the final figures is unusually high", Anjali Bhargava, Director of Common Cause earlier told *The Hindu*. She added that the poll body should upload a scanned copy of Form 17C as soon as it is submitted by the Presiding Officer to abate transparency concerns.

Addressing the ECI's assertion that access to Form 17C data by polling agents negates the need for such information to be published online, Jagdeep S. Chokkar, the founder of ADR pointed out that political parties do not contest elections in all constituencies. The renowned activist also highlighted how smaller political parties cannot afford to have polling agents in all booths or constituencies due to financial constraints. In fact, *The Hindu* found that since one constituency has roughly 2,000-2,200 booths, a candidate needs to have approximately 6,000 polling agents in each constituency to be able to obtain a copy of Form 17C. "This shows that it is impossible for smaller parties and many independents to have polling agents in all booths", Congress Rajya Sabha MP Shukti Singh told *Goli*.

THE GIST

ADR has flagged a sizeable difference in the initial turnout figures released by the ECI soon after the conclusion of polling and the final voter percentages published subsequently.

As per the DER Rules, the ECI has to maintain two forms that have data on the number of electors and the votes polled — Forms 17A and 17C. While the former is used to record the details of every voter who comes into a polling booth and casts his or her vote, the latter is an account of all the votes recorded.

The ECI maintained that it has no legal obligation to furnish to the general public information about the absolute number of votes polled in every polling station.



What is Form 17C?

- **As per the 1961 Rules, the ECI has to maintain two forms that have data on the number of electors and the votes polled — Forms 17A and 17C.**
- **While the former is used to record the details of every voter who comes into a polling booth and casts his or her vote, the latter is an account of all the votes recorded.**
- **Under Rule 49S(2), a presiding officer is mandated to furnish a copy of the entries made in Form 17C to the polling agents of the candidates at the close of polling.**

- **Part I of Form 17C contains crucial information — the identification numbers of the EVMs used in the polling station, the total number of electors assigned to the polling station, the total number of voters as entered in the register for voters (Form 17A), the number of voters who decided not to record their votes after signing the register, the number of voters who were not allowed to vote, the total number of test votes and votes recorded per EVM.**

- **Whereas, Part II of the same form contains the results of the counting carried out on the stipulated day.**
- **The data in Form 17C is used by candidates to verify the results on the counting day by matching it with the EVM count.**
- **An election petition can be moved in the concerned High Court in case of any discrepancies.**

Two U.S. asset managers introduce weight-loss Exchange Traded Funds

Reuters

Two separate asset-management firms announced the debut of exchange-traded funds (ETFs) on Tuesday, both designed to give investors exposure to stocks like Eli Lilly & Co and Novo Nordisk which are pioneers in developing new anti-obesity drugs.

Amplify ETFs said its Amplify Weight Loss Drug & Treatment ETF will track the VettaFi Weight Loss Drug & Treatment Index, while the Roundhill GLP-1 & Weight Loss ETF will be actively managed by Roundhill Investments.

The two products take slightly different approaches to building a portfolio around the new category



New trend: The number of ETFs targeting the booming segment of pharmaceutical market looks to explode. REUTERS

of medications to treat obesity, known as glucagon-like peptide-1 or GLP-1 drugs. Roundhill plans to focus squarely on pharmaceutical companies developing new drug therapies, while Amplify will include

a 30% weighting to firms involved in related businesses, such as manufacturing, analysis or distribution of these medications.

The number of ETFs targeting this booming segment of the pharmaceuti-

cal market appears to be exploding. In early 2020, Janus Henderson closed its own obesity-focused ETF, leaving investors with only broader pharmaceutical or healthcare fund options.

But last month, asset manager Tema re-branded and re-launched an ETF investing in stocks targeting cardiovascular and metabolic health.

It remains to be seen how long investors stay enthusiastic on ETFs tied to this particular trend. In the first four months of the year, ETFs designed to appeal to investors keeping tabs on trends like cybersecurity, WFH or cannabis logged outflows of \$2.4 billion compared with \$4.9 billion outflows in 2023.

Exchange traded fund

- **An exchange-traded fund (ETF) is a pooled investment security that can be bought and sold like an individual stock.**
- **ETFs can be structured to track anything from the price of a commodity to a large and diverse collection of securities.**
- **ETFs can even be designed to track specific investment strategies.**
-

- **ETF share prices fluctuate all day as the ETF is bought and sold; this is different from mutual funds, which only trade once a day after the market closes.**
- **ETFs offer low expense ratios and fewer broker commissions than buying the stocks individually.**
- **An ETF must be registered with the Securities and Exchange Commission.**

Pros and Cons of Exchange-Traded Funds



Lower costs



Diversification and
risk management



Tax benefits



Easy to trade



Potentially higher
costs



Limited control



Tracking error

BIMSTEC gets 'legal personality' after charter comes into force

Kallol Bhattacharjee
NEW DELHI

The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) will now be open to new members and observers after a historic first charter of the grouping came into force on May 20, the Ministry of External Affairs has announced.

With the charter having been adopted in the 5th summit of the BIMSTEC leaders, the grouping has acquired a 'legal personality' and will be able to enter

into structured diplomatic dialogue with other groupings and countries.

"The entry into force of the BIMSTEC Charter reaffirms India's commitment to a prosperous, peaceful and sustainable neighbourhood. BIMSTEC reflects the synthesis of our Neighbourhood First and Act East policies," External Affairs Minister S. Jaishankar said.

Official Spokesperson Randhir Jaiswal said the charter will provide "legal and institutional framework for meaningful cooperation and deeper inte-

gration of the Bay of Bengal region."

Long history

BIMSTEC was formed in 1997 but for a long time, the organisation could not form consensus among its seven member states – Bangladesh, Bhutan, Sri Lanka, Nepal, Thailand, Myanmar and India – about a common charter that could sum up the vision of the grouping.

Following the pandemic, the leaders of the BIMSTEC nations met virtually on 30 March 2022 under the chairship of Sri Lanka

and adopted the charter. The chair of BIMSTEC was taken up by Thailand after the 5th leaders' summit. Last month, Nepal's parliament took up the BIMSTEC charter and ratified it which paved the way for the coming into force of charter.

The organisation received greater attention especially in the backdrop of the near moribund status of the South Asian Association for Regional Cooperation (SAARC) which last time met in Kathmandu during November 2014.

The next SAARC summit

was to be held in Islamabad in 2016 but was derailed in the backdrop of terror strikes on India that New Delhi blamed on Pakistan-based elements. Ever since, the statements emanating from the Government of Prime Minister Modi have indicated that India is willing to shift its focus from SAARC to BIMSTEC as the latter is in greater harmony with India's 'Act East' policy.

This SAARC vs BIMSTEC issue came up during the debate in parliament in Kathmandu where Foreign Minister of Nepal Narayan

Kaji Shreshtha said that Nepal does not view BIMSTEC as a replacement of SAARC saying, "In order to reinvigorate the stalled SAARC process, Nepal, as its current chair, will surely take an initiative."

In the previous decades, BIMSTEC was also marked by growing discord between Bangladesh and Myanmar which has displaced more than a million Rohingya refugees who entered Bangladesh in 2017. Similar refugees from Myanmar have also streamed into Thailand ever since the 2021 coup.

BIMSTEC

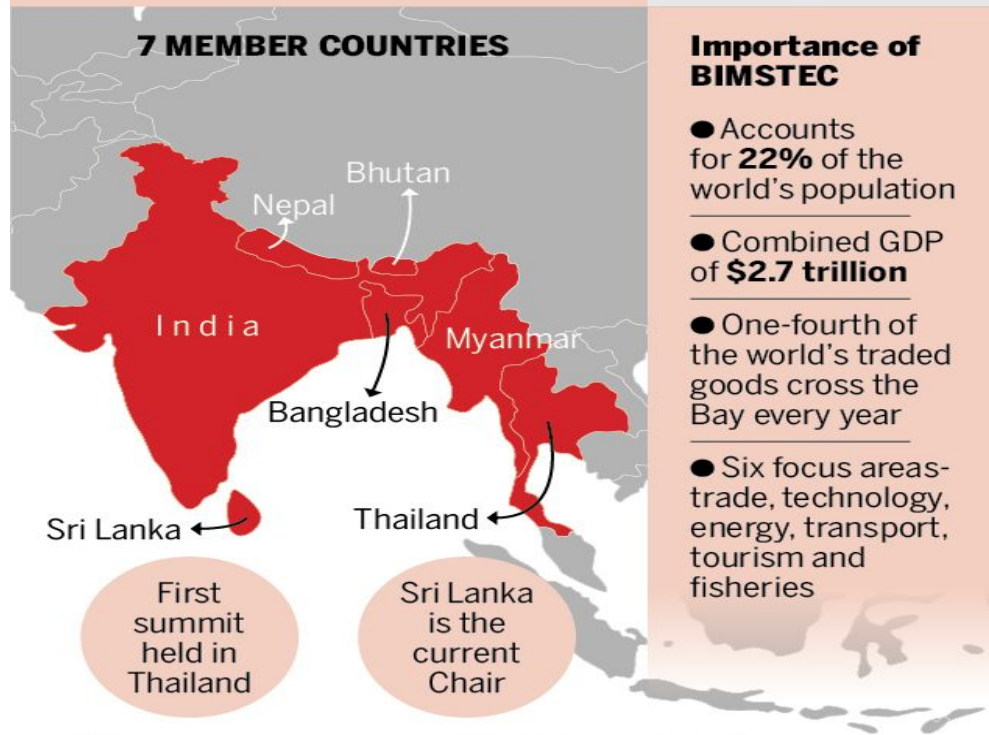
WHAT YOU SHOULD KNOW



Stands for **The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation**

Founded in 1997 through **Bangkok Declaration**

7 MEMBER COUNTRIES



Importance of BIMSTEC

- Accounts for **22%** of the world's population

- Combined GDP of **\$2.7 trillion**

- One-fourth of the world's traded goods cross the Bay every year

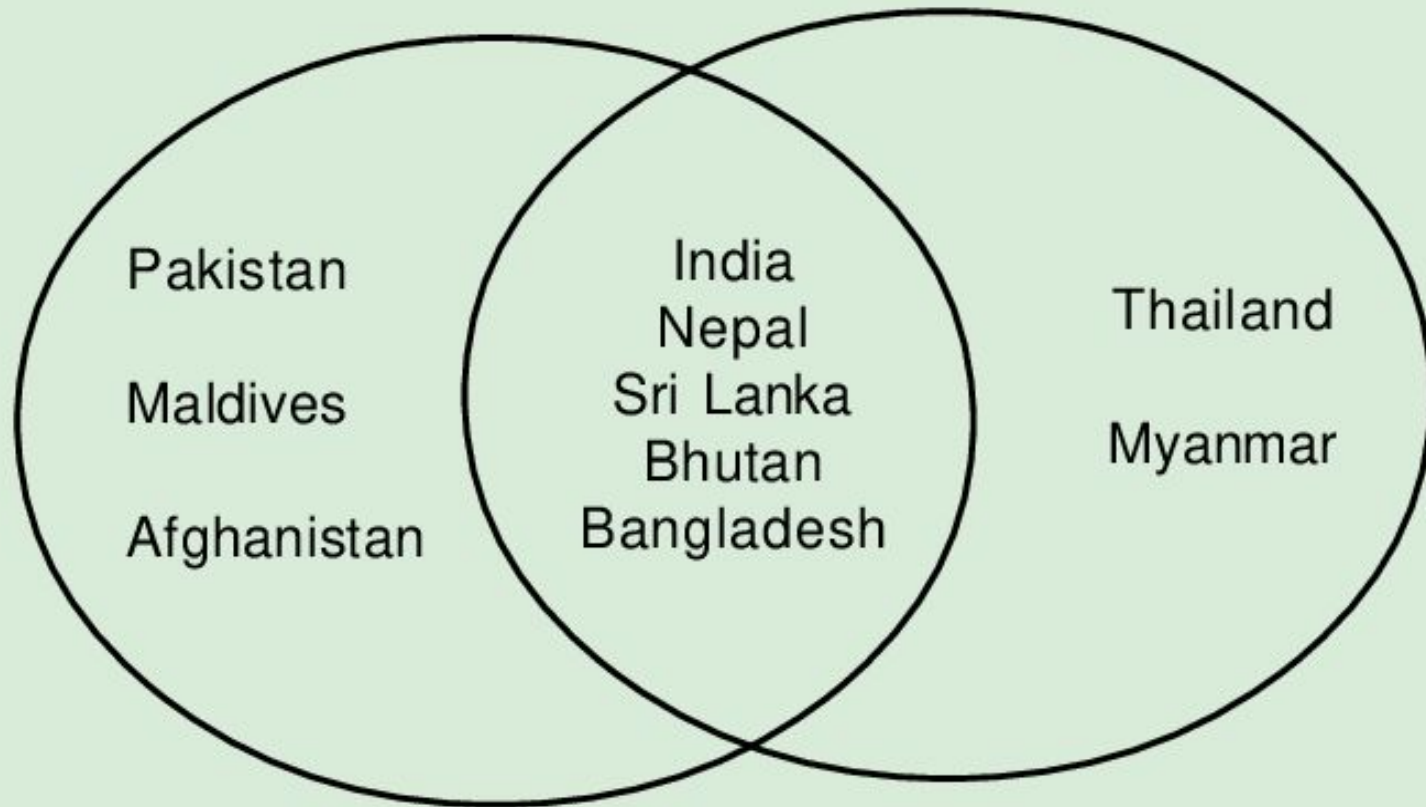
- Six focus areas- trade, technology, energy, transport, tourism and fisheries

First summit held in Thailand

Sri Lanka is the current Chair

SAARC

BIMSTEC



SAARC v/s BIMSTEC

SAARC

1. A regional organisation looking into South Asia
2. Established in 1985; a product of the Cold War era
3. Member countries suffer for mistrust and suspicion
4. Suffers from regional politics
5. Asymmetric power balance
6. Intra-regional trade only 5%

BIMSTEC

1. Interregional organisation connecting South Asia and South East Asia
2. Established in 1997 in the post-Cold War
3. Members maintain reasonably friendly relations
4. Core objective is the improvement of economic cooperation among countries
5. Balancing of power with the presence of Thailand and India on the bloc
6. Intra-regional trade has increased around 6 percent in a decade

South Asian Association of Regional Cooperation (SAARC) members are India, Pakistan, Bangladesh, Sri Lanka, Nepal, the Maldives, Bhutan and Afghanistan

BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) members are Bangladesh, India, Myanmar, Sri Lanka, Thailand, Nepal and Bhutan

- **The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) will now be open to new members and observers after a historic □ first charter of the grouping came into force.**
- **With the charter having been adopted in the 5th summit of the BIMSTEC leaders, the grouping has acquired a ‘legal personality’ and will be able to enter into structured diplomatic dialogue with other groupings and countries.**

- **“The entry into force of the BIMSTEC Charter reaffirms India’s commitment to a prosperous, peaceful and sustainable neighbourhood.**
- **BIMSTEC reflects the synthesis of our Neighbourhood First and Act East policies.**
- **Following the pandemic, the leaders of the BIMSTEC nations met virtually on 30 March 2022 under the chairship of Sri Lanka and adopted the charter.**
- **The chair of BIMSTEC was taken up by Thailand after the 5th leaders’ summit.**
- **Last month, Nepal’s parliament took up the BIMSTEC charter and ratified it which paved the way for the coming into force of charter**

- **The organisation received greater attention especially in the backdrop of the near moribund status of the South Asian Association for Regional Cooperation (SAARC) which last time met in Kathmandu during November 2014**

Topics

- MC13
- ICC
- Giz Galasi Dam
- IMEC
- Essay topic



By saurabh Pandey



At WTO, India still opposes 'plurilateral pact' on investment

Amiti Sen

NEW DELHI

India is under pressure at the WTO to give its consent for inclusion of the proposed China-led investment facilitation for development (IFD) pact in the formal WTO framework as a plurilateral agreement (endorsed by some of the members), but it is refusing to give in, sources said.

At this week's meeting of the WTO's General Council – the highest-level decision-making body in the WTO – New Delhi continued to oppose the move stating investment is not an issue for discussion at the WTO, sources said.

"India has maintained its position on the issue, as outlined at the WTO 13th Ministerial Conference (MC13) in Abu Dhabi earlier this year, against incorporating investment facilitation and other plurilaterals in the WTO framework. It said that investment is not an issue for discussion at the WTO," a trade official tracking the matter told *businessline*.

Joint declaration

At the WTO MC13, a joint ministerial declaration was issued by Trade Ministers from 123 WTO member-countries, including the EU, finalising the IFD pact, and they wanted it to be formally brought into the WTO as a plurilateral



agreement.

As a plurilateral pact, it would have been binding on only its signatories and not on non-members which include India, South Africa, the U.S. and some others.

"India and South Africa, played a key role in blocking the move as they pointed out there was no exclusive consensus to add the proposed IFD as a plurilateral agreement between the member countries already on board. They stressed that given the lack of exclusive consensus, this was not a matter for the MC13 agenda and should be discussed at the General Council," another source pointed out.

India stayed out of the IFD as it was concerned that some of its provisions would put the onus on the government to consult investors on policy matters which could encroach on its policy space, a government source had earlier explained.

(The writer is with *The Hindu businessline*)

MC13

- **The WTO's 13th Ministerial Conference (MC13) took place from 26 February to 2 March 2024 in Abu Dhabi, United Arab Emirates.**
- **Ministers from across the world attended to review the functioning of the multilateral trading system and to take action on the future work of the WTO.**
- **The Conference was chaired by H.E. Dr Thani bin Ahmed Al Zeyoudi, UAE's Minister of State for Foreign Trade**

I. Accessions

On the first day of MC13, ministers endorsed the accession to the WTO of two least-developed countries—Comoros and Timor-Leste.

II. WTO reform

At MC13, ministers endorsed progress on the WTO reform process, which covers the organization's deliberative, negotiating and dispute settlement functions

III. E-commerce

Since 1998, Members have regularly extended a so-called e-commerce moratorium, which commits Members not to impose customs duties on e-commerce. At MC13, ministers decided to renew the e-commerce moratorium until MC14 or 31 March 2026, whichever is earlier

Special and differential treatment

Ministers adopted a decision to improve the use of special and differential treatment (S&DT) provisions, in particular those in the Agreement on Technical Barriers to Trade and the Agreement on Sanitary and Phytosanitary Measures. The decision enhances training opportunities and endorses steps to make the S&DT provisions more effective and operational

Plurilateral agreements and initiatives

at MC13, Members failed to reach consensus on agriculture and food security as well as further disciplines fisheries subsidies

Plurilateral initiatives (covering less than the full Membership) are, therefore, becoming more prominent.

Domestic regulation of services

- **One commercially particularly relevant outcome is the agreement reached at MC13 on the entry into force, and integration into the WTO architecture, of new disciplines on domestic regulation of services. These disciplines are designed to facilitate trade in services by streamlining and simplifying regulatory procedures.**

Investment facilitation

- **Another important plurilateral initiative concerns Investment Facilitation for Development (IFD). At MC13, the parties to the IFD initiative welcomed an agreement that includes commitments to facilitate foreign direct investment.**

Sustainability-related initiatives

Members have also come together in different groupings to work on a series of sustainability-related initiatives. At MC13, they reported their progress

Fisheries subsidies

- In June 2022, at MC12, Members concluded an Agreement on Fisheries Subsidies (AFS). The AFS prohibits the granting or maintaining of subsidies to entities involved in (1) illegal, unreported and unregulated (IUU) fishing or (2) the fishing of overfished stocks. It is the first WTO agreement with a mostly sustainability-related objective (preserving the world's fisheries stocks).
- At MC13, ministers welcomed the progress over the past 20 months towards the AFS's entry into force.

Present Development

- **India is under pressure at the WTO to give its consent for inclusion of the proposed China-led investment facilitation for development (IFD) pact in the formal WTO framework as a plurilateral agreement.**
- **At the WTO MC13, a joint ministerial declaration was issued by Trade Ministers from 123 WTO member countries, including the EU, □finalising the IFD pact, and they wanted it to be formally brought into the WTO as a plurilateral agreement.**

- **As a plurilateral pact, it would have been binding on only its signatories and not on non-members which include India, South Africa, the U.S. and some others.**
- **“India and South Africa, played a key role in blocking the move as they pointed out there was no exclusive consensus to add the proposed IFD as a plurilateral agreement between the member countries already on board.**

India stayed out of the IFD as it was concerned that some of its provisions would put the onus on the government to consult investors on policy matters which could encroach on its policy space.

What is plurilateral Agreement ??

- **A plurilateral agreement is a multi-national legal or trade agreement between countries.**
- **In economic jargon, it is an agreement between more than two countries, but not a great many, which would be multilateral agreement**

MADRID

EU's Borrell urges Israel 'not to intimidate', 'threaten' ICC judges



REUTERS

EU foreign affairs chief Josep Borrell on Friday urged Israel “not to intimidate” or “threaten” the judges of the International Criminal Court (ICC), whose prosecutor has requested arrest warrants for Israel’s Prime Minister Benjamin Netanyahu and Defence Minister Yoav Gallant on suspicions of war crimes. AFP

INTERNATIONAL CRIMINAL COURT

ICC is an international tribunal which has jurisdiction to prosecute individuals for the international crimes of genocide, crimes against humanity and war crimes.

- **ICC is based in The Hague, the Netherlands.**
- **The ICC began functioning on 1 July 2002, the date when the Rome Statute entered into force.**

- **The Rome Statute is a multilateral treaty which serves as the ICC's foundational and governing document.**
- **Currently, there are 124 states which are party to the Rome Statute.**
- **India has not signed the Rome Statute**

- **The International Court of Justice has no jurisdiction to try individuals accused of war crimes or crimes against humanity. However, the ICC tries individual people for genocide, crimes against humanity, war crimes and crimes of aggression.**
- **All UN member states are automatically members of the ICJ, whereas nations must individually become members of ICC by ratifying Rome Statute.**
- **ICJ is an organ of UN, whereas ICC is independent of UN.**

Iran denies foul play in chopper crash that claimed Raisi's life

Agence France-Presse

TEHRAN

Iran's Army has so far found no evidence of criminal activity in a helicopter crash that killed the country's President Ebrahim Raisi and seven others, state media reported.

The 63-year-old died on Sunday after his helicopter went down in the country's mountainous northwest while returning from a dam inauguration on the border with Azerbaijan.

"No bullet holes or similar impacts were observed on the helicopter wreckage," said a preliminary report by the general staff of the armed forces published by the official *IRNA* news agency late on Thursday.

"The helicopter caught fire after hitting an elevated area," it said, adding that "no suspicious con-



Ebrahim Raisi

tent was observed during the communications between the watch tower and the flight crew".

Raisi's helicopter had been flying on a "pre-planned route and did not leave the designated flight path" before the crash.

The Army said "more time is needed" to investigate the crash and that it would announce more details later.

Raisi was laid to rest in his hometown of Mashhad on Thursday..

Giz Galasi Dam

- Giz Galasi Dam is an **embankment dam** on the **Aras River** straddling the **international border** between **Azerbaijan** and **Iran**.
- It is located in **Jabrayil District**, Azerbaijan, and **Khoda Afarin County**, East Azerbaijan Province, Iran, 12 km (7.5 mi) downstream of the **Khoda Afarin Dam**.
- Built both to generate electricity and to irrigate the plains in the region, it is the third joint Azerbaijan–Iran project on the Aras River



The missing links in IMEC, as shown by the Gaza war



On May 13, 2024, India and Iran finally signed a 10-year long-term bilateral contract for the operation of Chabahar Port – it was inked between the Indian Ports Global Limited and the Port and Maritime Organisation of Iran, in the presence of India's Ports, Shipping and Waterways Minister Sarbananda Sonowal. Mr. Sonowal said that the deal and the Chabahar Port is more important than just a bridge linking India with Iran. It is a critical economic route that links India with Afghanistan and the Central Asian countries.

But before this, a similar, and equally important, connectivity project, the IMEC, or the India-Middle East-Europe Corridor, was signed on the sidelines of the G-20 summit in New Delhi on September 9, 2023 by the European Union, France, Germany, India, Italy, Saudi Arabia, the United Arab Emirates (UAE) and the United States. Designed and formulated under the Partnership for Global Infrastructure and Investment (PGII), it aims to stimulate economic development through enhanced connectivity and economic integration between Asia, the Arabian Gulf and Europe.

As a counter to the BRI

The IMEC will comprise two separate corridors – an east corridor connecting India to the Arabian Gulf and a northern corridor connecting the Arabian Gulf to Europe. In addition to existing maritime and road transport routes, it will include a railway network that aims to be a reliable and cost-effective cross-border ship-to-rail transit network for goods and services to transit. The corridor also envisages along the railway route, the laying of cable for electricity and digital connectivity and a pipeline for clean hydrogen export. In its plan, the Indian ports of Kandla, Mumbai and Mundra will be connected by sea links to Fujairah, Jebel Ali and Abu Dhabi in the UAE in the east, followed by the rail-road link through Saudi Arabia and Jordan and onwards to Europe in the west by the port of Haifa in Israel, and along with the ports in Marseille in France, Messina in Italy and Piraeus in Greece.

This 4,800 kilometre-long IMEC corridor aims to secure regional supply chains, increase trade accessibility and improve trade facilitation across regions. Currently, much of the trade between India and Europe is through the Suez Canal as there is no overland access due to Pakistan being located to India's west overland. The IMEC will thus help overcome this obstacle and also cut down on the time, distance and costs of transit of goods from India to Europe significantly. It is



Rajeev Agarwal

a retired colonel, is the Assistant Director of the Manohar Parrikar Institute for Defence Studies and Analyses (MP-IDSA), New Delhi. He was Director in the Ministry of External Affairs and Director, Military Intelligence

Any conflict situation in the Persian Gulf poses a serious threat, but there are solutions

estimated that the time and cost of transporting goods to Europe from India will be reduced by 40% and 30%, respectively. It is also being touted as an effective counter to China's Belt and Road Initiative (BRI) in the region – and, therefore, has the U.S. as one of its major stakeholders.

The shadow of the Gaza war

But even before the potential impact of this path-breaking project could be examined by experts, the war in Gaza broke out on October 7, less than a month after its announcement. As a result, the whole project was stalled. In an interview on May 12, External Affairs Minister S. Jaishankar acknowledged that the delay in implementation of the IMEC in view of the current situation in West Asia is a matter of "concern" and the expectation generated following firming up of the initiative in September last has to be "adjusted" a bit now. He, however, was confident that work on the project would progress well after the war.

However, the Gaza war has amply proven that the IMEC has serious missing links in its current form. During the course of this war, the Houthis in Yemen have blocked the ships of Israel and its western allies from access to the Red Sea. Despite naval deployment by the U.S. Navy and Europe, the Houthis have not been deterred and have successfully targeted those ships. As a result, Israel and its western allies have been forced to take the longer route across the Cape of Good Hope in South Africa, increasing shipping time as well as insurance costs.

During the same period, Iran has repeatedly threatened to close the Strait of Hormuz in the north through which most crude oil and natural gas is shipped to other parts of the world, including India. In fact, a similar situation happened during the Persian Gulf Crisis in the summer of 2019 which was triggered by the downing of a U.S. drone by the Iranian military; the drone was over Iran. Reports suggested that the U.S. President ordered retaliatory military strikes against Iran, to be executed at dawn on June 21 before changing his mind at the last moment.

During this period, there were repeated incidents of Iran intercepting ships in the Persian Gulf and the Strait of Hormuz. The Indian Navy had to launch 'Operation Sankalp' in order to ensure the safe passage of Indian flagged ships through the Persian Gulf. There were armed security teams from the Indian Navy on Indian flag ships transiting the Persian Gulf.

Coming back to the Gaza war, in Israel, two of its major ports, Eilat and Haifa, have suffered

heavy losses due to disruption in trade through the Red Sea and also the targeting of these critical ports by Hamas and its allies. A consortium led by India's Adani Group purchased Haifa port in January 2023, expecting an expansion and an increase in traffic but the Gaza war has put everything on hold.

On Oman and Egypt

The IMEC envisages that the ports in the UAE such as Fujairah and Jebel Ali will form the eastern offload points for ships transiting to India. The problem here is that all the ports of the UAE are located in the Persian Gulf and are well within the Strait of Hormuz. Therefore, they will always be threatened by any conflict situation in the Persian Gulf.

What is the way out? Oman provides the perfect foil to this threat. Its ports open up into the Arabian Sea, well away from direct influence of an Iranian threat. It also offers the closest and direct link to ports in India. Traditionally too, merchants in Oman and India have traded for centuries through small boats called 'dhows' and Oman is considered India's gateway to West Asia. Oman is also an acceptable partner politically in the region as it has good relations with all stakeholders, including Israel.

Similarly, towards the West, instead of the ports of Israel, there has to be an alternate spur of the IMEC traversing through Egypt and ending at any of its major ports in the Mediterranean Sea – this will provide a safe and direct sea route to ports in Europe. Egypt is also a major player in West Asia and its inclusion will only help balance out the regional dynamics too. Like Oman, Egypt has good relations within the region and with Europe, Israel and the U.S.. In fact, Egypt had quietly voiced its displeasure on being left out of the IMEC and such an extension will not only take care of the politics but also the economics of it.

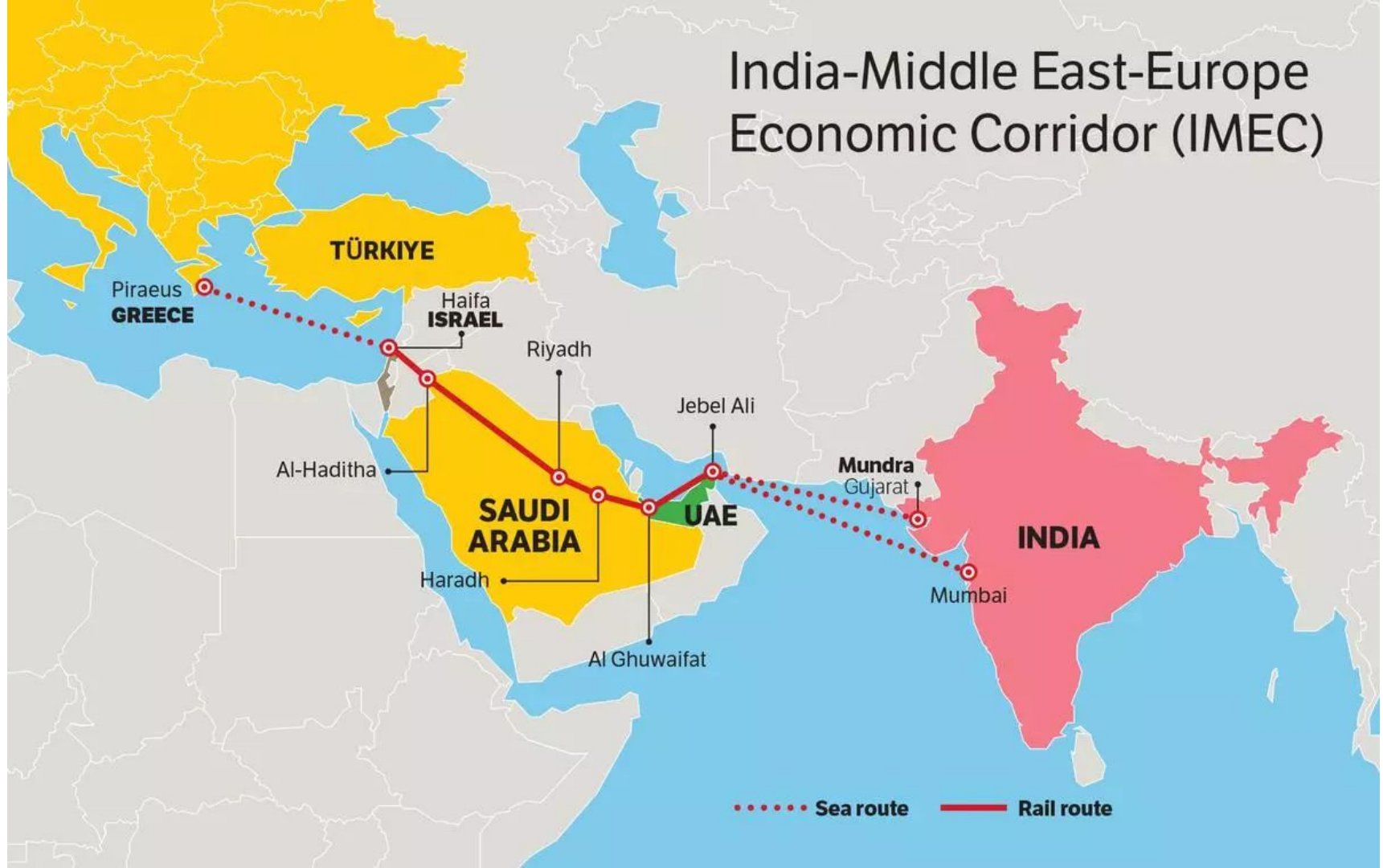
With the inclusion of Oman to the east and Egypt to the west, the IMEC can be made safe from disruptions from future conflicts and can, therefore, be considered vital to plug the critical missing links in the current structure of the IMEC.

The IMEC is a futuristic and path-breaking initiative. Building upon the wave of reconciliation within West Asia triggered by the Abraham Accords, this could be an ideal foil not only to China's BRI but also as a useful tool to better integrate the region and insulate it from threats posed to connectivity due to conflict. The missing links, highlighted by the Gaza war, can add a layer of insurance to this ambitious project.

IMEC

India and Iran finally signed a 10-year long-term bilateral contract for the operation of Chabahar Port — it was inked between the Indian Ports Global Limited and the Port and Maritime Organisation of Iran

India-Middle East-Europe Economic Corridor (IMEC)



- **the IMEC, or the India-Middle East-Europe Corridor, was signed on the sidelines of the G-20 summit in New Delhi on September 9, 2023 by the European Union, France, Germany, India, Italy, Saudi Arabia, the United Arab Emirates (UAE) and the United States. Designed and formulated under the Partnership for Global Infrastructure and Investment (PGII),**
- **it aims to stimulate economic development through enhanced connectivity and economic integration between Asia, the Arabian Gulf and Europe**

As a counter to the BRI

- **The IMEC will comprise two separate corridors — an east corridor connecting India to the Arabian Gulf and a northern corridor connecting the Arabian Gulf to Europe.**
- **In addition to existing maritime and road transport routes, it will include a railway network that aims to be a reliable and cost-effective cross-border ship-to-rail transit network for goods and services to transit.**
- **The corridor also envisages along the railway route, the laying of cable for electricity and digital connectivity and a pipeline for clean hydrogen export.**

- **In its plan, the Indian ports of Kandla, Mumbai and Mundra will be connected by sea links to Fujairah, Jebel Ali and Abu Dhabi in the UAE in the east, followed by the rail-road link through Saudi Arabia and Jordan and onwards to Europe in the west by the port of Haifa in Israel, and along with the ports in Marseille in France, Messina in Italy and Piraeus in Greece.**
- **This 4,800 kilometre-long IMEC corridor aims to secure regional supply chains, increase trade accessibility and improve trade facilitation across regions.**

- **Currently, much of the trade between India and Europe is through the Suez Canal as there is no overland access due to Pakistan being located to India's west overland.**
- **The IMEC will thus help overcome this obstacle and also cut down on the time, distance and costs of transit of goods from India to Europe significantly**

On Oman and Egypt

- **The IMEC envisages that the ports in the UAE such as Fujairah and Jebel Ali will form the eastern offload points for ships transiting to India.**
- **The problem here is that all the ports of the UAE are located in the Persian Gulf and are well within the Strait of Hormuz.**

- **Therefore, they will always be threatened by any conflict situation in the Persian Gulf. Oman provides the perfect foil to this threat.**
- **Its ports open up into the Arabian Sea, well away from direct influence of an Iranian threat. It also offers the closest and direct link to ports in India.**

- **Similarly, towards the West, instead of the ports of Israel, there has to be an alternate spur of the IMEC traversing through Egypt and ending at any of its major ports in the Mediterranean Sea — this will provide a safe and direct sea route to ports in Europe.**
- **Egypt is also a major player in West Asia and its inclusion will only help balance out the regional dynamics too.**
- **Like Oman, Egypt has good relations within the region and with Europe, Israel and the U.S..**







Topics

- The International Health Regulations (IHR)
- China In europe
- Reduction in Household saving
- Balfour Declaration
- China focus on food security
- India in Africa - critical minerals
- Mad honey
- Mains



By saurabh Pandey



Kunal Roy

Q =

With growing closeness between Russia and China, India's depth of dilemma will increase. Discuss.

(Please don't write anything in this space)

In order to emerge as a superpower in Asia, India needs to have strong friends like Russia, whose growing closeness with China, is a dilemma for India.

The Indo-Russia ties originated during the Cold-war era when India maintained its Non-Alignment stance but leaned towards USSR due to its support for India in the Kashmir issue and economic cooperation.

Post-Soviet era, Russia continued good relations and strategic partnership with India.

But, with the changing dynamics of Asian geopolitics, we can see that our friend has held/shaked one hand with our foe-China.

China has not always been a good neighbour to us as we have been to them. From pushing boundaries at the LOC, to pushing buttons of our

(Please don't write anything in this space)

(Please don't write anything in this space)

brother nation Pakistan, by wedging them against us with arms and ammunitions.

Post Russia-Ukraine war, the European and the American nations have put economic sanctions on Russia. They have ban import of Russian oil and Russian goods, also ceasing their reserves with the World Bank. Russia has found a trade partner with China. China being a manufacturing economy, imports resources from Russia, keeping its economy afloat.

They both have joined hands in China's Built and Road initiative. Their trade

value has reached \$240 billion in 2023.

Russia is also predominantly dependent on China for exports of energy and critical inputs.

Russia was the largest crude oil supplier to China with volume averaging 2.1 million barrels a day in 2023.

(Please don't write anything in this space)

(Please don't
write anything
in this space)

Russia and China are trying to form a power bloc against the west, both being the members of BRICS, SCO, ~~At~~ Asian Development Bank, to resist their influence and hegemony.

India has also been a close friend and partner to Russia. India at many incidents has acted as a peace negotiator between Russia and other nation.

The bilateral trade between India and Russia had reached \$45 Billion in December, 2022.

India as always, has tried to maintain a balance between the west and Russia, without affecting its own sovereignty. But it will be a huge dilemma for India, if Russia decides to side with China, causing disruption in the geopolitics and security on land as well as in water.

(Please don't
write anything
in this space)

At the upcoming World Health Assembly, a toolkit to prepare nations for pandemics



Ramya Kannan

When the World Health Assembly (WHA) meets next week, it will create a historic milestone for global public health. A package of amendments, based on 300 proposals made by member countries after the pandemic, will be the star of the agenda. These amendments to the International Health Regulations will target improving the ability of countries to respond to public health emergencies of international concern.

The International Health Regulations (IHR), first adopted by the WHA in 1969 and last revised in 2005, were conceived to maximise collective efforts to manage public health events while minimising disruption to travel and trade. There are 196 State Parties to the IHR, comprising all 194 WHO Member States plus Liechtenstein and the Holy See. The IHR provides an overarching legal framework that defines countries' rights and obligations in handling public health events and emergencies that have the potential to cross borders. They also introduce important safeguards to protect the rights of travellers and other persons in relation to the treatment of personal data, in-



Lockdown during the COVID-19 pandemic. GETTY IMAGES

formed consent and non-discrimination in the application of health measures under the Regulations. Therefore, the IHR is an instrument of international law that is legally binding on 196 countries.

Surveillance systems

The IHR requires that all countries have surveillance systems capable of detecting acute public health events in a timely manner, assessing these events, reporting to the WHO and those that may constitute a public health emergency of international concern, and responding to public health risks and emergencies. The goal of country implementation is to limit the spread of health risks to neighbouring countries and

to prevent unwarranted travel and trade restrictions.

WHO Director General Tedros Adhanom Ghebreyesus said: "The IHR has served for 20 years, but our experience in using this vital tool for the management of multiple public health emergencies, including COVID-19, has demonstrated important areas in which they could be strengthened."

Of the amendments, he added: "This is historic. Countries have come together around improved international mechanisms to protect every person in the world and future generations from the impact of epidemics and pandemics."

IHR Working Group co-chair Ashley Bloomfield hoped the amendments would hold out. "It has been a long process to achieve consensus on the majority of amendments. This shows the importance the world places on being able to prepare effectively for and respond better to epidemic and pandemic threats, and that there is strong international consensus on how to go about international public health protection." This process has been running in parallel with an intergovernmental process to develop an international agreement on pandemic pre-

vention, preparedness, and response. The draft pandemic agreement, with its own Member State-led negotiating process, is also due to go to the World Health Assembly.

Building capacities

A potential new pandemic agreement and the amended IHRs would be complementary to international instruments designed and negotiated by Member States to help countries protect their peoples better from future pandemic threats. The IHR focuses on building countries' capacities to detect and respond to public health events, which could take on international dimensions, while the draft pandemic accord focuses on a coordinated international response to pandemics, with equitable access to vaccines, therapeutics, and diagnostics at the centre.

(ramya.kannan@thehindu.co.in)

For feedback and suggestions

for 'Science', please write to science@thehindu.co.in with the subject 'Daily page'

The International Health Regulations (IHR)

- **The International Health Regulations (IHR), first adopted by the WHA in 1969 and last revised in 2005, were conceived to maximise collective efforts to manage public health events while minimising disruption to travel and trade.**
- **There are 196 State Parties to the IHR, comprising all 194 WHO Member States plus Liechtenstein and the Holy See.**
- **The IHR provides an overarching legal framework that defines countries' rights and obligations in handling public health events and emergencies that have the potential to cross borders.**

Table 5.1 Seven strategic actions to guide IHR (2005) implementation^a



	Strategic action	Goal
GLOBAL PARTNERSHIP		
1	Foster global partnerships	WHO, all countries and all relevant sectors (e.g. health, agriculture, travel, trade, education, defence) are aware of the new rules and collaborate to provide the best available technical support and, where needed, mobilize the necessary resources for effective implementation of IHR (2005).
STRENGTHEN NATIONAL CAPACITY		
2	Strengthen national disease surveillance, prevention, control and response systems	Each country assesses its national resources in disease surveillance and response and develops national action plans to implement and meet IHR (2005) requirements, thus permitting rapid detection and response to the risk of international disease spread.
3	Strengthen public health security in travel and transport	The risk of international spread of disease is minimized through effective permanent public health measures and response capacity at designated airports, ports and ground crossings in all countries.
PREVENT AND RESPOND TO INTERNATIONAL PUBLIC HEALTH EMERGENCIES		
4	Strengthen WHO global alert and response systems	Timely and effective coordinated response to international public health risks and public health emergencies of international concern.
5	Strengthen the management of specific risks	Systematic international and national management of the risks known to threaten international health security, such as influenza, meningitis, yellow fever, SARS, poliomyelitis, food contamination, chemical and radioactive substances.
LEGAL ISSUES AND MONITORING		
6	Sustain rights, obligations and procedures	New legal mechanisms as set out in the Regulations are fully developed and upheld; all professionals involved in implementing IHR (2005) have a clear understanding of, and sustain, the new rights, obligations and procedures laid out in the Regulations.
7	Conduct studies and monitor progress	Indicators are identified and collected regularly to monitor and evaluate IHR (2005) implementation at national and international levels. WHO Secretariat reports on progress to the World Health Assembly. Specific studies are proposed to facilitate and improve implementation of the Regulations.

^a Strategic actions 2–5 are key because they call for significantly strengthened national and global efforts.

International Health Regulations

Protecting People Every Day

The **International Health Regulations** (IHR) represent an agreement between 196 countries, including all WHO Member States, to work together for global health security. Under the IHR, all countries must report events of international public health importance.

The IHR require that all countries can:



Detect

Make sure surveillance systems and laboratories can detect potential threats



Assess

Work together with other countries to make decisions in public health emergencies



Report

Report specific diseases, plus any potential international public health emergencies



Respond

Respond to public health events



We share a responsibility to protect our world from outbreaks of infectious diseases and other health threats. The goal of the IHR is to stop events in their tracks before they become international emergencies.

- **They also introduce important safeguards to protect the rights of travellers and other persons in relation to the treatment of personal data, informed consent and non-discrimination in the application of health measures under the Regulations.**
- **Therefore, the IHR is an instrument of international law that is legally binding on 196 countries.**

- **The IHR requires that all countries have surveillance systems capable of detecting acute public health events in a timely manner, assessing these events, reporting to the WHO those that may constitute a public health emergency of international concern, and responding to public health risks and emergencies.**
- **The goal of country implementation is to limit the spread of health risks to neighbouring countries and to prevent unwarranted travel and trade restrictions.**

A visit to preserve China's interests in Europe



The Chinese President Xi Jinping's first trip to Europe (except Russia) in five years, earlier this month, was carefully constructed as evidenced by his ports of call – France, Serbia and Hungary. The first is a leading proponent of the notion of “strategic autonomy” of Europe, the second is a non-North Atlantic Treaty Organization, non-European Union (EU) outlier close to Russia, and the third is a pro-Russian maverick that has blocked many resolutions criticising China in EU.

World events, visit's goals

The COVID-19 pandemic had the effect of closing off China to the rest of the world for an extended period, forcing Beijing to re-adjust its global investment goals because of economic problems. Indeed, Mr. Xi did not travel abroad for two and a half years and has not been too frequent a traveller even after the restrictions were lifted last year.

In this period, the world had been turned upside down geopolitically by the Russian invasion of Ukraine. In the meantime, the China-United States trade war has morphed into a technology war and the Biden administration has broadened and intensified the technology restriction regime on China. In the U.S. and Europe, accusations of Chinese dumping of cheap goods have intensified and there are calls for retaliation. A lot of them focus on electric vehicles (EV), an area where China has emerged a world leader.

Mr. Xi had three goals – to prevent the EU from getting too close to the U.S., to avert a trade standoff with EU and to bolster China's standing in Europe. He has had to do all this in the face of the fallout of the Russian invasion of Ukraine that has hardened the western alliance against Russia, with China having to sustain some collateral damage. It has also had an indirect influence in shaping negative EU views on China's trade policy.



Manoj Joshi

is Distinguished
Fellow, Observer
Research Foundation,
New Delhi

The Chinese President's trip to Europe was a carefully constructed one in the face of adverse geopolitics

The goals of French President Emmanuel Macron were fairly straightforward – to promote French trade interests as well as to push China to stop supplying weapons components to Moscow. He did his own messaging by meeting the Tibetan Sikyong (Prime Minister of the government in exile) Penpa Tsering on the eve of the Xi visit.

In Paris, Mr. Xi also met with the European Commission President Ursula von der Leyen who has advocated a policy of “de-risking” from China by reducing dependence on Chinese imports and technology. Both Mr. Macron and the EU chief urged China to ensure a more balanced trade with Europe.

France is united with the EU on the issue of the cost advantage that Chinese EVs have over European cars. While the Chinese are keen to ride on the strength of their EV industry, the Europeans are equally keen to protect their car manufacturers.

In 2019, the EU had recast its doctrine to define China as “a partner for cooperation, an economic competitor and a systemic rival.” A sceptical Chinese Foreign Minister Wang Yi has described it as driving to a crossing where the lights are simultaneously green, yellow and red. But this somewhat convoluted formulation seeks to balance Europe's China policy between the economic opportunity it sees there, with the risks from China's economic policy and its national security postures.

The focus on Hungary

Mr. Xi got a warm welcome in Serbia and Hungary which do not otherwise attract top-drawer visitors. Chinese foreign direct investment in Serbia is growing and it has invested \$5.5 billion in the country, mainly in copper mining and a steel processing plant. The big investment common to both countries has been in the upgradation of the Belgrade-Budapest high-speed railway project, and there are plans for more roads, tunnels and bridges with Chinese

investment. Newer plans exist for railways to link Chinese factories in eastern Hungary to markets in western Europe. CATL, the giant Chinese battery company, is setting up a plant to supply German EV makers. The Chinese EV giant, BYD, which hopes to capture the European market, has chosen the southern Hungarian city Szeged to set up its first factory in Europe.

Hungary is today the closest ally of China within the EU and it provides China access to the world's largest trading bloc. Its world view is at odds with its Eastern European neighbours who are wary of Russian aggressiveness, and by extension, China.

Between eastern and western Europe

China had sought to develop ties with eastern European countries through the so-called 17+1 China and Eastern Europe (CEE) community to serve as a gateway for markets in rich western Europe. However, this has now fallen victim to the Ukraine war which has strained ties between China and many of the Eastern European countries which are backing Ukraine. In all fairness the CEE had begun to pall even before the invasion of Ukraine as the countries realised that despite promises, the Chinese remained focused on western Europe.

Europe itself figures large in Beijing's world view. Among the key Belt and Road Initiative (BRI) projects have been railways linking China to Europe via Central Asia. With the help of high-speed trains, the Chinese aim is to crunch the overland distance between themselves and prosperous Europe, which they see as a market for their increasingly sophisticated products.

Given the global developments, Mr. Xi's visit can be seen as a defensive one, aimed at preserving Chinese interests in Europe in the face of adverse geopolitics. But visits to Hungary and Serbia, though high on the friendship front, are not likely to break much ice with the rest of Europe which is increasingly sceptical of China.

China In Europe



- **China had sought to develop ties with eastern European countries through the so-called 17+1 China and Eastern Europe (CEE) community to serve as a gateway for markets in rich western Europe.**
- **However, this has now fallen victim to the Ukraine war which has strained ties between China and many of the Eastern European countries which are backing Ukraine.**
- **In all fairness the CEE had begun to pall even before the invasion of Ukraine as the countries realised that despite promises, the Chinese remained focused on western Europe. Europe itself figures large in Beijing's world view.**

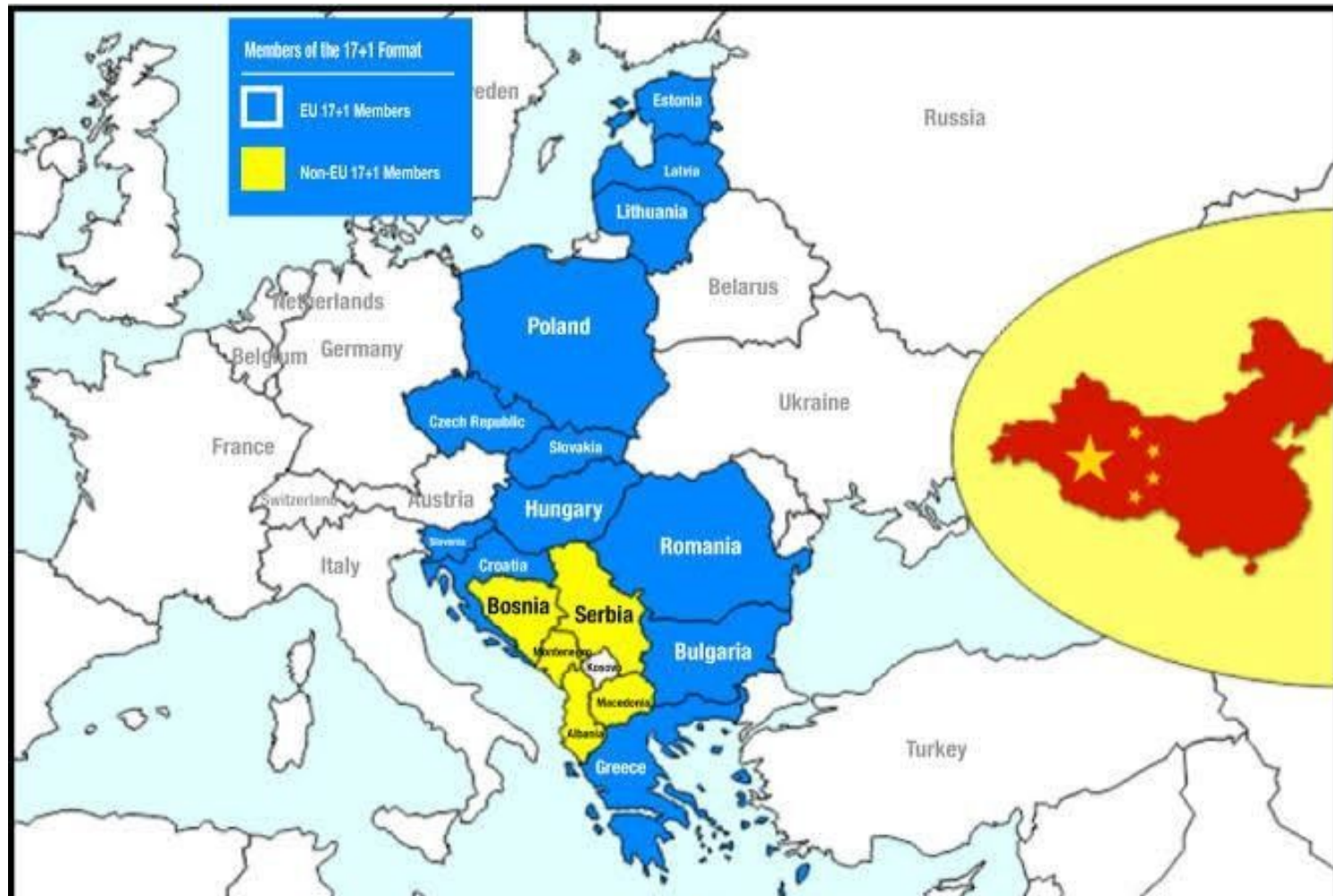




Figure 1: The Chongqing-Duisburg Trans-Eurasia Railroad & Schengen Area

TRANS-EURASIA RAILROAD

The 11,179-kilometre rail line is the most important connection to Europe. Launched in 2011 by a joint venture with Germany, China, Kazakhstan, and Russia, the rail goes from the city of Chongqing in southwestern China to Duisburg, Germany.

SCHENGEN AREA

It is an area without internal borders, within which citizens, many non-EU nationals, business people and tourists can freely circulate without being subjected to border checks. Since 1985, it has gradually grown and encompasses today almost all EU States and a few associated non-EU countries.

http://ec.europa.eu/dgs/home-affairs/what-we-do/policies/borders-and-visas/schengen/index_en.htm

- **Among the key Belt and Road Initiative (BRI) projects have been railways linking China to Europe via Central Asia.**
- **With the help of high-speed trains, the Chinese aim is to crunch the overland distance between themselves and prosperous Europe, which they see as a market for their increasingly sophisticated products.**
- **Given the global developments, Mr. Xi's visit can be seen as a defensive one, aimed at preserving Chinese interests in Europe in the face of adverse geopolitics.**

Rising debt strains household savings

Household net financial savings to GDP ratio have declined due to increased borrowing and structural shifts rather than a mere change in savings pattern; there's a need for macroeconomic policies to support household income growth to reduce its own financial stress and stabilise the macroeconomy



ECONOMIC NOTES

Zico Dasgupta
Srinivas Raghuvaran

The bone of contention in the recent debate has been the drastic fall in household net financial savings to GDP ratio during 2022-23 on account of a higher borrowing to GDP ratio. In response to our previous article 'On the fall in Household Savings' (*The Hindu*, April 21, 2024), the Chief Economic Advisor (CEA) to the Government of India has interpreted this trend as a mere shift in the composition of household savings, where households are argued to incur greater borrowing (or reduce net financial savings) solely to finance higher physical savings (investment). In this article, we argue that this interpretation is inconsistent with broad trends and highlight some signs of structural shifts in the Indian economy.

Not a mere change in savings pattern
The household savings to GDP ratio is the sum of its net financial savings to GDP ratio, physical savings to GDP ratio and gold and ornaments. A mere shift in the composition of savings would have kept the overall household savings to GDP ratio unchanged, with lower net financial savings to GDP ratio or higher borrowing to GDP ratio being fully offset by higher physical savings to GDP ratio. Figure 1 shows the extent to which these ratios changed during 2022-23 as compared to 2021-22 and indicates a contrary phenomenon.

The net financial savings to GDP ratio declined by 2.5 percentage points, whereas the physical savings to GDP ratio increased only by 0.3 percentage points. The household borrowing to GDP ratio increased by 2 percentage points. With the gold savings to GDP ratio remaining largely unchanged, the household savings to GDP ratio declined by 1.7 percentage points. In short, the phenomenon of a household's higher borrowing to GDP ratio cannot be explained exclusively in terms of change in savings composition. In our last article, we argued that lower net financial savings to GDP ratio and higher borrowing to GDP ratio largely reflected a household's need to finance greater interest payment commitments at a given income amid higher interest rates and debt-income ratio, leading to an increase in financial distress of the household.

Surprisingly, the CEA's response is based on the analysis of absolute nominal numbers of household total savings. He argues that the nominal value of a household's total savings has increased, as the nominal value of physical savings has increased more than the fall in nominal value of net financial savings. However, this trend merely shows that the nominal (inflation unadjusted) growth rate of total household savings has been positive during 2022-23, which has hardly been a topic of contention. A positive nominal growth rate of savings neither addresses the historic fall in net financial savings to GDP ratio nor refutes our explanation of the higher borrowing to GDP ratio and the phenomenon of greater interest payment burden of the household that we pointed out.

The phenomenon of household's higher interest payment burdens and debt-income ratio in the post-COVID period, however, brings forth two

Rising interest, falling savings

Challenges ahead include narrowing the gap between income growth and lending rates, and averting potential decreases in aggregate demand

Declining trends: Figure 1 Changes in the components of the savings to GDP ratio in FY21-FY23

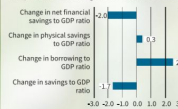


Table 1a: Lending rate and the household GNI growth (%)

	2019-20 to 2021-22	2019-20 to 2022-23
Avg. lending rate (RBI)	9.3	8.4
Average household GNI growth rate	8.0	9.3
Average household GNI growth rate minus Average WALK	-1.3	-0.1

Table 1b: Lending rate and the GNI growth (%)

	2003-04 to 2007-08	2019-20 to 2021-22
Average Lending rate (RBI)	11.8	8.8
Average GNI** growth rate	14.5	8.7
Average GNI growth rate minus Avg lending rate	2.7	-0.1



the previous episodes when household borrowing increased?

Signs of structural shift

Since the share of interest payment in household income (interest payment burden) is the product of interest rate and debt-income ratio, any increase in the latter would lead to a greater interest payment-income ratio at a given interest rate. The recent period has been associated with a sharp rise in both these variables. The debt-income ratio of the household can potentially change through two distinct factors. The first factor pertains to a higher net borrowing-income ratio of the household, where net borrowing is the difference between total borrowing and interest payments. Household's stock of debt would rise at any given level of income if they decide to increase their net borrowing for financing higher investment or consumption.

The second route involves factors that are largely exogenous to the household's decisions namely, the interest rate on the outstanding debt and the nominal income growth rate of the household. Any increase in interest rate or reduction in nominal income growth rate increases a household's debt-income ratio during a particular period. If the growth in interest payments outweighs income growth, the debt-income ratio will continue to grow. Such mechanism can be described as "Fisher dynamics" following Irving Fisher, who explained the phenomenon of rising debt-income ratio in terms of changes in interest rate and nominal

- 1 The nominal (inflation unadjusted) growth rate of total household savings has been positive during 2022-23
- 2 For the year 2022-24, the GNI growth rate has been lower than the average WALK
- 3 At the present juncture, India's debt servicing ratio is still lower than many countries

Sources for the Figure and Tables: Figure 1 National Accounts Statistics, Table 1a: RBI, Table 1b: RBI, National Accounts Statistics

THE GIST

➤ The household net financial savings to GDP ratio fell significantly in 2022-23, primarily due to a higher borrowing to GDP ratio. This decline cannot be solely explained by a shift in the composition of savings.

➤ The increase in household borrowing has led to a higher debt-income ratio, resulting in greater interest payment burdens. This trend has been particularly pronounced in the post-COVID period.

➤ Unlike previous periods of high household borrowing, the current period is characterised by a lower nominal income growth rate compared to the average lending rate, leading to increased financial stress on households.

➤ There is a need for macroeconomic policies that not only address inflation and government debt targets but also stimulate and support household income growth to mitigate these emerging challenges.

by such Fisher dynamics. The post-COVID period has seen a sharp rise in the ratio between nominal debt and nominal income of the household, largely on account of a lower nominal income growth rate. The debt-income ratio as an indicator of household leverage (or repayment capacity) has received scrutiny, particularly after the global financial crisis. Notwithstanding the recent rise in the lending rate that has contributed to the rise in debt-income ratio, the key structural feature that has emerged in the recent period is that the nominal income growth rate has often been lower than the weighted average lending rate. This seems to be the very mechanism by which a household's interest payment burden and debt-income ratio have increased.

Table 1 shows that the average value of the growth rate of household disposable income has been lower than the weighted average lending rate (WALK) for the period 2019-20 to 2022-23. The average value of the lending rate for this period is constructed from the Reserve Bank of India's quarterly figures. The household disposable income data is not yet available for 2022-24. However, the gross national income (GNI) growth rate, which is closely associated with the growth rate of household disposable income in the recent period, has recorded lower than the average WALK for this year. The emerging features seem to stand in contrast with previous episodes of high household borrowing, like the period of 2003-04 to 2007-08. While a long run comparison becomes difficult

average GNI growth rate was greater than the average lending rate from 2003-04 to 2007-08. In contrast, the average GNI growth rate was lower than the average lending rate during the period 2019-20 to 2022-23.

Macroeconomic challenges

The comforting news at the present juncture is that India's debt servicing ratio is still lower than that of many countries. But with the emergence of the Fisher dynamics, there are at least two unique challenges that confront the Indian economy.

The first challenge pertains to decreasing the gap between interest rate and income growth and slowing down the growth of the debt-income ratio of the household. While the level of debt-income ratio presently remains low, frequent episodes of income growth lagging behind the lending rate can quickly push up household's interest payment burdens.

The second challenge involves stemming the possibility of downward adjustment of aggregate demand amid high interest payment and debt commitments of the household. Such possibilities emerge when households tend to maintain stock flow norms in debt and wealth management by curtailing their consumption expenditure. The sharp decline in the consumption to GDP ratio in 2023-24 points towards such a possibility.

These challenges point towards the need to include an additional macroeconomic policy target to stimulate

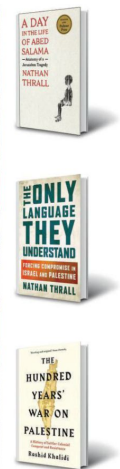
Reduction in Household saving

- The household net financial savings to GDP ratio fell significantly in 2022-23, primarily due to a higher borrowing to GDP ratio.
- This decline cannot be solely explained by a shift in the composition of savings.
- The increase in household borrowing has led to a higher debt-income ratio, resulting in greater interest payment burdens.
- This trend has been particularly pronounced in the post-COVID period.

- Unlike previous periods of high household borrowing, the current period is characterised by a lower nominal income growth rate compared to the average lending rate, leading to increased financial stress on households.
- There is a need for macroeconomic policies that not only address inflation and government debt targets but also stimulate and support household income growth to mitigate these emerging challenges.



Shadow of conflict: People walk in an alley of the Palestinian refugee camp of Shufla in Beirut's southern suburb. APF



The 'Oslo trap', a number of wars and other challenges in the Israel-Palestine conflict

Two writers explain the reasons why peace is elusive in this West Asian region; while Rashid Khalidi gives a historical sketch of Israel's settler colonialism, Nathan Thrall writes about the impact of this colonial rule on ordinary Palestinian lives

Stamly Johny

It was a wet, grey, and extremely windy February morning in 2002, Nathan Thrall writes in *A Day in the Life of Abed Salama: Anatomy of a Jerusalem Tragedy*. On that fateful day, a trailer truck flipped on an old bus carrying Palestinian children on a highway in the Israeli-controlled Area C of the West Bank outside Jerusalem. The children, from a private kindergarten, were on the way to a local play centre. A few minutes after the accident, Abed got a call from his nephew. "Did Milad go to the picnic today? There was an accident with a school bus near Jaba."

Milad Salama is Abed's five-and-a-half-year-old son. Earlier in the day, Milad's mother, Haifa, had helped her boy into his school uniform: "grey pants, a white-collared shirt and a grey sweater". After the crash, Milad's school bus rolled over on the road, doors against the ground. The fire soon engulfed the bus. Six children and a teacher were killed and many more were injured.

Thrall, a Jewish American journalist who lives in Jerusalem, follows Abed's frantic efforts to trace his son. And through the story of the accident and that of Abed, Thrall writes about the day-to-day life of Palestinians under the many yokes of the Israeli occupation in a non-sentimental yet powerful prose. The bus is "crackling with flames," writes Thrall. A crowd had gathered around the bus and was screaming and shooting. "The site of the accident was a few minutes

drive away from a Jewish settlement and seconds from the Jaba checkpoint. It would take time for rescue workers to reach the site, navigating the morning traffic and Israeli checkpoints. An Israeli ambulance or soldiers could have reached the site in minutes, but about half an hour after the crash, Thrall writes, "not a single firefighter, police officer or soldier had come."

Thrall originally wrote about the accident in March 2002 in *The New York Review of Books* in a 20,000-word essay. Abed Salama's quest to find his son "lays bare the reality of Palestinian life under Israeli rule," he wrote in the article. Later, he expanded the article into a book, with more details on the experiences of those whose children were there on the bus. The book won the Pulitzer Prize for non-fiction this year.

Busting myths

Thrall is a familiar name for Israel-Palestine watchers. A former research director at the International Crisis Group, Thrall's previous book, *The Only Language They Understand*, is one of the most authoritative works on the Israel-Palestine conflict of recent times. The popular narrative about the Israel-Palestine conflict is that "terrorism" on the Palestinian side has been a major stumbling block for a two state solution. Thrall details the concessions the Palestinians made in *The Only Language*. "In the 1948 war, Israel captured 22% more territories than what even the UN had proposed for an

independent Jewish nation." When the PLO (Palestine Liberation Organization) was formed, its goal was to "liberate" all of Palestine. Later, the PLO settled for an independent Palestinian nation within the 1967 border – which is only 22% of the historical Palestine.

When the Oslo Accords were signed and a provisional government was formed in parts of the West Bank and Gaza, the Palestinian leadership excluded Jerusalem from the process, allowing Israel to continue the occupation of East Jerusalem. But even with these compromises, the Palestinians failed to move towards sovereignty. Almost a quarter century after the Oslo Accords, the Palestinian Authority controls only parts of a restive West Bank, with Israel building more settlements in the occupied land. Gaza has been blockaded from all sides. That's why Thrall calls the Oslo process the "Oslo trap." It was against this background the October 7, 2023 attack by Hamas in Israel unfolded.

Brutal occupation

For the Israeli government, Hamas represents Palestinian terrorism, and the government of Prime Minister Benjamin Netanyahu has vowed to "crush" Hamas. Israel has killed over 35,000 Palestinians in Gaza since October 7 and wounded tens of thousands more. Israel claims that it is a victim of Hamas terrorism. What Israel doesn't want to talk about is its brutal, illegal occupation of the Palestinian territories. While Hamas's attack on Israeli civilians should be

condemned, any understanding of the Israel-Palestine conflict without the historical context would not be complete.

Rashid Khalidi, a Palestinian American historian, attempts to complete the circle by providing a compelling account of the loss of Palestine in his 2020 book, *The Hundred Years of War on Palestine: A History of Settler Colonial Conquest and Resistance*. Often provocative, sharp and insightful, Khalidi's account, rich with interesting historical anecdotes and personal history, stretches from the Balfour Declaration of 1917 to the then U.S. President Donald Trump's decision to recognise Jerusalem as Israel's capital in 2017.

According to Khalidi, there were six declarations of war on Palestinians during this time: the Balfour Declaration, the declaration of the state of Israel in 1948; the Security Council Resolution 242, which was passed after the 1967 war; Israel's attack on Lebanon in 1982 to oust the PLO from the country; the Oslo Accords; and, the sixth, Ariel Sharon's visit to the Haram esh-Sharif (Temple Mount) in 2000, which triggered the Second Intifada.

When Khalidi gives a historical sketch of Israel's settler colonialism, Thrall writes about the impact of this colonial rule on ordinary Palestinian lives.

In these three books, the writers show that history and faith have led to the personal suffering which much of the international community has conveniently ignored for the past seven decades.

Balfour Declaration

- Balfour Declaration, (November 2, 1917), statement of British support for “the establishment in Palestine of a national home for the Jewish people.”
- It was made in a letter from Arthur James Balfour, the British foreign secretary, to Lionel Walter Rothschild, 2nd Baron Rothschild (of Tring), a leader of the Anglo-Jewish community.

China's ambitious food security plan faces land, soil and water woes



The Chinese government envisions 92% self-sufficiency in staple grains and beans by 2033, up from 84% during 2021-2023; food security has long been a priority for China, which must feed nearly 20% of the global population with less than 9% of its arable land and 6% of its water resources

NEWS ANALYSIS

Reuters
BEIJING

China, the world's biggest agriculture importer, has set targets to drastically reduce its reliance on overseas buying over the coming decade in line with its push for food security, but they will be exceedingly difficult to meet, experts say.

With limited land and water, China will have to sharply increase farming productivity through technology, including genetically modified crops, and expand area under cultivation to meet Beijing's 10-year projections.

The government envisions 92% self-sufficiency in staple grains and beans by 2033, up from 84% during 2021-2023, according to a document released in late April, on a path towards President Xi Jinping's goal to become an "agriculture power" by the middle of the century.

Cutting the country's imports would be a blow to producers from the U.S. to Brazil and Indonesia, who have expanded capacity to meet demand from China's 1.4 billion people, the world's largest market for soybeans, meat and grains.

Over the 10 years to 2033 the agriculture ministry projects a 75% plunge



Wake-up call: Urgency to cut imports grew after supply-chain disruptions during pandemic. REUTERS

in corn imports to 6.8 million tons and a 60% drop for wheat to 4.85 million tons.

For soybeans, the biggest item on a farm import bill that totalled \$234 billion last year, Beijing sees imports falling 21% to 78.7 million tons in a decade.

Those targets defy the trends of the past decade in which grains and oilseed imports have surged 87%.

"Forecasting a sharp reversal where in 10 years the country will be importing less than it does today seems questionable," said Darin Friedrichs, co-founder of Sitionia Consulting.

China will struggle to meet its targets mainly due to a lack of land and water, five analysts and industry executives say.

In stark contrast to Bei-



Farms in China average 0.65 hectare, compared to 187 hectare in the U.S. and 60 hectares in Germany; China is gradually shifting towards a consolidation of its fragmented farms

ing's projections, the U.S. Department of Agriculture (USDA) sees China's corn imports in 2033/34 roughly in line with current levels and wheat imports declining 20%. In the biggest divergence, USDA expects soybean imports to rise 39%.

National security
Food security has long

governments to include food security in their economic and development plans. That will add to other efforts to bolster food production, including stepped up grains insurance cover for farmers to protect their income, announced this week.

Last month, Beijing launched a drive to raise grain output by at least 50 million tons by 2030, spotlighting upgraded farmland and investments in seed technology for higher crop yields and quality.

Soil challenges

China increased production of corn, soybeans, potatoes and oilseeds last year after expanding planting on previously uncultivated land and encouraging farmers to switch from cash crops to staples.

However, even as the world's no. 2 corn producer harvested a record 288.84 million metric tons last year, imports surged to a near-record 27.1 million tons, driven by traders' preference for corn from overseas that is often higher quality and cheaper.

Production growth has hit a bottleneck due to insufficient arable land, small production scale and a lack of farmers and agriculture technology, state media reported.

China's arable land per capita is less than one-third the level in Brazil and one-sixth the level of the

U.S., World Bank data from 2021 shows. Degraded and polluted soil in a country where a significant share of land is either rocky mountains or desert leave it with little space for expansion.

The government, which has increasingly called for protection of its fertile black soil, is set to complete a four-year soil survey in 2025. The last survey, in 2014, found that 40% of its arable land was degraded from overuse of chemicals and heavy metal contamination.

To compensate, China is pouring millions of dollars into research of farming water-intensive crops such as rice in the deserts of Inner Mongolia and Xinjiang.

By turning sand into soil and breeding saline-tolerant crops, it aims to develop more farmland, a strategy industry executives say will take time and heavy investments in fertiliser, irrigation and biotechnology.

One obstacle is China's predominance of small farms, run by aging owners who may not be able to afford or operate machinery such as drone sprayers, more productive seeds and technology such as big data and AI.

Farms in China average 0.65 hectares, compared to 187 hectares in the U.S. and 60 hectares in Germany. China is gradually shifting towards a consolidation of its fragmented farms.

China Focus On food security

- china, the world's biggest agriculture importer, has set targets to drastically reduce its reliance on overseas buying over the coming decade in line with its push for food security, but they will be exceedingly difficult to meet.
- On June 1, China will implement a food security law that calls for absolute self-sufficiency in staple grains and requires local governments to include food security in their economic and development plans.
- That will add to other efforts to bolster food production, including stepped up grains insurance cover for farmers to protect their income, announced this week.

- **Last month, Beijing launched a drive to raise grain output by at least 50 million tons by 2030, spotlighting upgraded farmland and investments in seed technology for higher crop yields and quality.**
- **Soil challenges China increased production of corn, soybeans, potatoes and oilseeds last year after expanding planting on previously uncultivated land and encouraging farmers to switch from cash crops to staples**

- **To compensate, China is pouring millions of dollars into research of farming water-intensive crops such as rice in the deserts of Inner Mongolia and Xinjiang.**
- **By turning sand into soil and breeding saline-tolerant crops, it aims to develop more farmland, a strategy industry executives say will take time and heavy investments in fertiliser, irrigation and biotechnology.**
- **One obstacle is China's predominance of small farms, run by aging owners who may not be able to afford or operate machinery such as drone sprayers, more productive seeds and technology such as big data and AI.**

India to ramp up Africa mineral play



Stepping up: China currently controls an estimated 8% of Africa's resources, says lobby groups. REUTERS

Abhishek Law

NEW DELHI

India is looking to ramp-up its critical mineral play in Africa as it looks to resource securitisation and and upsetting the Chinese apple-cart in the region. There are MoUs in place with at least eight African nations for mining collaborations, including access to resources.

The nations include South Africa, Mozambique, Congo, Tanzania, Zambia, Malawi, Republic of Cote d'Ivoire and Zimbabwe. The key focus continues to be on critical minerals such as copper, cobalt, niobium, graphite, titanium, lithium, among others.

Some lobby groups in the U.S. have pointed out that China currently controls an estimated 8% of Africa's resources and the numbers have gone up from 2018 estimates.

Key countries

In fact, the race for critical minerals primarily focuses on cobalt and copper – key EV battery making metals, apart from lithium. Congo - Zambia seem to be the key area of interest for countries - Western or Asian ones.

India, meanwhile, is pushing for increased presence in the region primarily through a mix of G2G negotiations and private entity interests.

Discussions covered facets like exploration of resources or mines in select nations, looking at possibilities of acquisition and subsequent commercial offtake, including processing of some of these minerals.

(The writer is with The Hindu businessline)

India in Africa



- **India is looking to ramp-up its critical mineral play in Africa as it looks to resource securitisation and and upsetting the Chinese apple-cart in the region.**
- **There are MoUs in place with at least eight African nations for mining collaborations, including access to resources.**
- **The nations include South Africa, Mozambique, Congo, Tanzania, Zambia, Malawi , Republic of Cote d'Ivoire and Zimbabwe.**
- **The key focus continues to be on critical minerals such as copper, cobalt, niobium, graphite, titanium, lithium, among others.**

- **Some lobby groups in the U.S. have pointed out that China currently controls an estimated 8% of Africa's resources and the numbers have gone up from 2018 estimates.**
- **Key countries In fact, the race for critical minerals primarily focuses on cobalt and copper — key EV battery making metals, apart from lithium.**
- **Congo – Zambia seem to be the key area of interest for countries – Western or Asian ones.**

Critical Minerals in Africa

- **Critical minerals such as copper, lithium, nickel, cobalt and rare earth elements are essential components in many of today's rapidly growing clean energy technologies – from wind turbines and electricity networks to electric vehicles**

Figure 1 African countries with large shares of critical minerals



Source: Papa Daouda Diene et al., *Triple Win: How Mining Can Benefit Africa's Citizens, Their Environment and the Energy Transition*, Research Report (New York: Natural Resource Governance Institute, 2022)

BIG SHOT



'Mad honey' (komar honey in Turkish) is displayed in a shop in Cayeli, in the Turkish province of Rize. The lush green Pontic Alps are home to a subspecies of rhododendron whose purple flowers contain a hallucinogenic neurotoxin with which bees make 'mad honey'. Its fans swear it can cure heart palpitations, dodgy stomachs, and even impotence. Yet every year, hundreds of people end up in hospitals after gorging themselves on the substance. AFP

Mad honey

- When bees feed on the pollen of rhododendron flowers, the resulting honey can pack a hallucinogenic punch.
- It's called mad honey, and it has a slightly bitter taste and a reddish color. More notably, a few types of rhododendrons, among them *Rhododendron luteum* and *Rhododendron ponticum*, contain grayanotoxin, which can cause dramatic physiological reactions in humans and animals.
- Depending on how much a person consumes, reactions can range from hallucinations and a slower heartbeat to temporary paralysis and unconsciousness.
-

Topics

- Jet stream and Heat waves
- 'Transient '
- AI Convention
- India In Cannes
- What is flash drought ?
- Cobalt blue
- Bush moa
- Mains



By saurabh Pandey



This century, heatwaves are moving slower and lasting longer

Scientists analysed the upper atmosphere's air circulation patterns to see how the moving air could affect the big blobs of heat that render heatwaves; they found that over the years, the jet stream – a fast, narrow current of air that flows from west to east high up in the troposphere – has become weaker

Rohini Subrahmanyam

Growing up in the 1990s in India meant having seen an ad for a glucose-based drink on television in which the sun literally sucks the life-force out of children with a giant straw as they are playing. This ad has started to hit closer to reality. India has increasingly been in the grip of more frequent and intense heat waves, with outdoor workers especially struggling with the rising mercury. A recent study published in *Science Advances* showed that it wasn't just India: the whole world is grappling with slower and longer heatwaves.

Temperature and circulation

Heatwaves have a terrible impact on human and animal life, with increased risk of wildfires, damaged crops, and worse health. Analysing temperatures around the world from 1979 to 2020, Wei Zhang, a climate scientist at Utah State University, and his colleagues studied how they have changed over time.

On average, they found, heatwaves have slowed down nearly 8 km/day each decade and lasted longer by about four days – the effects being particularly drastic in North America and Eurasia. Heatwaves have also increased in frequency, from about 75 events averaged over 1979-1983 to about 98 over 2016-2020. "In thinking about heatwaves and how they would change in the future, there are two pieces of the puzzle that climate scientists think about," Rachel White, an atmospheric scientist at the University of British Columbia, said. "One of them is thermodynamics: it's just about the temperature. As temperatures are getting warmer, heatwaves are going to get warmer. The second piece is the dynamics: the atmospheric circulation patterns that cause heatwaves."

There are still some open questions around how these might change in a warming world.

The heat moves

Previous studies have mostly focused on how frequent heatwaves are or how hot it gets during one. In this study, the researchers classified contiguous heatwaves as events with extremely high temperatures, covering more than a million square kilometres, and lasting for longer than three days. They then tracked the movement of these huge masses of hot air over space and time, studying how far and how fast they were moving – one of the first groups of scientists to do so.

Instead of just focusing on the frequency and the intensity of heatwaves, the study also checked how fast they were propagating and how long they lasted. By



Taking cover: Women cover their faces to protect from heat at Bikaner in Rajasthan on April 19. REUTERS

looking at how heatwaves move over time and space, Dr. White believes the study has bridged the gap between the thermodynamic and dynamic pieces of the heatwaves puzzle a little more than before.

"This study is looking at heatwaves like an object that can move and can travel and propagate, which you would miss if you were just looking at one point," she said. "If you just look at one point, you can be like, 'oh, the heatwave lasted for 5 days'. But the object itself lasted for longer, it just moved. That's what they are doing here, tracking them as they are moving, which is cool."

The guiding hand falters

But what could be causing them to move so sluggishly? The scientists analysed the upper atmosphere's air circulation patterns, to see how the moving air could affect these big blobs of heat. They found that over the years, the jet stream – a fast, narrow current of air that flows from west to east high up in the troposphere – has become weaker.

The jet stream guides atmospheric waves, waves that are caused by the earth's rotation and which influence the earth's surface temperature. As the jet stream weakens, these waves also move more slowly, leading to more persistent weather events, and more spells of high and slow-moving heat.



Given that heatwaves have such a huge impact on human health and the environment, we need to think about climate adaptation

WEI ZHANG
Climate scientist, Utah State University

To check if human activity had played a role in this outcome, the researchers ran simulations with temperature data from 1979 to 2020, but included scenarios with and without human greenhouse gas emissions. They found that though natural climate variability and natural events also influenced how heatwaves had changed, human activity and greenhouse gas emissions have played a dominant role in rendering the slower-moving and longer-lasting heat.

Dr. White said the next steps would be to further tease apart the role of atmospheric air circulation patterns in contributing to heatwave dynamics on the ground. Country-specific changes in heatwaves over time would also be some of the missing pieces of the puzzle she would like to see. "I think there's just a lot that can be done with this dataset, now that they have created it," she said.

Dr. Zhang does plan to delve deeper into regional differences as part of the

group's next steps, while also working on climate adaptation strategies. "Given that heatwaves have such a huge impact on human health and the environment, we need to think about climate adaptation," he said.

Mitigation strategies

In densely populated urban areas, some strategies to better mitigate changes in heatwaves would be to plant more trees and increase green infrastructure – an undertaking Dr. Zhang has himself been involved in. Together with Tree Utah, an NGO, he has been engaging people in planting and taking care of trees. He has also been teaching a class on Climate Adaptation Science at Utah State University, where he helps students learn and apply climate adaptation strategies, with projects like working with farmers on alternative crops.

"This paper is another form of evidence that climate change is altering these extreme weather events," Dr. Zhang said. Adding to the already long list of studies, like how the intensity of hurricanes has increased or how there is extreme precipitation, this study, in Dr. Zhang's words, "is another signal of how climate change could influence our daily lives, our health, our environment – by changing the behaviour of heatwaves." (Rohini Subrahmanyam is a freelance journalist)

THE GIST

Heatwaves have increased in frequency, from about 75 events averaged over 1979-1983 to about 98 over 2016-2020

The jet stream guides atmospheric waves that are caused by the earth's rotation and which influence the earth's surface temperature

As the jet stream weakens, these waves also move more slowly, leading to more persistent weather events, and more spells of high and slow-moving heat

Though natural climate variability and natural events also influenced how heatwaves had changed, human activity and greenhouse gas emissions have played a dominant role in rendering the slower-moving and longer-lasting heat

WHAT IS IT?



Jet stream and Heat waves

- **Heatwaves have increased in frequency, from about 75 events averaged over 1979-1983 to about 98 over 2016-2020.**
- **Though natural climate variability and natural events also influenced how heat waves had changed, human activity and greenhouse gas emissions have played a dominant role in rendering the slower-moving and longer-lasting heat**

- **The jet stream guides atmospheric waves, waves that are caused by the earth's rotation and which influence the earth's surface temperature.**
- **As the jet stream weakens, these waves also move more slowly, leading to more persistent weather events, and more spells of high and slow-moving heat.**

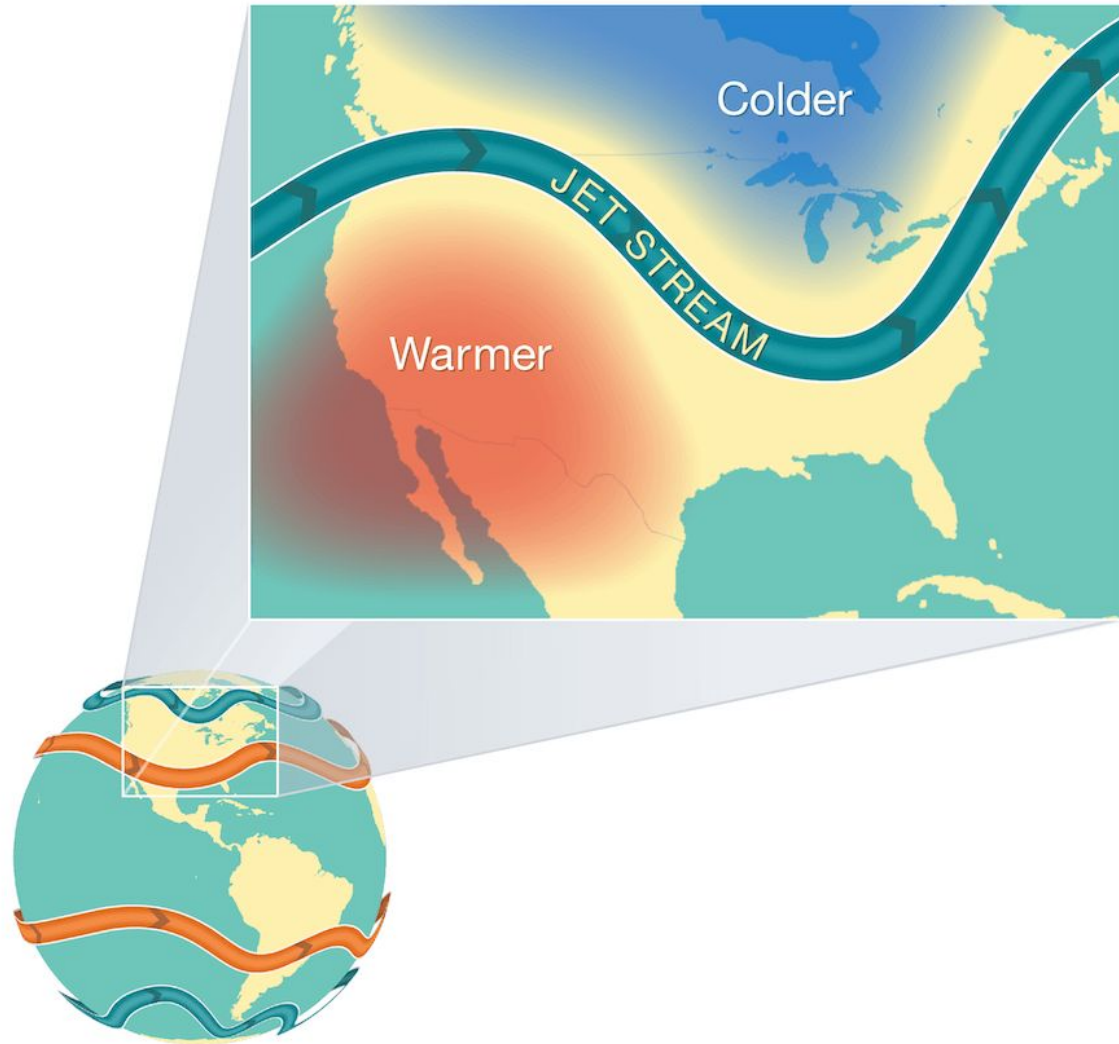
- **natural climate variability and natural events also influenced how heat waves had changed, human activity and greenhouse gas emissions have played a dominant role in rendering the slower-moving and longer-lasting heat.**

About Jet stream

- Jet streams are narrow bands of strong wind that generally blow from west to east all across the globe.
- Earth has four primary jet streams: two polar jet streams, near the north and south poles, and two subtropical jet streams closer to the equator.

What Causes Jet Streams?

- Jet streams form when warm air masses meet cold air masses in the atmosphere.



- The Sun doesn't heat the whole Earth evenly. That's why areas near the equator are hot and areas near the poles are cold.
- So when Earth's warmer air masses meet cooler air masses, the warmer air rises up higher in the atmosphere while cooler air sinks down to replace the warm air.
- This movement creates an air current, or wind. A jet stream is a type of air current that forms high in the atmosphere.



WHAT IS IT?

Astronomical transients: burning bright in the blink of an eye

Vasudevan Mukunth

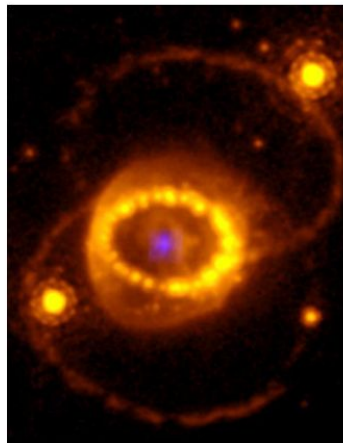
In astronomy, a 'transient' is any celestial object whose brightness changes in short spans of time. There are many kinds of astronomical transients, all of them united by phenomena that are violent in some measure. Astronomers study transients to understand where their violence comes from and what that can tell us about non-transient events.

On May 21, in fact, the Indian-American astronomer Shrinivas Kulkarni was awarded the Shaw Prize for Astronomy in 2024 for his work on the physics of astronomical transients.

One of the most well-known such transients is supernovae — when the outer layers of large stars blow up while their cores implode because the stars have run out of elements to fuse. Many a supernova has been known to become so bright that it emits light more intensely than the stars in the rest of its host galaxy combined.

Another famous transient is the active galactic nucleus (AGN). The centres of massive galaxies host supermassive black holes. Sometimes, these black holes actively feast on matter in their orbit. Interactions between the black holes and the matter in this process cause the latter to acquire energy and glow with a changing brightness.

In 2007, astronomers discovered a mysterious new transient called a fast



Moment of shine: The aftermath of supernova 1987A. Supernovae are one of the most well-known astronomical transients. AP

hundreds of FRBs even though they're hard to spot: they can emit more than 10-times as much energy as the Sun in a few milliseconds. We don't know what causes them.

For feedback and suggestions

for 'Science', please write to science@thehindu.co.in with the subject 'Daily page'

‘Transient ‘

- **In astronomy, a ‘transient’ is any celestial object whose brightness changes in short spans of time.**
- **There are many kinds of astronomical transients, all of them united by phenomena that are violent in some measure.**
- **Astronomers study transients to understand where their violence**

- **One of the most well-known such transients is supernovae — when the outer layers of large stars blow up while their cores implode because the stars have run out of elements to fuse.**
- **Many a supernova has been known to become so bright that it emits light more intensely than the stars in the rest of its host galaxy combined.**
- **Another famous transient is the active galactic nucleus (AGN). The centres of massive galaxies host supermassive black holes.**
- **Sometimes, these black holes actively feast on matter in their orbit. Interactions between the black holes and the matter in this process cause the latter to acquire energy and glow with a changing brightness**



An overview of Europe's AI convention

What is the scope of the Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law? What is the difference between a framework convention and a protocol? How does the convention address national security concerns?

EXPLAINER

Krishna Ravi Srinivas

The story so far:

The global governance of Artificial Intelligence (AI) is becoming more complex even as countries try to govern AI within their borders in various ways, ranging from acts of law to executive orders. Many experts have articulated a global treaty to this effect, but the obstacles in its path are daunting.

What is Europe's AI convention?

Although there are many ethical guidelines, 'soft law' tools, and governance principles enshrined in many documents, none of them are binding or are likely to result in a global treaty. There is also no ongoing negotiation for an AI treaty at the global level anywhere. Against this background, the Council of Europe (COE) took a big step by adopting the Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law, also known as the 'AI convention', on May 17. The COE is an intergovernmental organisation formed in 1949, with currently 46 members. The agreement is a comprehensive convention covering AI governance and links to human rights, democracy, and the responsible use of AI. The framework convention will be opened for signature on September 5.

What is a framework convention?

A 'framework convention' is a legally binding treaty that specifies the broader commitments and objectives under the convention, and sets mechanisms to achieve them. The task of setting specific targets is left to subsequent agreements. Those agreements that are negotiated under the framework convention will be called protocols. For example, the Convention on Biological Diversity is a framework convention while the Cartagena Protocol on Biosafety is a



ISTOCKPHOTO

protocol under it that deals with living modified organisms.

The framework convention approach is useful because it allows flexibility even as it encodes the core principles and processes by which the objectives are to be realised. Parties to the convention have the discretion to decide the ways in which to achieve the objectives, depending on their capacities and priorities. The AI convention can catalyse the negotiation of similar conventions at the regional level in other places. Then again, as the U.S. is also a member of the COE, the convention can indirectly affect AI governance in the U.S. as well, which matters because the country is currently a hotbed of AI innovation.

What is the scope of the convention?

Article 1 of the convention states: "The

provisions of this Convention aim to ensure that activities within the lifecycle of artificial intelligence systems are fully consistent with human rights, democracy and the rule of law".

Article 3 states: "The scope of this Convention covers the activities within the lifecycle of artificial intelligence systems that have the potential to interfere with human rights, democracy, and the rule of law as follows: a. Each Party shall apply this Convention to the activities within the lifecycle of artificial intelligence systems undertaken by public authorities or private actors acting on their behalf. b. Each Party shall address risks and impacts arising from activities within the lifecycle of artificial intelligence systems by private actors... in a manner conforming with the object and purpose of this Convention."

Does it address national security?

The exemptions in Articles 3.2, 3.3, and 3.4 are broad and pertain to the protection of national security interests, research, development and testing, and national defence, respectively. As a result, military applications of AI are not covered by the AI convention. While this is a matter of concern, it's a pragmatic move given the lack of consensus on regulating such applications. In fact, the exemptions in Articles 3.2 and 3.3 – while broad – don't completely rule out the convention's applicability vis-a-vis national security and testing, respectively.

Finally, the 'General Obligations' in the convention pertain to the protection of human rights (Article 4), the integrity of democratic processes, and respect for the rule of law (Article 5). While disinformation and deep fakes haven't been addressed specifically, parties to the convention are expected to take steps against them under Article 5. In fact, the convention indicates (in Article 22) that parties can go beyond the commitments and obligations specified.

Why do we need the AI convention?

The AI convention doesn't create new and/or substantive human rights specific to AI. Instead, it asserts that existing human and fundamental rights that are protected by international and national laws will need to stay protected during the application of AI systems as well. The obligations are primarily directed towards governments, which are expected to install effective remedies (Article 14) and procedural safeguards (Article 15). In all, the convention takes a comprehensive approach to mitigating risks from the use of AI systems for human rights and democracy. There are bound to be challenges to implementing it, particularly at a time when AI regulation regimes are yet to be fully established and technology continues to outpace policy.

Krishna Ravi Srinivas is Adjunct Professor of Law, NALSAR University of Law, Hyderabad, and Associate Faculty Fellow, CeRAI, IIT Madras.

THE GIST

▼ The Council of Europe (COE) took a big step by adopting the Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law, also known as the 'AI convention', on May 17.

▼ A 'framework convention' is a legally binding treaty that specifies the broader commitments and objectives under the convention, and sets mechanisms to achieve them.

▼ The AI convention doesn't create new and/or substantive human rights specific to AI. Instead, it asserts that existing human and fundamental rights that are protected by international and national laws will need to stay protected during the application of AI systems as well.



AI Convention



The Council of Europe (COE) took a big step by adopting the Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law, also known as the ‘AI convention’,.

What is a framework convention?

- **A ‘framework convention’ is a legally binding treaty that specifies the broader commitments and objectives under the convention, and sets mechanisms to achieve them.**
- **The task of setting specific targets is left to subsequent agreements. Those agreements that are negotiated under the framework convention will be called protocols**

- **The framework convention approach is useful because it allows flexibility even as it encodes the core principles and processes by which the objectives are to be realised.**
- **Parties to the convention have the discretion to decide the ways in which to achieve the objectives, depending on their capacities and priorities.**

What is the scope of the convention?

- **Article 1 of the convention states: “The provisions of this Convention aim to ensure that activities within the lifecycle of artificial intelligence systems are fully consistent with human rights, democracy and the rule of law”.**
- **Article 3 states: “The scope of this Convention covers the activities within the lifecycle of artificial intelligence systems that have the potential to interfere with human rights, democracy, and the rule of law**

Does it address national security?

- The exemptions in Articles 3.2, 3.3, and 3.4 are broad and pertain to the protection of national security interests, research, development and testing, and national defence, respectively.
- As a result, military applications of AI are not covered by the AI convention. While this is a matter of concern, it's a pragmatic move given the lack of consensus on regulating such applications.

- **Finally, the ‘General Obligations’ in the convention pertain to the protection of human rights (Article 4), the integrity of democratic processes, and respect for the rule of law (Article 5).**
- **While disinformation and deep fakes haven’t been addressed specifically, parties to the convention are expected to take steps against them under Article 5.**
- **In fact, the convention indicates (in Article 22) that parties can go beyond the commitments and obligations specified.**

Double treat at Cannes as Payal and Anasuya bag awards

Press Trust of India

CANNES

India received a double treat at the Cannes Film Festival this year, with filmmaker Payal Kapadia taking home the Grand Prix award for her spellbinding drama *All We Imagine as Light* and Anasuya Sengupta, one of the lead stars of the film *The Shameless*, bagging the Best Actress award in the Un Certain Regard category.

The Grand Prix award is the second-most prestigious prize of the festival after the Palme d'Or, while the Un Certain Regard celebrates films with unusual styles and non-traditional stories.

Ms. Kapadia's feature directorial debut, which screened on Thursday night and has received glowing reviews in the international press, already registered its name in the history books after it became the first Indian film in 30 years and first-ever by an Indian woman director to be showcased in the main competition.

The screening of the



Filmmaker Payal Kapadia winning the Grand Prix Award for *All We Imagine As Light* at Cannes Film Festival; actors Rohit Kokate, Omara Shetty, Bulgarian director Konstantin Bojanov and Anasuya Sengupta arrive for the screening of the film *The Shameless*. GETTY IMAGES, AFP

film received an eight-minute standing ovation from the audience members. *All We Imagine as Light*, a Malayalam-Hindi feature, has two nurses as the protagonists. An alumna of the Film and Television Institute of India (FTII), Ms. Kapadia is best known for her acclaimed documentary *A Night of Knowing Nothing*, which premiered at the 2021 Cannes Film Festival's Director's Fortnight sidebar where it won the Oeil d'or (Golden Eye) award.

The main competition jury was chaired by filmmaker Greta Gerwig and also included Spanish di-

rector Juan Antonio Bayona, Turkish actor-screenwriter Ebru Ceylan, Italian actor Pierfrancesco Favino, American actor Lily Gladstone, Japanese director Hirokazu Kore-eda, Lebanese actor-director Nadine Labaki and French stars Eva Green and French actor Omar Sy.

Ms. Sengupta, who starred in Bulgarian director Konstantin Bojanov's Hindi movie *The Shameless*, is the first Indian artist to win the top acting honour in the Un Certain Regard category.

In her acceptance speech on Friday night,



Ms. Sengupta dedicated the award to the "queer community and other marginalised communities" for bravely fighting for their rights all over the world.

Fight for equality

"You don't have to be queer to fight for equality, you don't have to be colonised to know that colonising is pathetic – we just need to be very, very decent human beings," the actor said.

The win at Cannes is a landmark moment in Ms. Sengupta's career. She earlier played a supporting part in the 2009 Bengali

film *Madly Bangalee*, directed by Anjan Dutt, and worked as a production designer after shifting to Mumbai.

The Shameless, which had its premiere at Cannes on May 17, forays into a dark, disturbing world of exploitation and misery in which two sex workers, one who bears the scars of her line of work, the other a young girl days away from ritual initiation, forge a bond and seek to throw off their shackles. Ms. Sengupta plays the central character of Renuka, who escapes from a Delhi brothel after stabbing a

Sean Baker's *Anora* crowned with Palme d'Or

Anora, a raw, highly explicit and often hilarious story about a New York erotic dancer, was crowned with the Palme d'Or at the Cannes Film Festival on Saturday. It confirmed its director Sean Baker as one of the leading voices of American indie cinema. AFP

policeman to death and takes refuge in a community of sex workers in northern India, where she meets Devika (Omara), a young girl condemned to a life of sex work.

The actor celebrated her win on Instagram, where she posted pictures with Un Certain Regard jury head, Canadian director Xavier Dolan, and German-Luxembourg star Vicky Krieps. "I won, guys, held so lovingly by my heroes. I'm here for you, to be the one you need THANK YOU @festivaldecannes," Ms. Sengupta wrote in the caption.



“India In Cannes”

- **India received a double treat at the Cannes Film Festival this year, with filmmaker Payal Kapadia taking home the Grand Prix award for her spellbinding drama All We Imagine as Light and Anasuya Sengupta, one of the lead stars of the film The Shameless, bagging the the Best Actress award in the Un Certain Regard category.**
- **The Grand Prix award is the second-most prestigious prize of the festival after the Palme d’Or, while the Un Certain Regard celebrates films with unusual styles and non-traditional stories**

Warming climate intensifies flash droughts worldwide

The Hindu Bureau

Sudden, severe dry spells known as flash droughts are rising in intensity around the world, with a notable exception in mountainous Central Asia, where flash drought extent is shrinking, according to new research. Heat and changes to precipitation patterns caused by a warming climate are driving these trends, the study

found. The new study is the first to apply a systematic, quantitative approach to the global incidence of flash drought, mapping hotspots and regions of rapid increases in recent decades.

Tracking measures

Many parts of the world have witnessed flash droughts for a longer time, with faster onset speed. The study defined and

tracked three critical measures of drought severity: speed of onset, duration and geographic extent. It analyzed 40 years of NASA's MERRA-2 climate data, from 1980 to 2019, drawn from weather observations, satellite imagery and modeled root-zone soil moisture, with the aim of improving prediction and disaster preparedness. The study is published in the journal *Geophysical Re-*

search Letters.

South America, particularly southern Brazil and the Amazon is experiencing strong intensification in all three dimensions of flash drought, aligning with deforestation patterns in the region, high temperatures and less rain. Congo, Angola, Zambia, Zimbabwe, South Africa, Lesotho, and Madagascar are also hotspots. High temperatures were found

to be more important than declining precipitation in the African watersheds.

Land cover is also important to flash drought vulnerability. Savanna and grasslands are more susceptible to flash droughts than other ecotypes, particularly in humid and semi-humid climates, the study found.

In Central Asian watersheds, centered on high mountains, including the

Himalaya Karakoram, Tianshan and Hindu Kush, flash drought extent shrank over the study period, bucking the worldwide trend. Climate-driven changes in precipitation, melting snowpack and a shift from snow to rain in the mountains have kept soils moist. These changes can cause an increase in flash floods, which have been observed in the region.

What Is Flash Drought?



- Flash drought is simply the rapid onset or intensification of drought.
- It is set in motion by lower-than-normal rates of precipitation, accompanied by abnormally high temperatures, winds, and radiation.
- Together, these changes in weather can rapidly alter the local climate.
- Higher temperature increases evapotranspiration—the process by which water is transferred from the land to the atmosphere by evaporation from the soil and by transpiration from plants—and further lowers soil moisture, which decreases rapidly as drought conditions continue.

- **If not predicted and discovered early enough, changes in soil moisture that accompany flash drought can cause extensive damage to agriculture, economies, and ecosystem goods and services.**



Question Corner

Colour blue

Is there any blue pigment with enhanced colour properties, reduced cost and lower cobalt content than cobalt blue?

The Egyptians and Babylonians used lapis lazuli 6,000 years ago. In 1802, a French chemist synthesised cobalt blue. In 2009 scientists discovered YInMn Blue, otherwise known as Oregon Blue. But most of these pigments have limitations. In 2020, researchers reported a new class of 'cool' blue colourants that are inexpensive and more environmentally friendly. For the last 200 years, cobalt blue has been a dominant commercial blue pigment because of its

colour intensity, ease of synthesis and versatility. However, 33% of the colourant by mass is carcinogenic, making cobalt blue relatively expensive and environmentally harmful to produce. The Oregon State University researchers were inspired by the crystalline structure of a light-blue mineral called hibonite. The team substituted aluminum ions in hibonite with cobalt, nickel or titanium ions. The resulting series of pigments showed a range of intense blue colours, some with reddish hues.

Readers may send their questions / answers to questioncorner@thehindu.co.in



Cobalt Blue

- **The Egyptians and Babylonians used lapis lazuli 6,000 years ago.**
- **In 1802, a French chemist synthesised cobalt blue. In 2009 scientists discovered YInMn Blue, otherwise known as Oregon Blue.**
- **But most of these pigments have limitations.**
- **In 2020, researchers reported a new class of ‘cool’ blue colourants that are inexpensive and more environmentally friendly.**

- **For the last 200 years, cobalt blue has been a dominant commercial blue pigment because of its colour intensity, ease of synthesis and versatility.**
- **However, 33% of the colourant by mass is carcinogenic, making cobalt blue relatively expensive and environmentally harmful to produce.**
- **The Oregon State University researchers were inspired by the crystalline structure of a light-blue mineral called hibonite.**
- **The team substituted aluminum ions in hibonite with cobalt, nickel or titanium ions**



Genome of the extinct little bush moa reconstructed

Using ancient DNA recovered from a fossil bone, scientists have reconstructed a complete genome of the little bush moa, an extinct species of flightless bird that once roamed the forested islands of New Zealand. The work allowed the scientists to determine the bird's likely population size, and even suggests that the moa's eyes could detect ultraviolet light. The moas made their homes in the island's dense forests and grasslands as recently as 700 years ago.

Bush moa

- The bush moa, little bush moa, or lesser moa (*Anomalopteryx didiformis*) is an **extinct** species of **moa** from the family **Emeidae**.
- It was the smallest known species of moa, only slightly taller than a **turkey** (approx. 1.3m tall). A slender bird, it weighed around 30 kilograms (66 lb)
- The species went extinct alongside other native New Zealand wildlife around 500-600 years ago, following the arrival and proliferation of the **Māori people** in **New Zealand** (who called them "moariki"), as well as the introduction of **Polynesian dogs**

- Scientists at **Harvard University** assembled the first nearly complete genome of the species from toe bones, thus bringing the species a step closer to being "**resurrected**" in the future by using the **emu** as a proxy.



Topics

- Caterpillars sixth sense
- Chabahar port
- Eucalyptus as invasive
- Farm subsidies
- Why PNG is prone to landslides ??
- Cyclones in bay of bengal

Mains



By saurabh Pandey





A cinnabar moth caterpillar, *Plutella*

Caterpillars may sense threats using electric fields

Karthik Vinod

Caterpillars have a sixth sense that most land-based animals do not. They can sense electric fields around them with small bristles called setae on its body – a feat called electroreception. British researchers have discovered this in laboratory experiments and their findings were published recently in the *Proceedings of the National Academy of Sciences*. They studied four species of caterpillars: cinnabar moth, source vineborer moth, European peacock butterfly, and common wasp. Researchers have long known that aquatic and amphibious animals use electroreception to detect both predators and prey. Since 2013, scientists have also

As an insect's wings flap through the air, static charges build up on them. When it nears the caterpillar, the setae sense these charges by building up charges of its own

found electroreception in arthropods like humpbees, hoverflies, and spiders. However, none of these land-based creatures use the ability to defend against predators. Caterpillars, which are also arthropods, may break this mould, using electroreception to sense predatory insects nearby. "It works exactly the same way as breathing at 'other balloons on your hair'," said first author Sam England. He is a postdoctoral researcher at the Museum für Naturkunde in Berlin and was at the University of Bristol before.

Static charges accumulate on both the balloon and the hair, leading to a mutual electrostatic attraction. The balloon can then move the hair without needing contact. As an insect's wings flap through the air, static charges build up on them. When it nears the caterpillar, the setae sense these charges by building up charges of its own. This mutual interaction gives rise to an oscillating electric field.

In the study, researchers stimulated caterpillars with a live electrode carrying a voltage oscillating at 180 Hz, to mimic an approaching wasp. In response, the caterpillars fluted and coiled, a sign that they were stressed. Caterpillars around an electrode without the voltage didn't behave this way. The caterpillars' setae responded to frequencies of 80-350 Hz, possibly to help distinguish between threats and non-threats, Dr. England said. The setae vibrated the most when the field frequency was 220-3 Hz – close to the rate at which many predator insects flap their wings. He suspected the caterpillars could have evolved to tune to their predator's wingbeats. "These animals have had a lot of evolutionary pressure upon them to evolve defences because so many animals like to eat them."

That said, scientists also "already know" that caterpillars don't rely on electroreception alone to sense predators, Dr. England added. It supplements the other five senses. He also said that "sensory pollution" could damp the caterpillars' electroreception. The setae are sensitive to voltage frequencies also present in overhead power cables, around 50-60 Hz. This "exposure" could desensitize the setae and diminish the caterpillars' ability to spot predators with them.

(Karthik Vinod is an intern with The Hindu)



Caterpillars sixth sense

- **Caterpillars have a sixth sense that most land-based animals do not.**
- **They can sense electric fields around them with small bristles called setae on its body — a feat called electroreception.**
- **Researchers have long known that aquatic and amphibious animals use electroreception to detect both predators and prey.**

- **Since 2013, scientists have also found electroreception in arthropods like bumblebees, hoverflies, and spiders.**
- **However, none of these land-based creatures use the ability to defend against predators. Caterpillars, which are also arthropods, may break this mould, using electroreception to sense predatory insects nearby.**

Chabahar's opportunities and challenges



The recently concluded contract between India and Iran, which gives New Delhi rights to invest in and operate the Shahid-Behesti terminal at Chabahar Port for another 10 years, has created many headlines. The port remains the crown project anchoring economic relations between the two countries. The deal came at a precarious time in West Asia as the war in Gaza continues unabated, Israel-Iran tensions remain critical, and the passing of Iran's President and Foreign Minister in a helicopter accident challenges domestic politics in Tehran.

Representative of India's thinking

There is no denying that the Chabahar project is an important endeavour for both economic and strategic reasons. At the core of it, Chabahar, for India, represents its thinking from the perspective of an extended neighbourhood, and not necessarily as part of its West Asia outlook. The port is a fulcrum of the International North-South Transport Corridor, a project looking towards seamlessly linking India with Central Asia and Russia, bypassing Pakistan. Beyond this, Chabahar is also astutely tuned into the 'new' realities of Afghanistan. The Taliban-led interim government in Kabul has also thrown its weight behind the port, offering an investment of \$35 million as it looks to secure alternatives and not be economically reliant on Pakistani ports such as Karachi or the China-backed Gwadar. In November 2023, Taliban leader Mullah Baradar visited Chabahar, with Shahid-Behesti visible in the background.

Bilaterally for India and Iran, Chabahar is also a symptom of challenges between the two states. While there is a lot of public championing for the project, and for good reasons, if it was not for Chabahar, India-Iran ties today would look extremely dry. The reasons are multifaceted and tied to both country's views of their national,



Kabir Taneja

is Fellow, Strategic Studies Programme, Observer Research Foundation

The geopolitics around India's play in Chabahar and Iran's leverages is interesting

regional, and geopolitical interests. Instead of expanding projects and economic cooperation beyond Chabahar, many older ones, such as the gas field Farzad-B which was discovered by Indian state-owned enterprise ONGC Videsh, have now been written off. Another old bilateral platform, the IranoHind shipping company, was dissolved in 2013 because of sanctions. Chabahar, is a legacy project, which has its foundations going back to 2003. This was an era when India was opening to developing economic assets abroad. Chabahar in Iran was one, Sakhalin-I in Russia, was another.

A reflection of diplomacy

The geopolitics today that surrounds India's play in Chabahar, and Iran's leverages, make for an interesting study. This latest iteration of the deal was signed not too long after both Israel and Iran exchanged missile fire and came critically close to a full-scale conflict. India's Adani Group, meanwhile, has also invested in a large port project in Israel. The company bought Israel's Haifa port on the Mediterranean Sea for \$1.2 billion. This was also made possible in part due to India's participation in new diplomatic and economic endeavours with the United States, Israel, and Arab partners, such as the I2U2 and India-Middle East-Europe Economic Corridor.

The fact that India's buy-in to Haifa was not a constraint for the Chabahar deal to go through is not only a testament to Indian diplomacy but also for the U.S. to also recognise that this kind of access which New Delhi has is beneficial, and not detrimental, to Washington.

Recent remarks from the U.S. over potential sanctions against Chabahar stand out as myopic. India's relations with Iran and the continuity of Chabahar's development, which offers access to difficult political terrain such as Central Asia, and even Afghanistan, could bring in a significant level of integration and help in building

alternatives to China-backed projects. Despite public discourse, China's heavy financial might and the 2021 strategic deal with Iran, does not automatically make Tehran subservient to Beijing. Iran is a quintessential survivalist state and plays a diverse set of cards in its playbook of geopolitics.

The Biden administration would benefit by not blindly following former U.S. President Barack Obama's doctrine on how to deal with India-Iran ties, and Chabahar, at its centre. New Delhi burnt its fingers by giving Mr. Obama too much room when it completely stopped importing oil from Iran. This took Tehran, consistently among India's top-two suppliers of oil for decades, out of the top 10. Even if India's thinking was to build influence in Washington around the nuclear deal negotiations, Donald Trump as the U.S. President and the unilateral exit of the U.S. under his watch from the Joint Comprehensive Plan of Action (JCPOA) in 2018, recalibrated how non-partisanship and the stability of critical U.S. foreign policies were to be viewed thereafter.

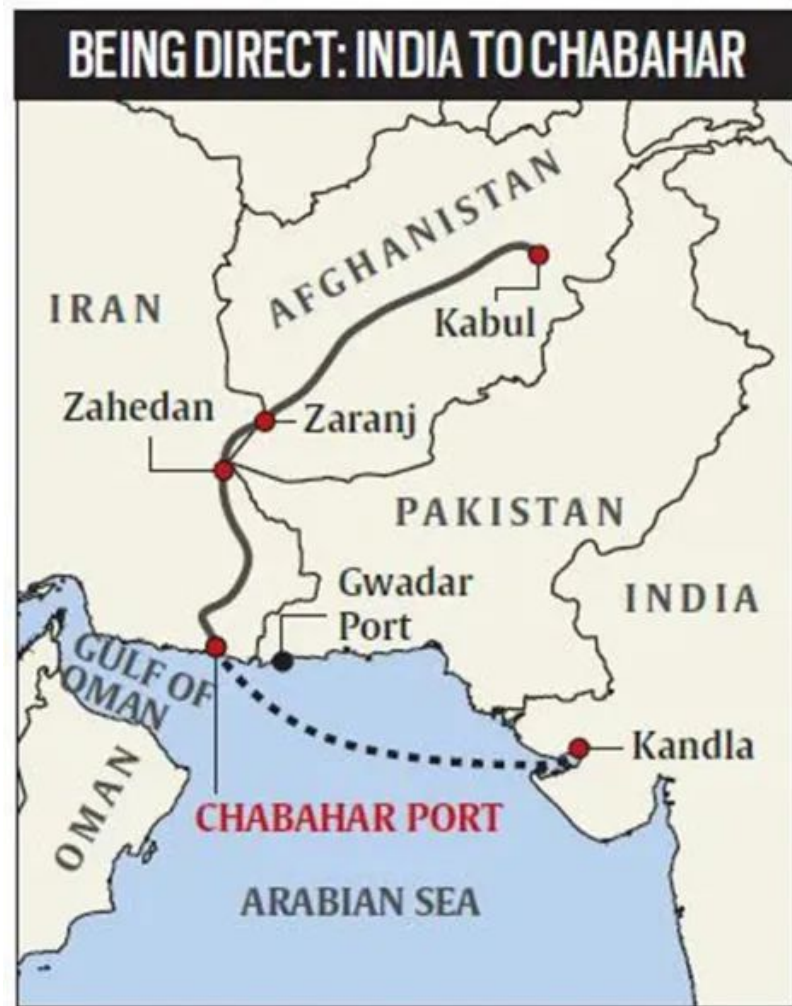
The bigger picture

Finally, for Chabahar, there are two main points to consider moving forward. First, the port project cannot be the singular major play in the bilateral relationship. This concentration of interests is volatile. Second, the U.S. must move towards being accommodative on sanctions against Chabahar. Viewing the port as a collateral against problematic Iranian policies in West Asia would not be an accurate understanding of the big picture of India's own outreach towards its extended neighbourhood which could benefit larger American aims as well.

This is important to be considered at a time when the U.S. itself maintains a channel with the Iranians not only through Swiss intermediaries but, increasingly, through Oman and Qatar as well.

Chabahar port

- **At the core of it, Chabahar, for India, represents its thinking from the perspective of an extended neighbourhood, and not necessarily as part of its West Asia outlook.**
- **The port is a fulcrum of the International North–South Transport Corridor, a project looking towards seamlessly linking India with Central Asia and Russia, bypassing Pakistan.**
- **Beyond this, Chabahar is also astutely tuned into the ‘new’ realities of Afghanistan.**



- **The Taliban-led interim government in Kabul has also thrown its weight behind the port, offering an investment of \$35 million as it looks to secure alternatives and not be economically reliant on Pakistani ports such as Karachi or the China-backed Gwadar.**
- **Chabahar's development, which offers access to difficult political terrain such as Central Asia, and even Afghanistan, could bring in a significant level of integration and help in building alternatives to China-backed projects**

- **for Chabahar, there are two main points to consider moving forward.**
- **First, the port project cannot be the singular major play in the bilateral relationship. This concentration of interests is volatile.**
- **Second, the U.S. must move towards being accommodative on sanctions against Chabahar.**
- **Viewing the port as a collateral against problematic Iranian policies in West Asia would not be an accurate understanding of the big picture of India's own outreach towards its extended neighbourhood which could benefit larger American aims as well**

The controversy over eucalyptus planting in Kerala

Why did the Kerala government allow the Kerala Forest Development Corporation to plant eucalyptus trees?
Why were environmentalists and social activists against the order?

The Hindu Bureau

The story so far:

The Kerala government issued an order allowing the Kerala Forest Development Corporation (KFDC) to plant eucalyptus trees for its financial sustenance in 2024-2025. Environmentalists soon protested the decision saying the move would adversely affect forests and heighten human-animal conflicts in future. Subsequently, the head of the Forest Force submitted a report to the State Forest Minister saying it hadn't permitted the planting of eucalyptus trees inside forests. On May 20, the government amended its order to limit permission to only cut exotic tree species from lands in the KFDC's control.

What are KDFC and its plantations?

The KFDC was established on January 24, 1975, as part of a dynamic production forestry enterprise. According to the

KFDC website, the corporation has around 7,000 hectares (ha) of plantations. The plantation working circle includes the following species: *Eucalyptus grandis*, *Acacia auriculiformis*, *Acacia mangium*, *Acacia crassiparva*, *Acacia pycnantha* (also known as wattle), *Alnus nepalensis*, *Casuarina equisetifolia*, and *Pinus patula*.

Eucalyptus plantations have a rotation age of nine years; *Acacia auriculiformis* trees, 18 years; and *Acacia mangium*, seven years. At the end of each cycle, plantations approved by the Union Ministry of Environment, Forests and Climate change are felled.

Clear-felled plantations are planted with species listed in a management plan. Before planting, experts check for soil quality and consult with the Kerala Forest Research Institute. As of this month, the KFDC website also said plantations of exotic species, including eucalyptus, would be converted to those of indigenous species once exotic flora has been felled "so as to be more ecologically

and environmentally friendly".

What was the issue with the order?

In 2021, the State government had published an eco-restoration policy. Among other things, it sought to address what it called the "proliferation of invasive species that are not suitable for our environment" and the resulting "depletion of natural forests". Such depletion, according to the policy, was in turn forcing wild animals to move to human-occupied land in search of food and thus increasing the prevalence of human-wildlife conflict.

For example, a recent study by the Kerala State Forest Protective Staff Organisation – an association of frontline forest officers – found replacing exotic plants in forested areas with the corresponding natural species could help ensure food for wild elephants at Chinnakanal in Munnar. The Chinnakanal landscape is prime elephant habitat in the Munnar forest

division, and is filled with eucalyptus trees. The policy also acknowledged that invasive species of plants as well as animals had rendered "serious damage to natural habitats and ecosystems" and that "eradicating such invasive species ... is of high priority." Environmental activists alleged following the State's order – permitting the KDFC to plant eucalyptus trees – contravened the policy's aspirations and undermined efforts to beat back invasive species and mitigate human-animal conflicts.

What is eco-restoration?

Kerala has around 27,000 ha under industrial plantations. Against the backdrop of climate change and the promise researchers have said trees offer to mitigate against its worsening, the Kerala government had decided to phase out plantations of eucalyptus, acacia, wattle, and pine by 2024 and replace them with natural forests. This process is called eco-restoration. Many of these areas are currently overwhelmed with invasive species.

For example, in 2019, in the Marayoor Sandal Division in Idukki, the forest department initiated a project supported by the UNDP, the National Bank for Agriculture and Rural Development, and the Compensatory Afforestation Fund Management and Planning Authority. Some 108 hectares of exotic species were removed to allow natural grasses to flourish. The result: water streams in the area were restored after a 30-year gap.

THE GIST

▼
The Kerala government issued an order allowing the Kerala Forest Development Corporation (KFDC) to plant eucalyptus trees for its financial sustenance in 2024-2025.

▼
Environmentalists soon protested the decision saying the move would adversely affect forests and heighten human-animal conflicts in future.

▼
In 2021, the State government had published an eco-restoration policy. Among other things, it sought to address what it called the "proliferation of invasive species that are not suitable for our environment" and the "depletion of natural forests".

- **The Kerala government issued an order allowing the Kerala Forest Development Corporation (KFDC) to plant eucalyptus trees for its financial sustenance in 2024-2025.**
- **Environmentalists soon protested the decision saying the move would adversely affect forests and heighten human-animal conflicts in future.**
- **invasive species of plants as well as animals had rendered “serious damage to natural habitats and ecosystems” and that “eradicating such invasive species ... is of high priority.”**

Eucalyptus as invasive



- There are many possible reasons as to why introduced species become invasive – the introduced species is adapted to grow in a wide range of climatic regimes or soil types; it is dependent on generalist pollinators; it has no natural enemies in its adventive range; grows rapidly; establishes easily; etc.
- With these attributes invasive plants can outcompete/displace native species for space, access to nutrients and water, etc.
- Gums have another tool in their arsenal and that is allelopathy – they displace other species through chemical warfare, in other words they release chemicals that other plant species don't like. In this way they displace native species, improving conditions for themselves – eliminating competitors, etc.

- **Wetlands in water scarce countries are critical, especially now that climate change is impacting on the frequency and abundance of rainfall.**
- **However, in the past, gums were used to dry up wetlands, swamps, marshes, etc. to try to curb the incidence of malaria – the gums suck up the water which is then lost to the atmosphere as a result of evapo-transpiration.**
- **To try to mitigate their negative impacts it is important not to grow them near any water resources – wetlands, rivers, etc. where they will have a far greater impact on water.**

What is eco restoration ?

- **Ecological restoration aims to recreate, initiate, or accelerate the recovery of an ecosystem that has been disturbed.**
- **Disturbances are environmental changes that alter ecosystem structure and function. Common disturbances include logging, damming rivers, intense grazing, hurricanes, floods, and fires.**

U.S., U.K. fret over farm input subsidy rise



Sharp rise: India's farm input subsidies increased by a sharp 50% to \$48.13 billion in 2022-23. THE HINDU

Amiti Sen
NEW DELHI

India's farm input subsidies, including sops for fertilizers, electricity and irrigation, have increased by a sharp 50% to \$48.13 billion in 2022-23 from \$32.07 billion in the previous fiscal, as per notifications of the country at the WTO.

This prompted several countries such as the EU, the U.K. and the U.S., to raise concerns and call for greater transparency at a recent peer group review meeting of the WTO, officials said.

"New Delhi explained the input subsidies are mainly for power, irrigation and fertilizers, and the increase was due to inflation and rising costs of fertilizers. It further said the country had duly notified the information to the WTO," a Geneva-based official told *businessline*.

Farm subsidies

Agricultural input subsidies, targeted towards low income and resource poor farmers, are exempt from limits on domestic subsidies under the carve-out of special and differential treatment measures offered to developing nations under WTO rules.

As India has declared that 99.43% of farm holdings in the country are of low-income or resource-poor farmers (per the Agricultural Census for 2015-16), its input subsidies are excluded from capping. "There is more peer group scrutiny on input subsidies also because it is not capped and can be increased without limits," the official said.

(The writer is with The Hindu businessline)

Farm subsidies

- **India's farm input subsidies, including sops for fertilizers, electricity and irrigation, have increased by a sharp 50% to \$48.13 billion in 2022-23 from \$32.07 billion in the previous ☐ fiscal, as per noti^ocations of the country at the WTO.**
- **This prompted several countries such as the EU, the U.K. and the U.S., to raise concerns and call for greater transparency at a recent peer group review meeting of the WTO,**

- **“New Delhi explained the input subsidies are mainly for power, irrigation and fertilizers, and the increase was due to inflation and rising costs of fertilizers. It further said the country had duly notified the information to the WTO**

Green Box

- These measures are exempt from reduction commitments and, indeed, can even be increased without any financial limitation under the WTO.
- Applies to both developed and developing country members but in the case of developing countries special treatment is provided in respect of governmental stockholding programmes for food security purposes and subsidized food prices for urban and rural poor.

(India's PDS does not come under Green Box)

Amber Box

- All domestic support measures considered to distort production and trade (with some exceptions) fall into the amber box.
- For instance, MSP, Procurement Price, sum total of subsidies on inputs like fertilizer, water, credit, power, etc

Blue Box

- These are basically Amber Box subsidies, but they tend to limit the production. Any support that would normally be in the amber box, is placed in the blue box if the support also requires farmers to limit their production.
- These measures are also exempt from reduction commitments.

Special and Differential Treatment Box

- It comprises of investment subsidies like tractors and pump sets, Agricultural input services like fertilizers to farmers etc.
- SDT box subsidies can be given by only developing and low-income countries.

Box	Status	Payment Type
Amber	Trade-distorting	<ul style="list-style-type: none"> • Marketing loan benefits • Product-specific supports • Crop and revenue insurance subsidies • Irrigation subsidies • Renewable energy programs
Blue	Market-distorting and production-limiting	<ul style="list-style-type: none"> • Deficiency payments
Green	Non-trade-distorting	<ul style="list-style-type: none"> • Environmental payments • Natural disaster relief • Decoupled income support • Farm credit programs

'More than 2,000 buried in Papua New Guinea landslide'

Associated Press

MELBOURNE

A Papua New Guinea government official has told the United Nations more than 2,000 people were believed to have been buried alive by Friday's landslide and has formally asked for international help.

The government figure is roughly triple the UN estimate of 670 killed by the landslide in the South Pacific island nation's mountainous interior. The remains of only six persons had been recovered so far.

In a letter to the UN resident coordinator dated Sunday, the acting director of the South Pacific island nation's National Disaster Center Luseta Laso Mana said the landslide "buried more than 2,000 people alive" and caused "major destruction" at Yambali vil-



Taking stock: Locals gather at the site of a landslide at Mulitaka village in Papua New Guinea's Enga Province on Sunday. AFP

lage in the Enga province.

Estimates of the casualties have varied widely since the disaster occurred.

Determining the scale of the disaster is difficult because of challenging conditions on the ground including the village's remote location, a lack of telecommunications and tribal warfare throughout the

province which means international relief workers and aid convoys require military escorts.

The government estimates Papua New Guinea's population at around 10 million people, although a UN study, based on data including satellite photographs of rooftops, estimated in 2022 it could be as high as 17 million.



More than 670 feared killed in landslide

Emergency crews continue to retrieve bodies after a massive landslide in the South Pacific island nation's Enga province buried more than 150 homes on Friday.



Why PNG is prone to landslides ??



- attributes PNG's regular landslides to a number of specific factors, chief amongst them being the country's deeply weathered, mountainous terrain and tropical climate.
- Heavy rain and storms lead to increased erosion, flooding and higher tides, all of which raise the chance of dangerous rockfalls,
- Add to that the fact that the country sits on the Ring of Fire — a string of active volcanoes and high seismic activity that runs along the border of two tectonic plates in the Pacific — and you have perfect landslide conditions.
- "You have regular significant earthquakes, which of course trigger landslides in their own right, but also weaken the rock slope,"
- "The whole area is very tectonically active."

- **Alongside small villages and farms, PNG's forests play host to a number of large industries that create conditions where landslides can become more likely**
- **Gold, silver, nickel, copper and cobalt are all mined in the country, and LNG operations have been taking place in areas where **deadly landslides occurred in the past.****
- **PNG also has a large illegal logging industry, as well as being the **world's fifth-largest exporter of palm oil**, which requires extensive deforestation**

- **In the meantime, climate change — itself exacerbated by deforestation — is making extreme weather events more likely, as well as contributing to higher king tides as global sea levels rise.**

Six killed, life severely affected as Cyclone Remal batters southern districts of Bengal

Shiv Sahay Singh

KOLKATA

Six people were killed and life was severely affected as Cyclone Remal left behind a trail of destruction across the southern districts of West Bengal.

One person was killed in Kolkata when the roof of a structure collapsed in the Entally area and an elderly woman died on Mousuni Island at the mouth of the Bay of Bengal, when a tree fell on her house. A man and his son at Purba Bardhaman and a youth in North 24 Parganas were electrocuted. Later in the evening, a woman died from electrocution in the Metiabruz area of Kolkata.

The weather formation,



A boat damaged in Cyclone Remal near the Sundarbans area in South 24 Parganas district of West Bengal on Monday. ANI

which made landfall on Sunday night, gradually weakened into a cyclonic storm on Monday morning and further weakened into a deep depression by evening. The wind speed had touched 120 kmph over Sagar Island on Sunday.

A preliminary report by the State government said more than two lakh people were evacuated to safer places.

The government said that nearly 2,500 houses were destroyed and 27,000 damaged.

It said 1,700 electric poles had been brought down and many trees were uprooted in North 24 Parganas and South 24 Parganas.

Kolkata recorded 144 mm of rainfall in the 24 hours till 8.30 a.m. on Monday, resulting in widespread waterlogging. Several trees were uprooted in the metropolis and its adjoining coastal regions. While Haldia received 110 mm, Tamluk received 70 mm and Nimpith 70 mm. Flights resumed at Kolkata's Netaji Subhas Chandra Bose airport on Monday morning.

The airport services were suspended for almost 20 hours.

Chief Minister Mamata

Banerjee, while acknowledging the damage caused by Remal, said that due to the actions of the State administration, the loss of life was relatively less.

In the Sundarbans, minor breaches of embankments were reported in several places in the coastal areas of South 24 Parganas.

The IMD has predicted surface wind with speed reaching 50 to 60 kmph gusting to 70 kmph likely over North and South 24 Parganas, East Midnapore, Nadia and Murshidabad; reaching 40 to 50 kmph likely over Kolkata, Howrah and Hooghly.

MORE REPORTS

» **PAGES 6 & 14**

Cyclones in bay of bengal

(1) BoB water is warmer than Arabian sea water ,

a) landlocked- less heat circulation (b) less powerful winds- again lesser heat circulation

(2) fresh water from rivers fall into BoB, (as suggested in and above) making the water as a light thin layer, more prone to evaporation

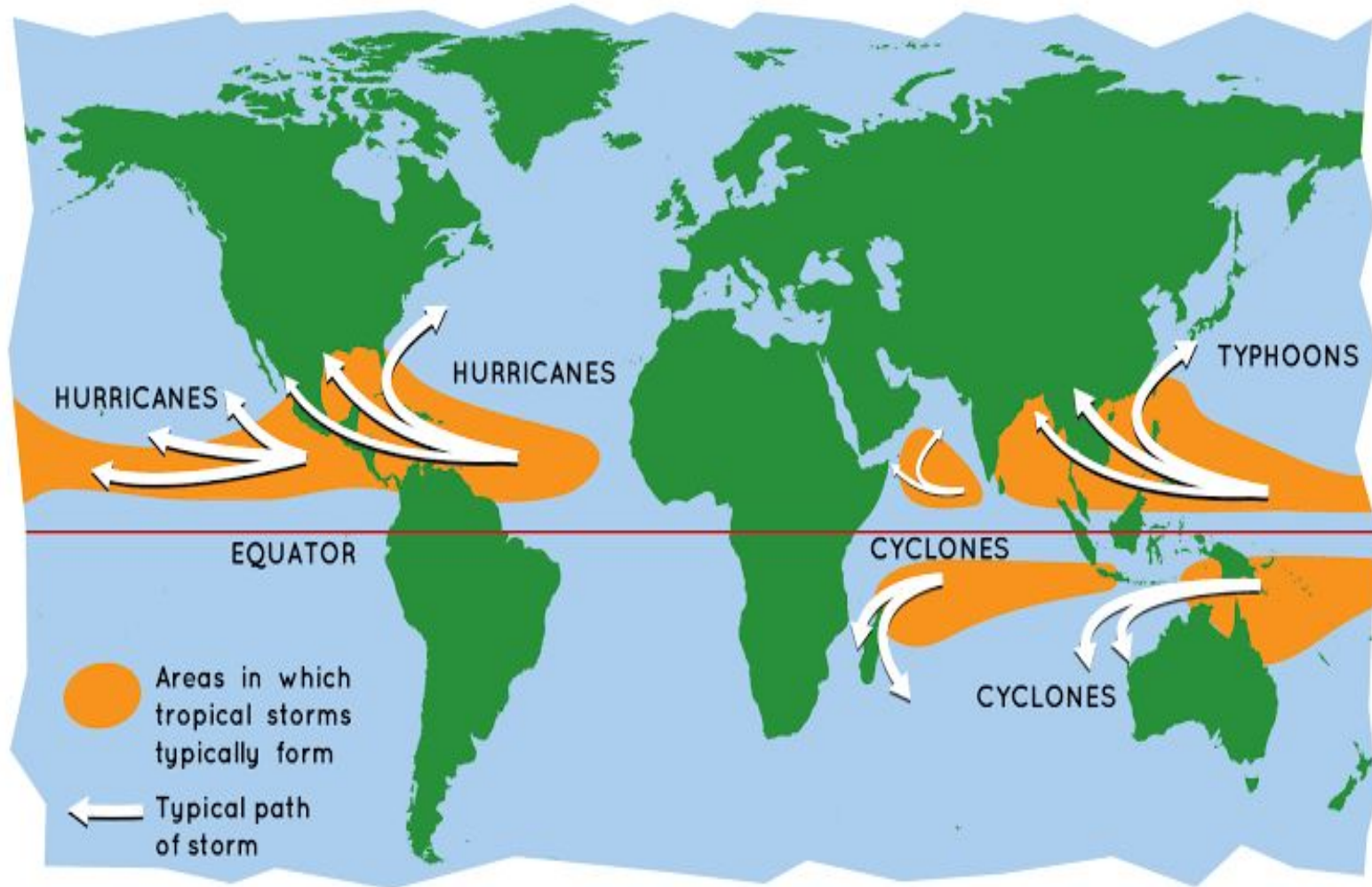
(3) easterly jet - causing the windfall in eastern coastal States of India. And in Arabian sea these winds will steer the windfall towards eastern Africa , not towards western coast of India

- On an average, five to six significant cyclonic storms emerge in the Bay of Bengal region every year.

The months of April and May just before the start of the monsoon, and then October to December immediately after the end of the monsoon, are the prime seasons for tropical cyclones.

A big difference between the strengths of cyclones in April-May and October-December is that the former originate in situ in the Bay of Bengal itself, barely a few hundred kilometres from the landmass.

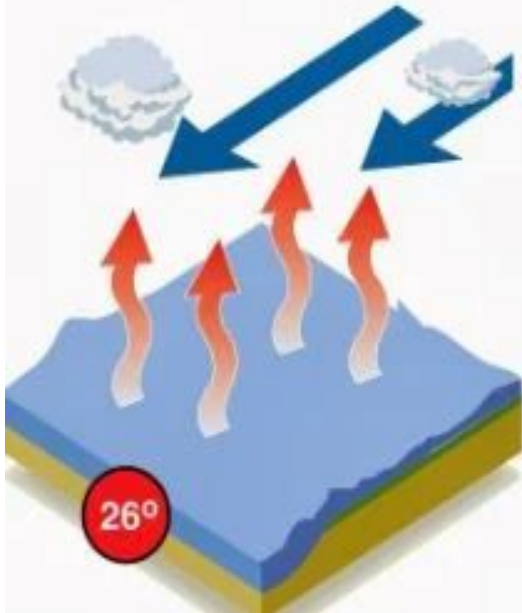
- On the other hand, **cyclones in October-December are usually remnants of cyclonic systems that emerge in the Pacific Ocean**, but manage to come to the Bay of Bengal, considerably weakened after crossing the southeast Asian landmass near the South China Sea



How tropical storms are formed

High humidity and ocean temperatures of over 26°C are major contributing factors

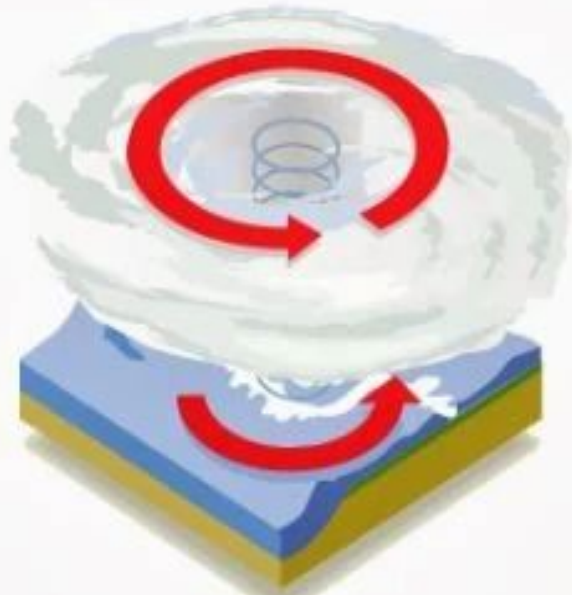
Water evaporates from the ocean surface and comes into contact with a **mass of cold air**, forming **clouds**



A **column of low pressure** develops at the centre. **Winds form** around the column



As pressure in the central column (the eye) weakens, the **speed of the wind around it increases**



Cyclones are named as per guidelines decided by the World Meteorological Organisation (WMO). The WMO says that countries in the affected region should name the cyclones.

In the north Indian Ocean region, eight countries decide the names of cyclonic storms. These countries include India, Bangladesh, Maldives, Myanmar, Oman, Pakistan, Sri Lanka and Thailand.

The name 'Remal' in the list of tropical cyclones is given by Oman. It will be the first cyclone to hit the region this 2024 pre-monsoon season. 'Remal,' meaning 'sand' in Arabic

28/5/24

रुद्राक्ष सिद्ध

UPSC

Please do not write anything except question number in this space.
(कृपया इस स्थान में प्रश्न संख्या के अतिरिक्त कुछ भी न लिखें।)

Candidates must not write on this margin.

(अभ्यर्थी को इस मार्जिन में नहीं लिखना चाहिए।)

Explain the factors responsible for increase in landslides in Pacific Islands.

Mass wasting wherein a mass of rock or weathered debris moves downhill along discrete shear surface is defined as a landslide. landslide involves downslope displacement of both weathered rock material and soils.

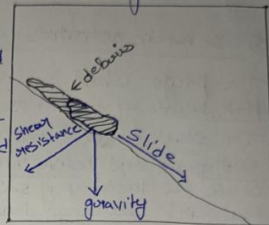


Fig.- landslide Mechanism

Recently Papua New Guinea had faced a landslide which causes heavy loss to the people. Furthermore the Pacific island nations are more prone to the landslide due to many factors which are as followed.

① Heavy Rainfall and Storms

Due to heavy rainfall and storms the soil get eroded and the heavy rocks, boulders slide toward downslope causing heavy landslide. The rainfall decrease the viscosity of soil which cause the slide of material downhill.

② Tides and Storm Surge

The Pacific Island face the cyclones as well as Tides. cyclones cause storm surge which erode the coastal area, similarly the tides also erode the coastal areas

UPSC

anything except question number in this space.
(कृपया इस स्थान में प्रश्न संख्या के अतिरिक्त कुछ भी न लिखें।)

अभ्यर्थी को इस मार्जिन में नहीं लिखना चाहिए।

leading to the landslide near coast.

For example: In Ngaremad, Palau there was a slide in coastal area which cause destruction of habitat and the coastal reefs.

③ seismic activities and Active Volcanoes

The Pacific island are situated in the convergent plate boundary as well as Pacific ring of fire.

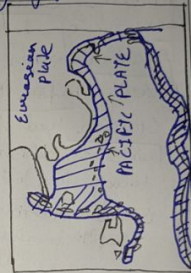
The shock wave created by earthquake and Active Volcanoes cause the loosen up of soil and rock material causing landslide.

Due to change in isostasy the seismic waves get generated which also cause the landslide.

for eg:- The recent landslide in Philippines is caused due to

earthquake. Similarly a landslide caused in 2020 due to volcanic eruption.

Fig: Pacific ring of fire



④ Mining activity and Construction

The Pacific island are rich in mineral like gold, silver, copper and cobalt and due to heavy mining activity and heavy construction and settlement cause the landslides in the valley areas.

In the meantime climate change itself exacerbated by deforestation is making extreme weather events more likely as well as contributing to higher tides as global sea level rise, which make Pacific island more prone to landslides.

L'Hoest's monkeys

- **L'Hoest's monkeys (*Cercopithecus lhoesti*) are found in montane forests of the Albertine Rift, including southwestern Uganda, Rwanda, Burundi, and Democratic Republic of the Congo.**

Habitat

L'Hoest's monkeys reside in montane tropical rainforests, including both primary and secondary forests. In secondary forests, they occupy the thick underbrush that grows where trees have fallen. L'Hoest's monkeys can be found at altitudes ranging from 900 to 2,500 m. The species is typically more terrestrial than other [guenons](#). ([Tolo, et al., 2008](#); "[L'Hoest's monkey \(*Cercopithecus lhoesti*\)](#)", 2007)

Habitat Regions: tropical

Terrestrial Biomes: forest ; rainforest ; mountains



L'HOEST'S MONKEY

Allochrocebus lhoesti

CONSERVATION STATUS: VULNERABLE

- Also called mountain monkeys
- Endemic to eastern DR Congo, Burundi, Rwanda, and western Uganda
- Reclassified from the *Cercopithecus* genus to *Allochrocebus* in 2013
- Mostly ground-dwelling, they sleep in trees sitting upright, holding onto tree limbs or each other
- Threatened by regional human conflicts, deforestation, and bushmeat hunting; populations are rapidly decreasing







Major Radhika Sen to receive UN gender advocacy award

Major Radhika Sen, an Indian woman peacekeeper for the United Nations, will be honoured with a prestigious military gender advocate award, with UN Secretary-General Antonio Guterres describing her as a “true leader and role model.” Major Sen, who served with the United Nations Organisation Stabilisation Mission in the Democratic Republic of the Congo as the Engagement Platoon Commander with the Indian Rapis Deployment Battalion, will receive the prestigious ‘2023 United Nations Military Gender Advocate of the Year Award’ from Mr. Guterres during a ceremony at the world body’s headquarters on May 30, the International Day of UN Peacekeepers. PTI

Major Radhika Sen



- **Major Radhika Sen, an Indian woman peacekeeper for the United Nations, will be honoured with a prestigious military gender advocate award, with UN Secretary-General Antonio Guterres describing her as a “true leader and role model.”**
- **Major Sen, who served with the United Nations Organisation Stabilisation Mission in the Democratic Republic of the Congo as the Engagement Platoon Commander with the Indian Rapis Deployment Battalion, will receive the prestigious ‘2023 United Nations Military Gender Advocate of the Year Award’ from Mr. Guterres during a ceremony at the world body’s headquarters on May 30, the International Day of UN Peacekeeper**

An altered protein and fussy neurons conspire to cause microcephaly

The SAS6 gene and its variants have been implicated in a developmental process that leads to microcephaly. A new study has found that if one copy of this gene is non-functional, the other retains some function. So if both copies are non-functional, a human embryo dies before it becomes a foetus

D.P. Kasbekar

Microcephaly is a condition in which a baby's head is much smaller than normal. Most children with microcephaly also have a small brain, poor motor function, poor speech, and abnormal facial features, and are intellectually disabled.

Researchers believe the roots of the condition lie in the peak phase of brain development in the embryo – when the cells that eventually become neurons fail to divide normally. Clinicians can diagnose microcephaly before the baby is born using foetal ultrasound and magnetic resonance imaging.

The SAS6 gene

In particular, since 2014, a gene called SAS6 and its variants have been implicated in this developmental process. On March 19, researchers at the Affiliated Maternity and Child Health Care Hospital of Nantong University, China, presented “the genetic findings of members of a nonconsanguineous Chinese couple with a history of microcephaly and foetal growth restriction during their first pregnancy”.

The team's findings reinforced the SAS6 gene's role in causing microcephaly. But more importantly, the team also found that if one copy of the SAS6 gene was non-functional, the other retained at least some function. The implication was that if both copies are non-functional, the human embryo dies before it becomes a foetus.

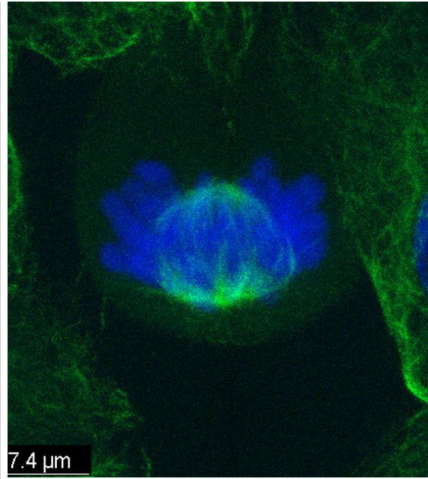
“Our findings confirm the pivotal role of SAS6 in microcephaly pathogenesis and reveal an expanded view of the phenotype and mutation spectrum associated with this gene,” the researchers wrote in their paper, published in the *American Journal of Medical Genetics*.

Similarly, in a February 2024 study, researchers at the University of Cologne, Germany, reported that they modified mouse embryo-derived cells to remove all functional SAS6 genes. These genes contain instructions for cells to make structures called centrioles. But even after the genes were removed, the cells were able to make passable, if also abnormal, centrioles.

The problem arose when the cells were nudged to develop into neurons: at this point, all the centrioles made without using the gene's recipe disappeared, and the cells couldn't differentiate into neurons.

Consanguinity and genetic risk

According to Ashwin Dalal, a



An image of chromosomes (blue) attached to a spindle (green) in a dividing cell. SHWETA TING AND ANSHUK KATARIA/CIFD

paediatrician turned medical geneticist at the Centre for DNA Fingerprinting and Diagnostics, Hyderabad, 70% or more of cases of congenital microcephaly seen in the clinic come from consanguineous marriages. These are marriages between closely related individuals, such as between uncle and niece or between first cousins.

Consanguinity increases the risk of an individual inheriting a mutated copy of a gene from both parents. The risk is greater if the mutated gene is rarer in the general population.

Microcephaly is caused by mutations in 30 genes. Cells use 10 of these genes to encode proteins that are required to assemble the centrioles and for their subsequent function. When a cell divides, its centrioles help form another structure called the spindle.

During cell division, the old and new cells need to take a series of careful steps. The spindle is like the handrail along this staircase, helping the cells form and maintain their structure. For example, once the old cell makes two copies of its chromosomes, each copy sticks to the



Most children with microcephaly have a small brain, poor motor function, poor speech, and abnormal facial features, and are intellectually disabled

centre of the spindle, which is an elongated structure. From there, the spindle moves each copy to its two ends. Each of these ends then becomes the nucleus of a new cell.

If a cell creates centriole proteins from mutated genes, however, cell division is affected as well.

The lle62Thr mutation

In 2004, researchers discovered the SAS6 gene in the roundworm *Caenorhabditis elegans*. They also found that the protein that cells made using this gene was conserved across animals, meaning natural selection allowed this

protein to exist in all members of the animal kingdom.

When the researchers suppressed the SAS6 gene in *C. elegans* embryos, they found that the cells failed to assemble new centrioles, resulting in arrested development.

In 2014, other researchers studied a consanguineous Pakistani family of which four members had microcephaly. All the affected individuals were found to carry a mutated version of the human SAS6 gene on both their copies of chromosome 1: one inherited from the father and the other from the mother.

The SAS6 gene encodes a protein that has 657 amino acids. This protein assembles new centrioles during the cell division process. In the study of the Pakistani family, the researchers were able to describe the mutation correlated with microcephaly: the amino acid isoleucine at position 62 had been replaced by threonine. Thus its name: lle62Thr.

Last year, researchers at the University of Tulsa, in the U.S., introduced the lle62Thr mutation into the *C. elegans* SAS6 gene. Their experiment, reported in the journal *Genetics*, revealed that this change didn't detectably impair centriole assembly and function in *C. elegans*. But when the worm's genome had another mutation that affected a different centriolar protein, the lle62Thr mutation significantly increased centriole replication failure and embryo death.

Evidently, a protein made using a SAS6 gene with the lle62Thr mutation is functional enough to allow individuals with other unaffected organs to be born and grow into adulthood. In *C. elegans*, it becomes deadlier when the second mutation is also present.

At the same time, humans with just the lle62Thr mutation don't escape unscathed: the mutation's mild impairment of centriole function still dysregulates cell division enough to cause microcephaly.

Scientists conducted three studies since then, including the March study, and found six more SAS6 gene variants.

Neurons are finicky

As the February 2024 paper indicated, different cell types have different tolerances to a range of deficits in centriole composition and function.

In particular, the cells fated to become neurons are finicky and have the least tolerance for imperfect centrioles.

This is why, while an individual with a slightly defective SAS6 gene can survive to birth and adulthood, he/she also suffers serious brain and head deficits and intellectual disability.

(D.P. Kasbekar is a retired scientist)

THE GIST

Most cases of congenital microcephaly come from consanguineous marriages. Consanguinity increases the risk of inheriting a mutated copy of a gene from both parents. The risk is greater if the mutated gene is rarer in the general population

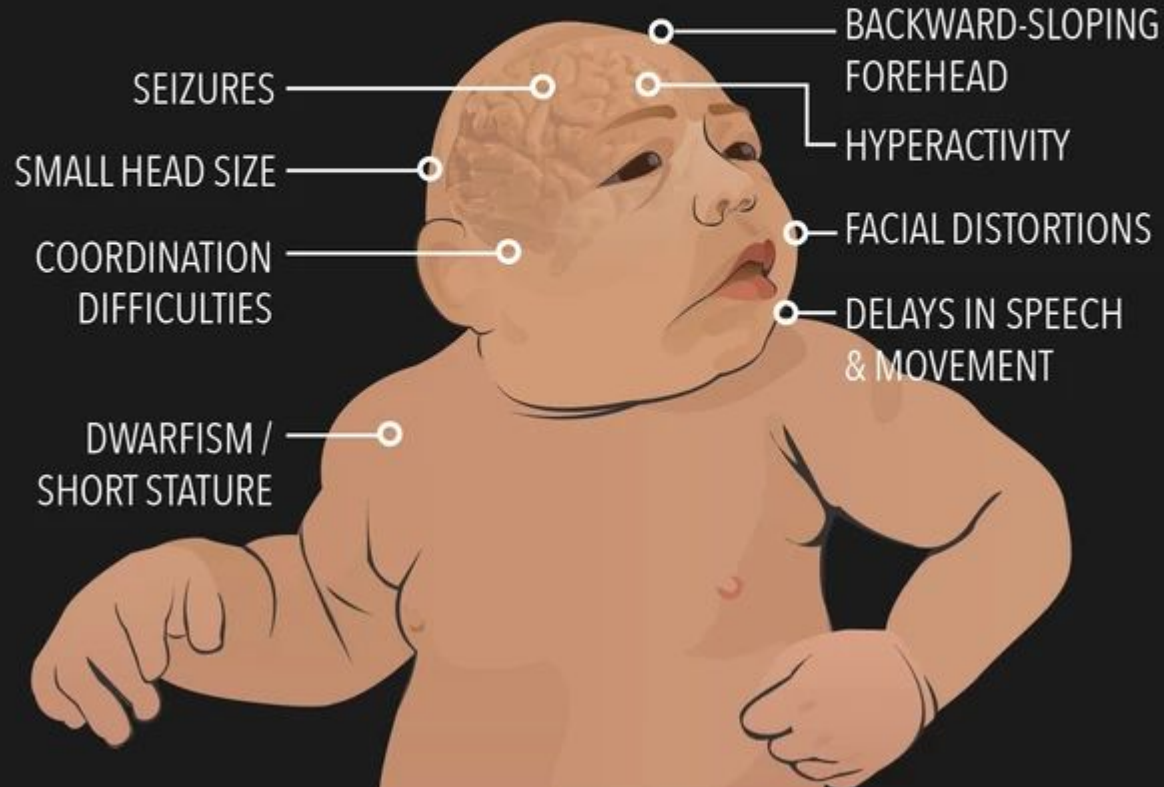
When researchers suppressed the SAS6 gene in *C. elegans* embryos, they found that the cells failed to assemble new centrioles, resulting in arrested development

After studying a family of which four members had microcephaly, researchers found the mutation correlated with microcephaly. The amino acid isoleucine in the SAS6 gene had been replaced by threonine. Thus it is named lle62Thr

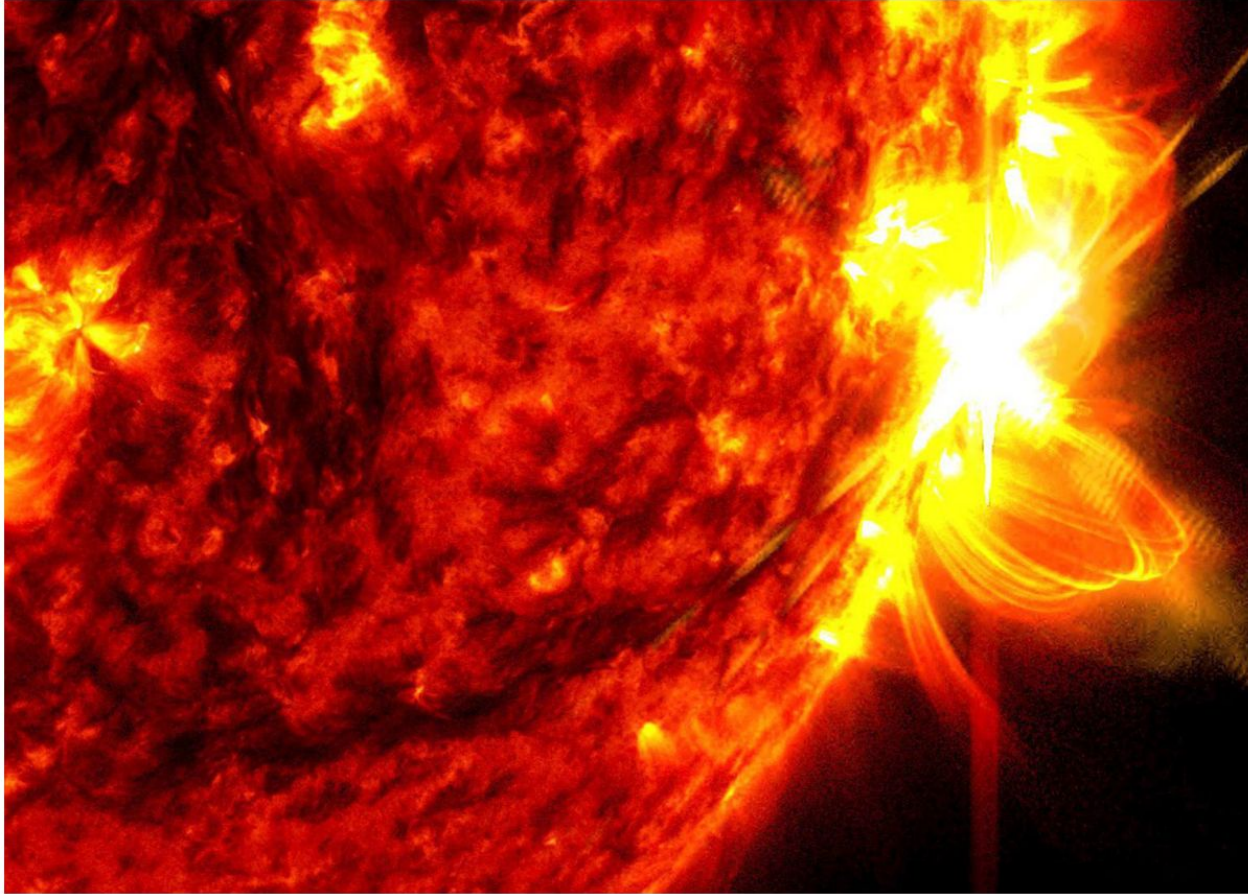
SASS6

- **SASS6 gene's role in causing microcephaly. But more importantly, the team also found that if one copy of the SASS6 gene was non-functional, the other retained at least some function.**
- **The implication was that if both copies are non-functional, the human embryo dies before it becomes a foetus.**

SYMPTOMS OF MICROCEPHALY



BIG SHOT



This image provided by NASA's Solar Dynamics Observatory shows a solar flare, right, on May 14, captured in the extreme ultraviolet light portion of the spectrum colorised in red and yellow. An international team of mathematicians and scientists reported on May 22 that the Sun's magnetic field originates much closer to the surface than previously thought. NASA/AP

Solar Dynamics Observatory

- On Feb. 11, 2010, NASA launched the Solar Dynamics Observatory, also known as SDO.
- SDO keeps a constant eye on the sun, helping us track everything from sunspots to solar flares to other types of space weather that can have an impact on Earth. For instance, solar activity is behind the aurora, one of Earth's most dazzling natural events.

- **SDO's goal is to understand, driving towards a predictive capability, the solar variations that influence life on Earth and humanity's technological systems by determining:**
 - **how the Sun's magnetic field is generated and structured**
 - **how this stored magnetic energy is converted and released into the heliosphere and geospace in the form of solar wind, energetic particles, and variations in the solar irradiance.**

Gravity: shaping celestial bodies

Karthik Vinod



Q: Why are planets formed in a spherical shape?

- Hemant Sardesai

A: The short answer is gravity.

This 'force', by virtue of the large masses of planets and stars, forces them into a spherical shape.

Part of the answer is also geometry: a sphere is the most compact three-dimensional shape. To be more accurate, for a given volume, a sphere is the shape with the lowest surface area.

If stars and planets had any other shape, gravity would force them to become spherical. Bodies that are less massive also experience less of a 'force' due to gravity and thus will be less compelled to enter into a spherical shape. The electromagnetic forces between the atoms in these bodies will be able to better resist gravity's attempts to sculpt it. This is why comets, most asteroids, and even us humans aren't spherical.

But let's get even more accurate: nothing in the universe is truly spherical. Stars and planets are actually oblate



An artist's illustration of a protoplanetary disc around a star. Planets form when gravity causes parts of the disc to clump together and coalesce.

NASA

spheroids. Since they both rotate around a central axis, they create a centrifugal force that pushes mass outwards. So the oblate spheroid shape is a sphere that appears to bulge at the equator.

As a result, gravity is weakest at the equator and strongest at the poles. This is why, on the earth, objects fall to the ground down a teeny-tiny bit faster at the poles than at the equator.

(Karthik Vinod is interning with The Hindu)



Have science questions The Hindu can answer? Please send them to science@thehindu.co.in with the subject 'Question Corner'

Why are planets formed in a spherical shape?

- The short answer is gravity.
- This ‘force’, by virtue of the large masses of planets and stars, forces them into a spherical shape.
- Part of the answer is also geometry: a sphere is the most compact three-dimensional shape.

Fire safety regulations in India

What happened at the Rajkot gaming centre and at the New Born Baby Care Hospital in New Delhi? What are the various laws and guidelines which stipulate rules around fire safety in buildings? How have courts responded to negligence over public safety?

EXPLAINER

G. Ananthakrishnan

The story so far:

A deadly fire at a gaming centre in Rajkot, Gujarat on May 25 killed at least 32 people, bringing focus back on the safety of public buildings and venues. The TRP Game Zone carnage unfolded in the evening, as fire spread inside the structure built with a metal frame and sheets, trapping the victims including several children. Two inquiries have been set up to go into the disaster, one a Special Investigation Team (SIT) by the State government and another by the Rajkot police. The Gujarat High Court suo motu took up the incident and made critical observations on the functioning of the State administration, following which the Police Commissioner, Raju Bhargava, Additional Commissioner Vidhi Choudhary, and Municipal Commissioner Anand Patel were transferred. Rajkot municipal officials including town planning officers responsible for the prevention of illegal constructions were suspended, and four people including the operator of the game zone, Dhaval Thakkar, were arrested.

What was the other incident?

On May 25, seven babies died in a fire in a hospital for newborns in Vivek Vihar, Delhi, leading to the arrest of Navan Khichi, owner of the New Born Baby Care Hospital, along with the doctor on duty. Preliminary reports suggested that a large number of oxygen cylinders stored in the facility aggravated the impact of the blaze. In both incidents, the focus is on public certification by the authorities, issue of No Objection Certificates (NOC), and the failure of authorities to take cognisance of illegalities that were happening in full public view.

What fire regulations govern safety?

The Union of India's position on fire safety is that the Model Building Bye-Laws, 2016 and its component Chapter 11 on "Fire Protection and Fire Safety Requirements" provides the necessary framework for State governments, which bear responsibility for fire safety under law. Ensuring adherence to fire safety norms and standards laid down in Part 4 of the National Building Code (NBC) and incorporating mandatory provisions in the process is left to the States.

A structure such as the Rajkot game zone would fall under assembly buildings of the Bye-Laws, since it is a venue without permanent seating arrangements where 300 or more persons would gather. The definition of assembly buildings is broad under the regulations. They include any building or part of a building where "not less than 50 gather for amusement, recreation, social, religious, patriotic, civil, travel and similar purposes, for example, theatres, motion picture houses, assembly halls, museums, skating, rinks, gymnasiums, restaurants, places of worship, dance halls, club rooms, passenger stations and terminals of air, surface and marine public transportation services, recreation piers and stands." Hospitals, custodial or penal or mental health institutions are institutional buildings, while educational, business, industry and specialised uses are covered separately.

During the pandemic, amidst a spate of fires, the Health Ministry circulated guidelines on September 28, 2020, stipulating third party accreditation for fire safety and putting a fire response plan



In ruins: A view of the burned down TRP Game Zone in Rajkot. [AP](#)

in place. Chapter 11 of the Bye-Laws clearly lays down fire safety and infrastructure requirements for buildings which are 40 feet in height or more, and those with low occupancies in various categories, for issue of NOC.

In addition, Gujarat's Comprehensive Development Control Regulations 2007 also make it mandatory to get the Chief Fire Officer's opinion even for a temporary structure. The same regulations stipulate that all structures for whatever use must meet fire prevention and safety provisions specified by the Fire Authority, in terms of the Fire Prevention and Life Safety Measures Act, 2013. In the case of the Rajkot game zone, it was built apparently as a non-standard structure to evade regulatory requirements, and the inquiry would reveal whether it was qualified to be used as an assembly building offering leisure and entertainment services.

How have the courts viewed neglect of fire safety?

Among the high-profile deadly fire accidents that have led to the loss of life, the Uphar cinema tragedy of 1997 in Delhi resulted in the conviction of the owners of the venue, Sushil Ansal and Gopal Ansal among others for negligence and tampering of evidence. The death of 80 people who were trapped in the balcony of the hall because of illegally installed seats and a blocked exit resulted in a protracted legal battle, with the families of the victims forming an association to seek justice. The Uphar case was prosecuted with the charge of

causing death by negligence (IPC 304A), hurt or grievous hurt by rash or negligent act (337, 338) by the owners of the cinema, and culpable homicide (304) and other sections in the case of theatre staff and public agency employees, such as the electricity authority. A transformer of the electricity authority that was placed without sanction and allowed without safeguards was thought to have triggered the inferno. The owners had to directly bear responsibility for the wilful structural deviations. Essentially, the court held the owners of the property, employees and staff from the electricity agency liable for the devastating toll in the Uphar tragedy for violating the law and later for payment of compensation. On June 13 last year, the anniversary of the blaze, the Association of Victims of Uphar Tragedy blamed the judiciary for allowing the Ansal brothers to walk out of jail on a reduced sentence.

In the wake of the Rajkot fire, the Gujarat High Court taking suo motu cognisance has led to scrutiny of the enforcement of fire and building laws on the one hand, and the identification of several unauthorised venues in the State causing leisure and entertainment services. The court was told by the Ahmedabad Municipal Corporation that a recent law, the Gujarat Registration of Unauthorised Development Act, 2022 (in force since Jan 2, 2022) was used by an unauthorised game zone to apply for regularisation.

Gujarat has witnessed more than one terrible fire in recent years. The 2009 fire in a tuition centre in Surat's Talakhshali

Academy killed over 20 students and led to calls for tightening of fire safety in public buildings. After Rajkot, the Gujarat High Court took note of the Public Interest Litigation (PIL) before it, and noted that "insult [had] been added to injury" because its earlier orders had not been complied with by the State government.

What can be done to get the law enforced?

The suo motu notice issued by the Gujarat High Court extends its directions on fire safety and calls for a government report on action to comply with the Comprehensive Development Control Regulations, fire NOCs, periodic checks under the Fire Safety Act and issue of licences under various Acts. Earlier, the State government had informed the court that 163 hospitals and 348 schools in municipal jurisdictions did not have a valid fire NOC. It cited practical difficulties and lack of trained manpower and infrastructure to achieve full compliance.

Given that there were 241 fires in commercial buildings and 42 in government buildings in 2022, killing a total of 257 people (NCBR data), tightening the implementation of the provisions of the building code and the Model Building Bye-Laws is imperative. Full accountability by the State and enforcement agencies is vital. Temporary and ramshackle structures allowed to come up in urban and rural areas, attracting unwary leisure seekers, run the risk of setting off deadly fires. They need to be tightly regulated for safety.

The writer is a Chennai-based journalist.

THE GIST

▼ On May 25, seven babies died in a fire in a hospital for newborns in Vivek Vihar, Delhi, leading to the arrest of Navan Khichi, owner of New Born Baby Care Hospital, along with the doctor on duty.

▼ The Union of India's position on fire safety is that the Model Building Bye-Laws, 2016 and its component Chapter 11 on "Fire Protection and Fire Safety Requirements" provides the necessary framework for State governments, which bear responsibility for fire safety under law.

▼ Given that there were 241 fires in commercial buildings and 42 in government buildings in 2022, killing a total of 257 people (NCBR data), tightening the implementation of the provisions of the building code and the Model Building Bye-Laws is imperative.

India's fire safety rules

- According to the XII Schedule of the Constitution under Article 243(W), the fire services in India are under the purview of the state and are listed as a municipal function.
- The National Building Code (NBC), published by the Bureau of Indian Standards (BIS), serves as the central standard for fire safety in the country. Published in 1970, it was last updated in 2016.
- The NBC provides guidelines on the construction, maintenance and fire safety of buildings. It is a “mandatory requirement” for all states to incorporate the recommendations in their local building bylaws.

- **The Code specifies the demarcation and restrictions of buildings in fire zones to ensure that industrial and hazardous structures do not co-exist with residential, business and institutional buildings.**
- **Buildings are classified into nine groups – residential buildings are in Group A, hospitals in Group C and marriage halls, nightclubs, and multiplexes in Group D.**
- **The NBC mentions the material to be used in construction to reduce the threat in case of a fire and minimise danger before evacuation. It also provides guidelines on height for buildings, floor area ratio, open spaces and provision of openings in walls and floors to prevent the spread of fire**
-

- **The National Disaster Management Authority (NDMA) has also chalked out fire safety requirements for public buildings like hospitals.**
- **They recommend having a minimum open safety space, exit mechanisms, dedicated staircases and essential evacuation drills**

Topics

- **Light and Viral infection**
- **Venus Volcanism and Magellan**
- **Amrut scheme**
- **rites**
- **AI OFFICE**
- **Mains**



By saurabh Pandey



New light-based tool could cut cost of spotting viral infections

A viral infection can stress cells and change their shapes and sizes. As the infection gains the upper hand and the body becomes 'diseased', the changes become more stark. Researchers have translated these cellular changes into patterns that can be used to say if a cell has been infected

Joel P. Joseph

Viruses infect plants, animals, and humans. A virus' spread from animals to humans could unleash pandemics like COVID-19 – significant public health crises with considerable economic and social fallout. To nip such infections in the bud, public health researchers have advocated the 'One Health' approach: monitoring and protecting plant, animal, environment, and human health in an integrated fashion. Quick, easy, and cost-effective methods of detecting viral infections can go a long way in ensuring this outcome. Recently, researchers from Harvard University, Cambridge, and Jiangsu University, Zhenjiang, reported developing one such tool: it can detect if cells have been infected by a virus using only light and some knowledge of high-school physics. Their paper was published in the journal *Science Advances* in March this year.

A fingerprint of infection

A viral infection can stress cells and change their shapes, sizes, and features. As the infection gains the upper hand and the body becomes 'diseased', the changes become more stark.

The researchers behind the new study translated these cellular changes into patterns that could be used to say if a cell had been infected. They infected cells from a pig's testicles with pseudorabies virus, shone light on them through a microscope, and tracked how changes in the cells distorted the light.

The researchers recorded these distortions at different points of time so that the light data mimicked a progressing viral infection. Then they compared these distortions with those in light that had been shone through healthy cells. They finally reported that the difference between the two light patterns represented a 'fingerprint' of virus-infected cells.

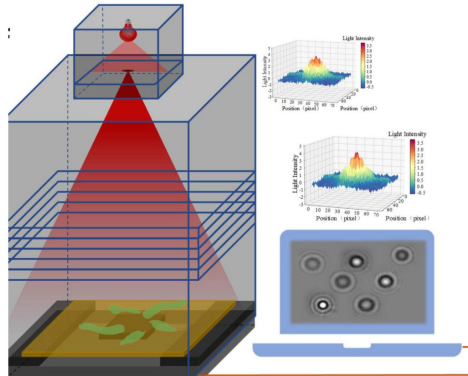
Changes in contrast

The distortion in question referred to diffraction patterns. Diffraction is the tendency of light waves to spread out after they pass through narrow openings or around small objects. Once this diffracted light reaches, say, a wall, it renders a pattern of alternating light and dark rings or stripes around a dark centre.

The fingerprint was based on two parameters: the contrast between the light and dark stripes and the inverse differential moment, a mathematical value that defined how textured the diffraction pattern was.

The method can differentiate between uninfected, virus-infected, and dead cells. Virus-infected cells were elongated and had more clear boundaries than uninfected cells. This changed the contrast between light and dark stripes of the diffraction fingerprint, and increased the differences in light intensity.

Less time, money, complexity
Current methods to detect virus infections in cells are not straightforward. For example, in one technique, researchers isolate infected cells in the lab and add chemical reagents like dimethyl thiazolyl diphenyl tetrazolium bromide to



A schematic diagram of the test setup which could reduce the cost of testing livestock for virus. DOI: 10.1126/SCIENCE.ADV.1606

them. The reagent destroys the cells – but not before the enzymes in the cells – called endonucleases and dehydrogenases – react with the reagent to produce purple crystals of a chemical entity called formazan. This colour change tells researchers the cells could have had a viral infection. Cells dying of a viral infection lack these enzymes and thus produce little to no amounts of formazan crystals.

The researchers compared their new technique with this standard for accuracy, time, and cost. They reported that their light-based method could detect viral infections as accurately or even more accurately than the standard method.

The new method was also cheaper than the standard, while the equipment cost for the standard method using chemical reagents is about \$3,000 (₹2.5 lakh), the cost of the new method described in this paper was about a tenth. Many research facilities around the world also procure reagents from other places, adding potential time delays and vulnerability of their research to supply-chain inefficiencies.

Finally, the new method reportedly takes only about two hours to detect virus-infected cells, against the 40 hours the current standard required.

Advantages for livestock

According to the paper, the researchers placed a sample of cells on slides under a microscope and light was shone on them. They obtained and subsequently analysed the diffraction fingerprint, and correlated each fingerprint with the corresponding condition of the cells. The team is yet to conduct real-world tests.



Researchers have developed a tool that can detect cells infected by a virus using only light and some knowledge of high-school physics

The low cost and ease of use point are likely to be lucrative to people working closely with animals, especially "henscratch or common pets such as dogs and cats," the researchers wrote in their paper. The new tool can help spot viral infections in their bodies as well as for "the selection and breeding of excellent livestock and poultry species at the cellular level."

A new tool in the arsenal

Indeed, the new method could help catch viral infections early – which could be very helpful during, say, a virulent bird flu outbreak. The one going on around the world killed more than 11 million poultry in 81 countries in 2022 and 2023, according to the World Health Organisation.

Scientists typically test samples from any part of the bird the virus could infect: windpipe, cloaca (the waste chamber for urine and faeces), or their waste itself. If a bird dies after displaying the symptoms associated with the infection, they also look for the pathogen in the carcass's tissues.

The methods they use include polymerase chain reaction (the 'PCR' fame during the COVID-19 pandemic) or antigen tests, which detect the genes or proteins associated with the H5N1 virus.

While the new method is not specific to certain kinds of viruses, it can help detect viral infections in general and help stakeholders take preventive measures in time to avoid significant losses.

In fact, the tool's generative nature could also be an advantage by catching a viral infection that is not due to H5N1, perhaps even a new virus.

Against the spread of viruses

Viral outbreaks in animals have significant economic consequences. According to a 2018 study in the journal *Transboundary and Emerging Diseases*, bird flu outbreaks in the Kuttanad region of Kerala imposed losses of ₹21 lakh in 2014. The study also estimated the Government of Kerala spent ₹5.4 crore "to contain the spread of the disease through massive culling, surveillance and monitoring of poultry and humans due to [the] zoonotic nature of the disease."

Against this backdrop, a rapid and cost-effective way to detect viral infections could help improve surveillance and reduce the cost of selecting healthy animals or birds for breeding. The existing methods to select animals for breeding require expensive DNA-sequencing tools, even if these tools are very good at identifying some desired features in an animal.

The light-based tool could also help low- and middle-income countries with limited resources to realise the WHO's recommendation to "rapidly detect, report and respond to animal outbreaks as the first line of defence" against the spread of viruses.

(Joel P. Joseph is a freelance science journalist and researcher)

Light and Viral infection

- **A viral infection can stress cells and change their shapes, sizes, and features.**
- **As the infection gains the upper hand and the body becomes ‘diseased’, the changes become more stark.**
- **The researchers behind the new study translated these cellular changes into patterns that could be used to say if a cell had been infected**

- **The researchers recorded these distortions at different points of time so that the light data mimicked a progressing viral infection.**
- **The distortion in question referred to diffraction patterns.**
- **Diffraction is the tendency of light waves to spread out after they pass through narrow openings or around small objects.**
- **Once this diffracted light reaches, say, a wall, it renders a pattern of alternating light and dark rings or stripes around a dark centre.**

A computer-generated 3D model of Venus shows the volcano Sif Mons, which is 300 km wide. REUTERS/INRA

More volcanism on Venus than was previously known: study

Reuters

Venus appears to be more volcanically active than previously known, according to scientists whose new analysis of decades-old radar images has spotted evidence of eruptions at two additional sites on the surface of the earth's inhospitable planetary neighbour.

Radar images obtained by NASA's Magellan spacecraft from 1990 to 1992 indicated large lava flows at these two locations in the Venusian northern hemisphere at the time of the observations, the researchers said. These findings, coupled with previous studies, indicate that the planet's volcanic activity is comparable to the earth's, they added.

Magellan mapped 98% of the Venusian surface. Advances in computing capability have made analysing Magellan's radar data easier in recent years.

"These findings significantly change our understanding of the degree to which Venus is volcanically active, suggesting it could be much more active than previously thought," said planetary scientist Davide Salomese of d'Alemaio University in Pescara, Italy, lead author of the study published this week in the journal *Nature Astronomy*.

One of the two sites is a volcano called Sif Mons, which is about 300 km wide

Magellan mapped 98% of the Venusian surface. Advances in computing capability have made analysing Magellan's radar data easier in recent years

and situated in a region called Eistla Regio. The before-and-after radar images indicate a lava flow amounting to about 20 sq. km of rock. The other site is a large volcanic plain in a region called Nioke Planitia. About 45 sq. kilometers of rock was produced in this lava flow.

"Both Sif Mons and the volcanoes in Nioke Planitia are shield volcanoes, characterized by broad, gentle slopes formed by low viscosity lava flows," said d'Alemaio University planetary scientist and study co-author Giuseppe Mitri.

The new rock at both locations was estimated to have an average depth between about three and 20 meters.

"The lava flows observed along the western flank of Sif Mons exhibit linear features with sinuous patterns that follow the direction of the maximum slope generally towards the west," said planetary scientist and study co-author Marco Mastrogioseppe of University Sapienza in Rome and LUMS Campus University in Rome.

"Regarding the flows in Nioke Planitia, the lava flows appear to originate near small shield volcanoes and extend towards the northeast, also following the direction of the slope," Dr. Mastrogioseppe added.

The new study builds on previous findings of ongoing Venusian volcanic activity. A 2023 study found that a volcanic vent on Maat Mons in a region called Alfa Regio, near the equator, expanded and changed shape during the Magellan mission.

"Our study is the first to provide direct proof of lava flows formed during the Magellan mission period," Salomese said.

Studying volcanic activity provides a fuller understanding of a planet's internal heat and geological processes. It provides insight into the planet's thermal evolution, surface renewal processes and atmospheric interactions, according to

Venus Volcanism and Magellan

- **Venus appears to be more volcanically active than previously known, according to scientists whose new analysis of decades-old radar images has spotted evidence of eruptions at two additional sites on the surface of the earth's inhospitable planetary neighbour.**
- **Radar images obtained by NASA's Magellan spacecraft from 1990 to 1992 indicated large lava □ flows at these two locations in the Venesian northern hemisphere**

The Magellan spacecraft

- The Magellan spacecraft, which arrived at Venus in 1990, made the first global map of the surface of Venus as well as global maps of the planet's gravity field.
- The mission produced surprising findings about Venus, including a relatively young planetary surface possibly formed by lava flows from planet-wide volcanic eruptions.
- In October 1994, the Magellan spacecraft intentionally plunged to the surface of Venus to gather data on the planet's atmosphere before it ceased operations.
- It marked the first time an operating planetary spacecraft had been intentionally crashed.

An overview of the AMRUT scheme



What was the purpose of the Atal Mission for Rejuvenation and Urban Transformation? What was the revenue set aside for the scheme? What has been its progress so far? What are the various shortcomings and how should they be addressed?

EXPLAINER

Tikender Singh Panwar

The story so far:

Around 36% of India's population is living in cities and by 2047 it will be more than 50%. The World Bank estimates that around \$840 billion is required to fund the bare minimum urban infrastructure over the next 15 years. The AMRUT (Atal Mission for Rejuvenation and Urban Transformation) scheme was a flagship programme launched by the NDA-1 government in June 2015, with its 2.0 version launched on October 1, 2021.

What is the AMRUT scheme?

Some of the challenges in infrastructure development with respect to water, mobility, and pollution were to be met by this scheme with some financial assistance from the Centre and the rest of the share mobilised by both States and respective cities. The mission was drawn to cover 500 cities and towns with a population of over one lakh with notified municipalities. The purpose of the AMRUT mission was to (i) ensure that every household has access to a tap with assured supply of water and a sewerage connection (ii) increase the value of cities by developing greenery and well-maintained open spaces such as parks and (iii) reduce pollution by switching to public transport or constructing facilities for non-motorised transport. The total outlay for AMRUT was ₹50,000 crore for five years from FY 2015-16 to FY 2019-20.

AMRUT 2.0 was aimed at making cities 'water secure' and providing functional water tap connections to all households in all statutory towns. Ambitious targets were set up such as providing 100% sewage management in 500 AMRUT cities. The total outlay for AMRUT 2.0 is ₹2,99,000 crore, with the Central outlay being ₹76,760 crore for five years, and the rest of the amount to be mobilised by the



At work: The Lions Park being renovated under AMRUT-2 by Kozhikode Corporation in 2023. FILE PHOTO

States and cities.

How much money has been utilised?

The AMRUT dashboard shows that as of May 19, 2024, a sum of ₹83,357 crore has been dispersed so far. This amount has been utilised to provide a total of 58,66,237 tap connections, and 37,49,467 sewerage connections. A total of 2,411 parks have been developed, and 62,78,571 LED lights have been replaced. These works include the contributions made by States and cities.

What is the reality?

It is estimated that about 2,00,000 people die every year due to inadequate water, sanitation and hygiene. In 2016, the disease burden due to unsafe water and sanitation per person was 40 times higher in India than in China. This has not

improved much. Huge amounts of waste water and little treatment enhances the vulnerability and incidence of diseases. The 150 reservoirs monitored by the central government, which supplies water for drinking and irrigation, and are the country's key source of hydro-electricity, were filled to just 40% of its capacity a few weeks ago. Around 21 major cities are going to run out of ground water. In a NITI Aayog report it was stated that 40% of India's population will have no access to drinking water by 2030. Nearly 31% of urban Indian households do not have piped water; 67.3% are not connected to a piped sewerage discharge system; and average water supply per person in urban India is 69.25 litres/day, whereas the required amount is 135 litres.

Additionally, air quality in AMRUT cities and in other large urban settlements

continue to worsen. A National Clean Air Programme was launched by the central government in 2019, as AMRUT 2.0 focused only on water and sewerage and because the air quality concerns of AMRUT 1.0 were far from addressed.

What went wrong?

The basic fundamental of the scheme was erroneously constructed. Instead of a holistic approach, it took on a project-oriented attitude. Furthermore, AMRUT was made for cities with no participation from the cities. It was quite mechanical in design, with hardly any organic participation of the elected city governments, and driven by mostly private interests. The project was owned by bureaucrats, parastatals, and large technology-based companies. For example, in the governance architecture, the apex committee is headed by the secretary of the Ministry of Housing and Urban Affairs (MOHUA) and all the members are non-elected. Similarly, the State level high powered committee is headed by the chief secretary with a private nexus of consultants and professionals. Peoples' representatives are completely missing, in violation of the 74th constitutional amendment.

Moreover, water management in cities must factor in climate and rainfall patterns of the area and existing infrastructure of combined sewers. It is no big surprise that most of the sewage treatment plants are designed in such a way that the travel distance of average faecal matter is more than the average commute of a worker to work! Since the drivers are large private players and builders, real estate development has become a proxy for urban planning – disappearance of water bodies and lakes, disrupted storm water flows, and absence of storm water drainage is very common.

The scheme needs nature based solutions and a comprehensive methodology with a people centric approach and empowering local bodies.

Author is former Deputy Mayor, Shimla, and Member, Kerala Urban Commission.

THE GIST

▼
The AMRUT (Atal Mission for Rejuvenation and Urban Transformation) scheme was a flagship programme launched by the NDA-1 government in June 2015.

▼
The purpose of the AMRUT mission was to (i) ensure that every household had access to a tap with assured supply of water and a sewerage connection (ii) increase the value of cities by developing greenery and well-maintained open spaces such as parks and (iii) reduce pollution by switching to public transport or constructing facilities for non-motorised transport.

▼
AMRUT was made for cities with no participation of the cities. It was quite mechanical in design.

Amrut scheme

- **A round 36% of India's population is living in cities and by 2047 it will be more than 50%.**
- **The World Bank estimates that around \$840 billion is required to fund the bare minimum urban infrastructure over the next 15 years.**
- **The AMRUT (Atal Mission for Rejuvenation and Urban Transformation) scheme was a □flagship programme launched by the NDA-1 government in June 2015, with its 2.0 version launched on October 1, 2021.**

What is the AMRUT scheme?

- **Some of the challenges in infrastructure development with respect to water, mobility, and pollution were to be met by this scheme with some financial assistance from the Centre and the rest of the share mobilised by both States and respective cities.**
- **The mission was drawn to cover 500 cities and towns with a population of over one lakh with notified municipalities.**
- **The purpose of the AMRUT mission was to**

(i) ensure that every household has access to a tap with assured supply of water and a sewerage connection

(ii) increase the value of cities by developing greenery and well-maintained open spaces such as parks and

(iii) reduce pollution by switching to public transport or constructing facilities for non-motorised transport.

- **The total outlay for AMRUT was ₹50,000 crore for five years from FY 2015-16 to FY 2019-20.**
- **AMRUT 2.0 was aimed at making cities ‘water secure’ and providing functional water tap connections to all households in all statutory towns.**
- **Ambitious targets were set up such as providing 100% sewage management in 500 AMRUT cities.**

RITES looks to increase exports to boost order book and profit margins

Maitri Porecha
NEW DELHI

Indian Railway PSU RITES declared a marginally lower net profit and revenue in FY24 compared with FY23 due to a significant dip in exports revenue and its quality assurance business. The company expects to turn the tide by raising its exports business as it gears up to supply 200 coaches to Bangladesh Railway, an order worth ₹915 crore.

The firm's FY24 net profit was ₹495 crore down from ₹571 crore year-on-year (YoY).

Speaking to *The Hindu*, Rahul Mithal, Chairman and MD, RITES Ltd. said exports revenue was a mere ₹6 crore in Q4 FY24. With the "signing of agreements to supply ten locomotives to Mozambique and 200 passenger coaches to Bangladesh Railway, revenue from the export is expected to pick up from second half of FY25," Mr. Mithal added.

"While coaches are quicker to make, locomotives are heavier pieces of equipment than coaches and take longer to manufacture. Final designs and approvals are underway. We have to freeze the designs and get prototypes approved before starting mass manufacture," Mr. Mithal said.

While the export order for Bangladesh is being funded by the European Investment Bank, an export order that RITES was expecting with the National Railways of Zimbabwe has been delayed. "The order will go through, subject to Zimbabwe securing



Crossing borders: The firm expects to turn the tide by raising exports as it gears to supply 200 coaches to Bangladesh Railway, AFP

funding. We had signed an MoU with Zimbabwe and have been in touch with them to convert it into formal LoA," he said.

On the India Middle East EU Corridor (IMEC) front, Mr. Mithal said following last year's G20 announcement to establish trade links between India, Middle East and Europe, and the intergovernmental framework agreement signed between India and the UAE in February, feasibility assessments along the corridor have begun.

"One port each from India and the UAE are being identified to prepare a proof of concept (PoC) to establish ease of movement, executing digitisation while moving cargo on an alternate route. It is like a confidence building measure, and the PoC can be replicated along other legs of the corridor," Mr. Mithal said.

Among the ports that could be connected on the India's west coast, Mundra and Kandla in Gujarat, and Jawaharlal Nehru Port Trust in Navi Mumbai, have been identified. In the Middle East, at least five ports have been shortlisted

to be connected to Indian ports that include Fujairah, Jebel Ali, and Abu Dhabi in the UAE and Damman and Ras Al-Khair in Saudi Arabia. It is to be noted that apart from government-owned ports, both Mundra in India and Haifa in Israel are privately controlled by the Adani Group, and have been highlighted in proposal documents accessed by *The Hindu*.

'Robust order book'

RITES consolidated operating revenue dipped to ₹2453 crore in FY24 from ₹2628 crore in FY23. Total revenue slid to ₹2539 crore from ₹2730 crore in FY23.

Q4 FY24 revenue was ₹668 crore against ₹706 crore in Q4 FY23. Net profit for the quarter was ₹137 crore, marginally lower ₹139 crore in Q4 FY23.

After a gap of four years, RITES received export orders worth ₹1200 crore. The firm secured more than 100 orders worth about ₹940 crore in Q4 FY24, continuing to be a 'one-order-a-day' company, Mr. Mithal said. "Q4 ended with a healthy order book of ₹5690 crore," he added.

rites

- **rites Limited, a Navratna and Schedule 'A' Central Public Sector Enterprise under the Ministry of Railways, incorporated on April 26, 1974,**
- **It is a multidisciplinary engineering and consultancy organization, providing a comprehensive range of services from concept to commissioning in all facets of transport infrastructure and related technologies.**
- **The company's market capitalization has placed it among the top 500 listed companies in India, a testament to the high-quality solutions and services it delivers, driven by its talented pool of professionals**

- **rites is uniquely placed in terms of diversification of services and geographical reach in various sectors such as railways, highways, metros, tunnels, bridge, urban engineering, sustainability & green mobility, airports, ports, ropeways, institutional buildings, inland waterways, etc.**

BRUSSELS

EU creates 'AI Office' to regulate technology under tough new law



REUTERS

▶ The European Union on Wednesday announced the creation of an "AI Office" of tech experts, lawyers and economists to regulate artificial intelligence under a sweeping new law. The EU this year approved the world's first comprehensive rules to govern AI, especially powerful systems like ChatGPT after intense talks. AFP

AI Office

- **The European Union announced the creation of an “AI Office” of tech experts, lawyers and economists to regulate artificial intelligence under a sweeping new law.**
- **The EU this year approved the world’s first comprehensive rules to govern AI, especially powerful systems like ChatGPT after intense talks**



Topics

- Inflammatory Bowel Disease
- Tobacco consumption in india
- Artificial intelligence
semiconductor
- The Funan Techo canal
- Blue Lagoon
- Mains



By saurabh Pandey



The rising incidence of paediatric inflammatory bowel disease in India

IBD is a chronic autoimmune condition where the white blood cells mistakenly identify cells in the human gut as their enemy and decide to attack it, causing ulcers in the mucosa. As a result a child with IBD may develop fever, loose stools and bloody diarrhoea. These children may lose weight, muscle mass, and may have vitamin deficiencies

Srinivas S.

When 10-year-old Durga recently came with her parents from their village in Andhra for a consultation, the family was worried that she was not thriving as well as her classmates and friends of the same age. She was pale, and had recurrent fever over the previous few months. She had also developed recurrent bouts of loose stools, sometimes bloody. Durga had lost a lot of weight and no longer resembled the child from a photograph taken during Deepawali. She underwent a number of tests which revealed that she was anaemic and had raised inflammatory markers. An ultrasonogram of the abdomen showed thickened bowel walls with increased vascularity (blood flow). She underwent a diagnostic upper gastro-intestinal endoscopy and colonoscopy, which revealed multiple ulcers in her intestines. Biopsies from various segments of her bowel helped confirm the diagnosis Inflammatory Bowel Disease (IBD).

IBD is a chronic autoimmune condition where the white blood cells or the body's soldiers mistakenly identify cells in the human gut as their enemy and decide to attack it, causing ulcers in the mucosa. As a result children may develop fever, abdominal pain, loose stools and at times bloody diarrhoea. These children may not absorb macro and micronutrients and hence lose weight, muscle mass, become anaemic and may have vitamin deficiencies. I explained to the parents that there were two types of IBD – *Ulcerative colitis* which affects only the large bowel and *Crohn's disease* which can affect any part of the gut from mouth to anus. Sometimes when we find it difficult to distinguish between these two conditions, we label it *Indeterminate Colitis* for a while until it evolves into one of the above conditions.

'Why did this happen to my child?'

This calls for a longer answer. Almost 20 years ago when I trained in paediatric gastroenterology at Sanjay Gandhi Postgraduate Institute, Lucknow; this condition was considered very rare in Indian children. Our adult gastroenterology colleagues saw IBD patients more frequently than we did (paediatric gastroenterologists). It was only when I trained at the Royal Children's Hospital, Melbourne a few years later that I found that IBD in Australia was very common in children too. Then, I did wonder about what would be the value of learning so much about a condition that is very common in the Western world but so rare in India. Next, I started to hear reports of IBD rising in incidence in children of Indian origin parents who migrated to the West. Gradually it became clear that IBD can affect children of all ethnicities and socioeconomic status. 15 years later, I am now treating more than a



A capsule packed with electronics and genetically engineered living cells at Cambridge, Mass. Researchers at MIT, who tested the swallowable device in pigs, say it correctly detected signs of bleeding. The results suggest a smaller version of the capsule could eventually be used in humans to find signs of ulcers, inflammatory bowel disease or even colorectal cancer. AP

hundred children with this condition from all over India.

But that was just a background. There is no easy answer to the question 'Why does IBD affect my child?' Medical research is still ongoing to pinpoint the exact cause. What is known is that children who are susceptible to IBD often have a weak or dysregulated immune system which responds inappropriately to environmental triggers such as a virus or bacteria. There may also be genetic factors which predispose these children to IBD as sometimes it seems to affect members of the same family. The human gastrointestinal tract harbours millions of microorganisms; often referred to as gut microbiota and this plays an important role in IBD. The gut microbiota of each individual is unique and influences health and disease. The nature and composition of gut microbiota can be altered by frequent antibiotics. Similarly, westernisation of food habits and lifestyle is also strongly linked to changes in the gut microbiota and a predisposition to develop IBD.

How can we treat and cure her?

IBD – Crohn's disease can be treated with very effective medications that control the inflammation and suppress the dysregulated and overactive immune system. These medications include steroids and a new class of drugs called biologics. But it is also possible to control the inflammation in the gut and heal ulcers in some children with the milder variety of Crohn's disease; without drugs using 'exclusive enteral nutrition'. Once the inflammation or acute flare up of the disease is under control, we aim to keep



Westernisation of food habits and lifestyle is also strongly linked to changes in the gut microbiota and a predisposition to develop IBD

the disease under control (remission) for several years using milder immunosuppressant drugs and a special Crohn's disease exclusion diet (CDED). IBD – Ulcerative colitis is also treated similarly, though another group of drugs called 'aminosalicylates' are used to treat milder forms of Ulcerative colitis. Exclusive Enteral Nutrition has not been found to be useful in treating Ulcerative Colitis.

Both forms of IBD are often chronic and need several years of medical therapy. A small minority of children who have remained in very good control (remission) for several years continue to do well even after stopping medications. The larger majority of children seem to need medications to keep the disease in remission. Further a small proportion of children who have uncontrolled inflammation develop complications connected today than before making it easy for developments in research in one part of the world to reach another.

Durga listened to all of this in rapt attention and asked if she had Ulcerative colitis or Crohn's disease. I replied – Crohn's disease. She then asked

me if it was mild or severe; to which I replied that she had a severe flare-up. She understood that simple diet therapy would not work and the family agreed to medication. With every week, she grew stronger and gained weight and achieved remission. She went on to receive milder drugs and continued to remain well for 2 months before yet another flare-up. She was disappointed; but ready for the challenge. She was then commenced on 'biologics' and remained in very good remission for the next 2 years; after which they were stopped. She has now remained in very good remission for the last 3 years without any flares and wants to study to become a doctor.

Durga is one of several success stories treated at our outpatient IBD clinic, but many struggle due to financial constraints and the very high cost of 'biologics'. There are also those who suffered because of the lack of timely & proper diagnosis of IBD. This is possibly because IBD has protean clinical manifestations ranging from a simple anaemia and failure to gain weight to fever, abdominal pain and loose stools. Patients and doctors often struggle to diagnose IBD and it is often mistaken for tuberculosis.

There is hence a need for increased awareness of this condition, both among the general public and medical community.

The writer is a senior paediatric gastroenterologist with a special interest in IBD at Kanchi Kamakoti CHILDIS Trust Hospital, Chennai. The hospital recently hosted a national paediatric IBD conference to observe celebrate World IBD week – May 19 to May 26.)

THE GIST

Susceptible children often have a weak or dysregulated immune system which responds inappropriately to environmental triggers such as a virus or bacteria. There may also be genetic factors which predispose these children to IBD as it sometimes affects members of the same family

IBD is often chronic and needs several years of therapy. A small minority of children who have remained in very good control for several years continue to do well even after stopping medications. The larger majority of children seem to need medications. A small proportion of children need surgery

Many patients struggle with the very high cost of 'biologics'. There are also those who did not receive timely and proper diagnosis, possibly because IBD has protean clinical manifestations. Patients and doctors often struggle to diagnose IBD and it is often mistaken for tuberculosis

Types of Inflammatory Bowel Disease (IBD)



There are two main types of IBD: Crohn's disease & Ulcerative colitis.

Ulcerative colitis only affects the inner lining of the colon and rectum. It is characterized by inflammation and ulcers that form in the lining of the colon.



Ulcerative colitis

Crohn's disease can affect any part of the digestive tract, from the mouth to the anus. It is characterized by inflammation that can spread deep into the layers of the affected tissue.



Crohn's disease

- **Susceptible children often have a weak or dysregulated immune system which responds inappropriately to environmental triggers such as a virus or bacteria.**
- **There may also be genetic factors which predispose these children to IBD as it sometimes affects members of the same family**

The tobacco epidemic in India

Tobacco causes a wide range of diseases and affects those consuming it as well as those cultivating it. There is a need for up-to-date data to understand trends in tobacco use to tackle the tobacco industry

EXPLAINER

Varun Raj Passi
Parth Sharma

Tobacco is the most widely recognised preventable cause of disease and death in the world. It causes a wide range of diseases and affects those consuming it as well as those cultivating it. After China, India has the world's highest number of tobacco consumers – nearly 26 crore, according to an estimate in 2016-2017. Additionally, the health of more than 60 lakh people employed in the tobacco industry is also placed at risk because of the absorption of tobacco through the skin, which can cause various diseases. Tobacco's deleterious influence extends beyond human health. It is a highly erosive crop that rapidly depletes soil nutrients. This requires more fertilizers to be used which further worsens soil quality. The plant is also a major contributor to deforestation. Up to 5.4 kg of wood is required to process 1 kg of tobacco. The production and consumption of tobacco generates nearly 1.7 lakh tonnes of waste every year in India. Therefore, tobacco production and use impose a heavy economic burden on India. A 2021 study estimated that the country incurred a loss exceeding 1.7 lakh crore as a result of tobacco's effects on the health of its consumers in the fiscal year 2017-2018. To compare, the Union Budget allocated for health in the same year was ₹48,000 crore. In addition, cleaning up tobacco waste has been estimated to cost close to ₹6,367 crore these estimates exclude the costs due to soil erosion and deforestation.

The status of tobacco use in India
The Global Adult Tobacco Survey (GATS), the Global Youth Tobacco Survey (GYTS), and India's National Family Health Survey (NFHS) capture the status of tobacco use in India. GYTS assesses tobacco use in students between the ages of 13 and 15 years and GATS and NFHS in people above 15 years of age. Overall, the results of these surveys have been promising: tobacco use has gone down in the population groups studied by these surveys. An exception to this is tobacco use in women, which went up by 2.1% between 2015-2016 and NFHS 2019-2021. This said, a major caveat is that no survey has been conducted since the COVID-19 pandemic.

Awareness and control programmes
India is one of the 168 signatories of the WHO's Framework Convention on Tobacco Control (FCTC), launched in 2005. It aims to reduce tobacco usage worldwide by helping countries develop demand and supply reduction strategies. A law to govern tobacco sales in India has existed since 1975 and was amended in 2003. The Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply, and Distribution) Act (COTPA) 2003 has 33 sections governing the production, advertisement, distribution, and consumption of tobacco. India also launched the National Tobacco Control Program (NCTP) in 2007. NCTP is designed to improve the implementation of COTPA and FCTC, improve awareness about the harms of tobacco use, and help people quit it. Apart from these interventions, tobacco taxation – a globally accepted method to effectively control tobacco use – is also applied in India.

However, existing measures are poorly implemented. Smokeless tobacco

To go up in smoke

Nearly 26 crore Indians are tobacco consumers, according to an estimate in 2016-2017. While usage and consumption has been going down, effective tobacco control is still a pipe dream

Chart 1: Comparison of monthly consumption of bidis and cigarettes between National Tobacco Control Program (NCTP) districts and non-NCTP districts

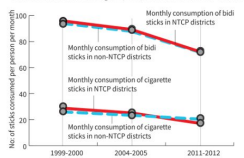


Chart 2: Trends in tobacco usage in different population groups

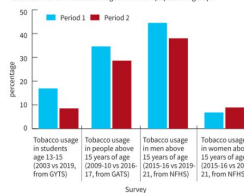
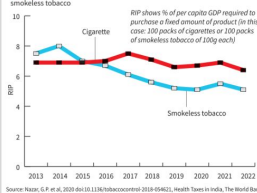


Chart 3: Trends in Relative Income Price (RIP) for cigarettes and smokeless tobacco



Source: Nazim, G.P. et al., 2020 doi:10.1136/tobaccocontrol-2018-04421, Health Team in India, The World Bank

products (SLTs) have predominantly been non-compliant with COTPA's packaging guidelines. Smuggled tobacco products – both smoked and smokeless forms – have also been badly regulated. To tax matters worse, the fines for violating COTPA regulations have not been updated since 2003. For instance, a tobacco company is fined a maximum of only ₹5,000 for violating packaging restrictions for the first time.

Further, while the COTPA bans direct advertisements, the position on indirect advertisements is unclear, which has allowed surrogate advertisements: they popularise the brand using a proxy product like a clutch, to promote tobacco manufactured by the same brand. The ICC Men's Cricket World Cup 2023 displayed surrogate advertisements for at least two tobacco brands, which were endorsed by famous cricketers. These advertisements are problematic as they indirectly promote tobacco use.

Becoming more affordable
Amendments to COTPA had been proposed in 2015 and 2020. The changes suggested in 2015 included regulations on surrogate advertisements, inclusion of films and video games in the definition of 'advertisement', and increasing the fines for violation of advertisement norms by a factor of 10. The amendment proposed in 2020 would have made licensing necessary for the production, supply, and distribution of tobacco products. But neither bill was passed.

The NCTP's effectiveness has also come into question. A 2018 study in the journal *BMJ Tobacco Control* reported no significant difference in the reduction of bidis or cigarette consumption between NCTP and non-NCTP districts. Possible reasons for this included insufficient

monitoring mechanisms. The Indian government's efforts to levy excise duty on tobacco have also been marred by tax evasion, such as by purchasing tobacco products in lower tax jurisdictions, and illegal methods such as smuggling, illicit manufacturing, and counterfeiting. Low tobacco taxes in India, which have not matched the rise in people's income, have kept tobacco affordable over the years. A 2021 study in *BMJ Tobacco Control* reported that cigarettes, bidis, and SLTs had become more affordable in the preceding 10 years and that transitioning to the Goods and Services Tax regime had rendered cigarettes and SLTs more affordable.

Tax measures and lobbying
Rijo M. John, an economist and tobacco policy analyst, estimated the tax burden to be 51% for cigarettes, 22% for bidis, and 44% for SLTs, much lower than the FCTC's recommendation of at least 75% tax. The tobacco lobby often argues that high taxes on tobacco lead to tax evasion. However, non-tax factors are equally, if not more, important. These factors include weak governance, high levels of corruption, poor government commitment to tackling illicit tobacco, ineffective customs and tax administration, and informal distribution channels for tobacco products. In a progressive move, the Prohibition of Electronic Cigarette Act (PECA), 2019 banned e-cigarettes in India – yet they continue to remain a major public health challenge in the country. (The safe amount of tobacco is zero, and 'cigarettes' usefulness in de-addiction has been questioned.) In one online survey completed by 840 adults, 22% reported having used e-cigarettes and 8% reported daily use.

Finally, the role of lobbying by the tobacco industry can't be understated.

Effective lobbying has led to the exemption of cess on bidis and smaller tobacco manufacturers to be continuously extended. It is public knowledge that government officials, both in-service and retired, engage with the tobacco industry. For example, a retired Indian counterintelligence officer joined the board of Godfrey Phillips as an independent director in 2022. Moreover, the Central government holds a 7.8% stake in ITC Ltd., India's largest tobacco company. India's score on the tobacco interference index – which calculates the degree of interference by the tobacco industry in governance – has also worsened since 2010.

Catching up with industry
COTPA, PECA, and NCTP provide a strong framework to successfully control tobacco production and use in India. But they need to be implemented more stringently. In addition, the tax on tobacco products also needs to be increased in line with the recommendations of the FCTC, inflation, and GDP growth.

With government support, it is also possible to help tobacco farmers switch to farming alternate crops, avoiding loss of livelihood, as shown by multiple studies conducted by the Central Tobacco Research Institute. In fact, for large-scale tobacco farmers, the net return per rupee of investment in lower cultivation (1.84) is higher than tobacco (0.48). There is also a need for up-to-date data to understand trends in tobacco use to tackle the tobacco industry, which modifies its sales strategies based on readily available sales trends. Without such data, we will always remain a step behind the industry, and effective tobacco control will remain nothing but a pipe dream.

Varun Raj Passi and Parth Sharma are public health researchers at the Association for Socially Applicable Research (ASAR).

THE GIST

After China, India has the world's highest number of tobacco consumers, with nearly 26 crore per an estimate in 2016-2017.

India is one of the 168 signatories of the WHO's Framework Convention on Tobacco Control (FCTC), launched in 2005. It aims to reduce tobacco usage worldwide by helping countries develop demand and supply reduction strategies.

With government support, it is possible to help tobacco farmers switch to farming alternate crops, avoiding loss of livelihood, as shown by multiple studies conducted by the Central Tobacco Research Institute. In fact, for large-scale tobacco farmers, the net return per rupee of investment in lower cultivation (1.84) is higher than tobacco (0.48).



SAURABH PANDEY
Editor-in-Chief
CSE

Tobacco consumption in india

- **After China, India has the world's highest number of tobacco consumers, with nearly 26 crore per an estimate in 2016-2017.**
- **India is one of the 168 signatories of the WHO's Framework Convention on Tobacco Control (FCTC), launched in 2005.**
- **It aims to reduce tobacco usage worldwide by helping countries develop demand and supply reduction strategies.**

- **With government support, it is possible to help tobacco farmers switch to farming alternate crops, avoiding loss of livelihood, as shown by multiple studies conducted by the Central Tobacco Research Institute.**
- **In fact, for large-scale tobacco farmers, the net return per rupee of investment in jowar cultivation (1.84) is higher than tobacco (1.48).**

Global AI chips revenue will grow 33% in 2024: Gartner



The Hindu Bureau
BENGALURU

Revenue from artificial intelligence (AI) semiconductors globally is expected to total \$71 billion in 2024, a rise of 33% from 2023, according to the latest forecast by Gartner Inc.

“Today, generative AI (GenAI) is fueling demand for high-performance AI chips in data centres,” said Alan Priestley, VP Analyst at Gartner. “In 2024, the value of AI accelerators used in servers, which offload data processing from microprocessors, will total \$21 billion, and increase to \$33 billion by 2028,” Mr. Priestley added.

Gartner forecasts AI PC shipments will reach 22%



‘Smarter’ computers: Gartner forecasts AI PC shipments will reach 22% of total PC shipments in 2024. REUTERS

of total PC shipments in 2024, and by the end of 2026, 100% of enterprise PC purchases will be an AI PC. AI PCs include a neural processing unit (NPU) enabling them to run longer, quieter and cooler and have AI tasks running continuously in the background, creating new op-

portunities for leveraging AI in everyday activities.

While AI semiconductor revenue would continue to experience double-digit growth through the forecast period, 2024 was expected to experience the highest growth rate during that period, Gartner predicted.

Artificial intelligence (AI) semiconductors

- **Revenue from artificial intelligence (AI) semiconductors globally is expected to total \$71 billion in 2024, a rise of 33% from 2023, according to the latest forecast by Gartner Inc.**
- **“Today, generative AI (GenAI) is fueling demand for high-performance AI chips in data centres.**

- **Gartner forecasts AI PC shipments will reach 22% of total PC shipments in 2024, and by the end of 2026, 100% of enterprise PC purchases will be an AI PC.**
- **AI PCs include a neural processing unit (NPU) enabling them to run longer, quieter and cooler and have AI tasks running continuously in the background, creating new opportunities for leveraging AI in everyday activities.**
- **While AI semiconductor revenue would continue to experience double-digit growth through the forecast period, 2024 was expected to experience the highest growth rate during that period.**

How will AI affect semiconductor design and production?

- **AI demands will have lasting impacts on semiconductor design and production. In large part, this is because the amount of data processed and stored by AI applications is massive.**
- **Semiconductor architectural improvements are needed to address data use in AI-integrated circuits.**
- **Improvements in semiconductor design for AI will be less about improving overall performance and more about speeding the movement of data in and out of memory with increased power and more efficient memory systems.**
-

- **One option is the design of chips for AI neural networks that perform like human brain synapses. Instead of sending constant signals, such chips would “fire” and send data only when needed.**
- **Nonvolatile memory may also see more use in AI-related semiconductor designs. Nonvolatile memory can hold saved data without power. Combining nonvolatile memory on chips with processing logic would make “system on a chip” processors possible, which could meet the demands of AI algorithms.**

- **While semiconductor design improvements are emerging to meet the data demands of AI applications, they pose potential production challenges.**
- **As a result of memory needs, AI chips today are quite large.**
- **With this large chip size, it is not economically easy for a chip vendor to make money while working on a specialized hardware. This is because it is very costly to manufacture a specialized AI chip for every application.**
- **A general-purpose AI platform would help address this challenge. System and chip vendors would still be able to augment the general-purpose platform with accelerators, sensors, and inputs/outputs**

PHNOM PENH

Cambodia to begin work on controversial canal in August: PM



AP

▲ Cambodia will start work on a \$1.7-billion canal linking the capital Phnom Penh to the sea in August, Prime Minister Hun Manet said on Thursday. The Chinese-backed Funan Techo canal has sparked fears in neighbouring Vietnam that it could be used by Chinese warships, and reduce Cambodian dependence on their ports. AFP

The Funan Techo canal



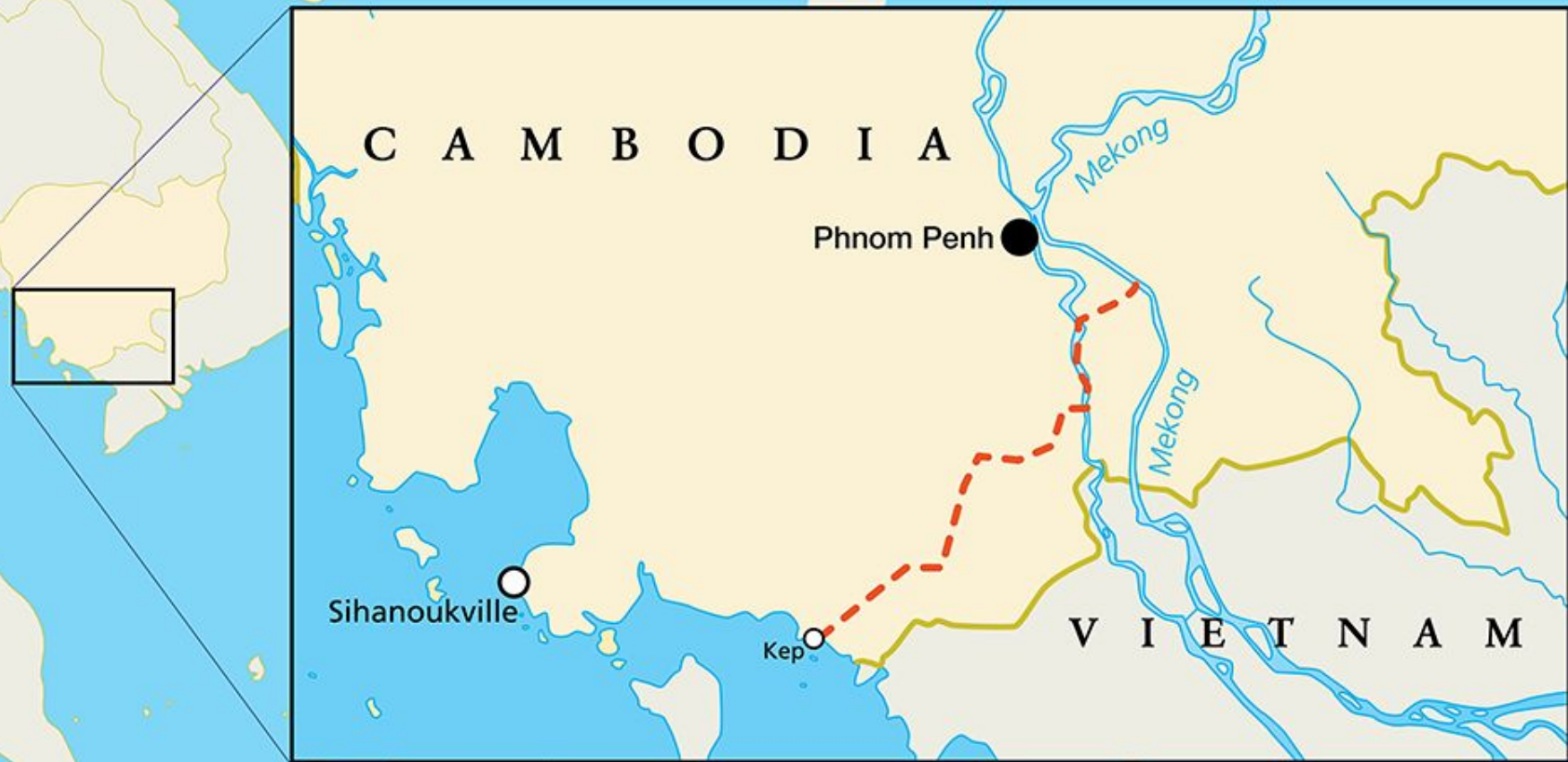
- **Cambodia's planned 180-kilometre Funan Techo Canal**, worth US\$1.7 billion, is funded by China as a part of the Belt and Road Initiative.
- This canal provides a waterway linking the capital Phnom Penh and the deep seaport in the coastal province Kep, ultimately opening onto the South China Sea.
- The Cambodian government hopes that this ambitious project may **foster economic development** by facilitating the transportation of goods and eco-tourism, along with an estimated **5 million jobs** to be created.
- Moreover, the Funan Techo waterway would **reduce Cambodia's dependence on Vietnam's seaport**, notably Cai Mep.



- The canal project may bring economic benefits to Cambodia, however, it has lead to mounting concerns within neighbouring Vietnam.
- **Water security** is a particular concern, with the canal is thought to act like a dam, altering the flow of the river and preventing water from reaching areas in the Mekong Delta in the south of Vietnam.

- The project also brings geopolitical anxiety for Vietnam.
- The canal thought to have “**dual-use**” potential – that is, promoting economic growth and domestic connectivity for Cambodia, but it could also facilitate China’s military presence in the country.
- The canal is said to connect the Ream naval base in Sihanoukville, recently refurbished with Chinese funding.
- two Chinese navy frigates docked at the base. Security concerns have been raised about **the ability of vessels to transit** the Funan Techo canal from the Gulf of Thailand

PROPOSED FUNAN TECHO CANAL



IR IN NEWS

- **Nigeria changes its national anthem, angering citizens irked over reforms**
- **Spain's Parliament gave the final green light to a controversial amnesty Bill for Catalan separatists paving the way for the return of their figurehead Carles Puigdemont.**
-

From deep down



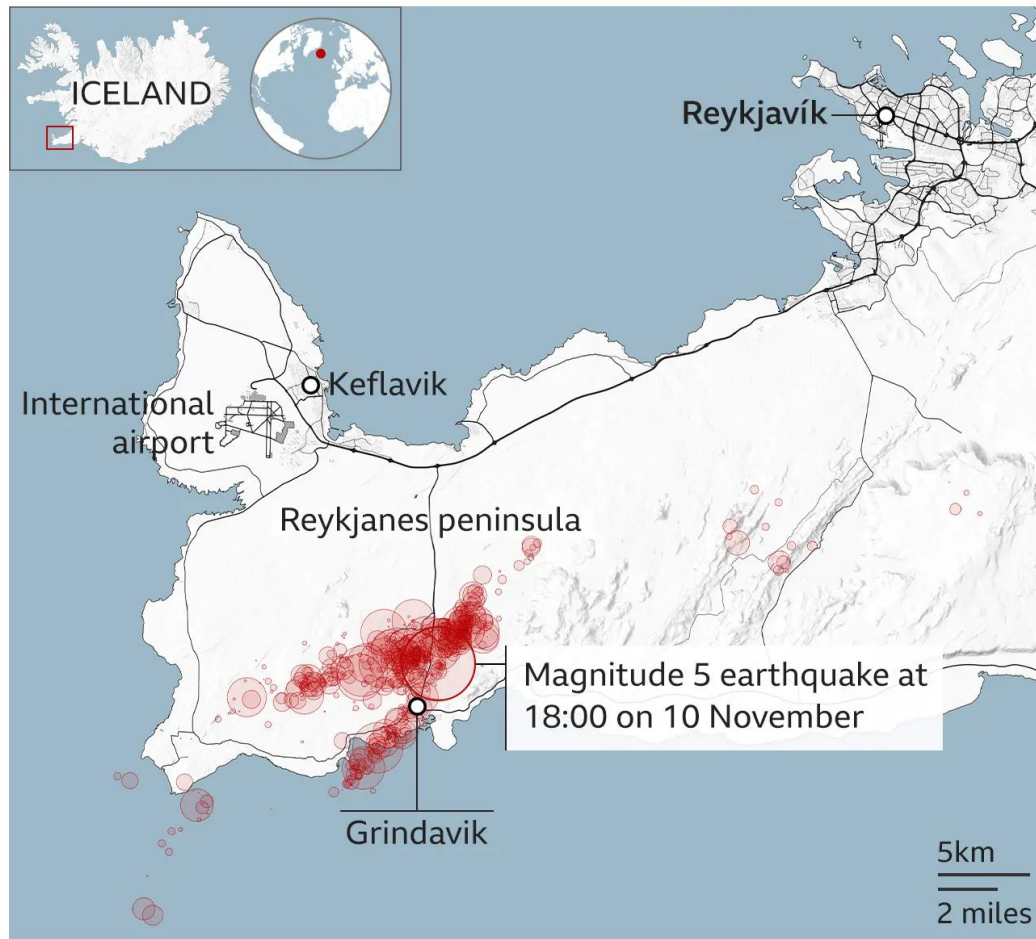
Smoke and lava: A handout picture released by the Icelandic Coast Guard shows billowing smoke and flowing lava pouring out of a new fissure, during a surveillance flight above a new volcanic eruption on the outskirts of the evacuated town of Grindavik, western Iceland. AFP

Blue Lagoon

- The Blue Lagoon is a **geothermal spa** in southwestern **Iceland**.
- The spa is located in a **lava field** 5 km (3.1 mi) from **Grindavík** and in front of Mount **Þorbjörn** on the **Reykjanes Peninsula**, in a location favourable for geothermal power, and is supplied by water used in the nearby **Svartsengi geothermal power station**.

- The lagoon is man-made. The water is a byproduct from the nearby **geothermal power** plant **Svartsengi** where **superheated water** is vented from the ground near a lava flow and used to run **turbines** that generate electricity.
- After going through the turbines, the steam and hot water pass through a **heat exchanger** to provide heat for a municipal **water heating** system. Then the water is fed into the lagoon.

Earthquake magnitude · 2 · 3 · 4 · 5



Source: Icelandic Meteorological Office (data from 20 Oct to 13 Nov)

Iceland's 'seismic swarm'

Over 2,000 quakes detected over the last 48 hours as volcanic eruption looms

As of Nov 13, 0830 GMT

