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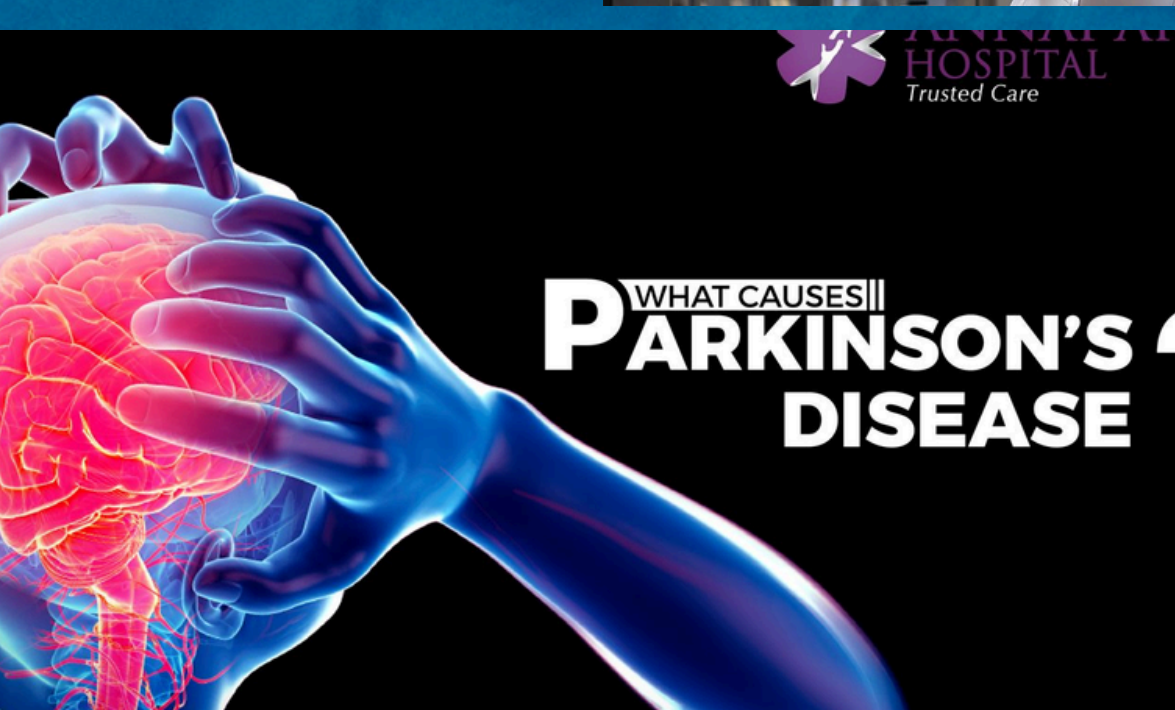
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Compilation

For civil
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UPSC CSE



By
**Saurabh
Pandey**
sir



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What is Fertile Crescent ??

- The Fertile Crescent is a crescent-shaped region in the Middle East, spanning modern-day Iraq, Israel, Jordan, Lebanon, Palestine, and Syria, together with northern Kuwait, south-eastern Turkey, and western Iran.
- Some authors also include Cyprus and northern Egypt.
- The Fertile Crescent is believed to be the very first region where settled farming emerged as people started the process of clearance and modification of natural vegetation to grow newly domesticated plants as crops.

- Early human civilizations such as Sumer in Mesopotamia flourished as a result.
- Technological advances in the region include the development of agriculture and the use of irrigation, of writing, the wheel, and glass, most emerging first in Mesopotamia.



Russia's invasion impaired scientists' ability to collect climate data

Scientists collecting data in the Arctic already face an uphill battle, with the unforgiving weather and scavenging polar bears. The bears sometimes accidentally destroy instruments. The lack of data because of the conflict is an additional, and exacerbating, variable. Without data results are irretrievably skewed and distorted

Rohini Subrahmanyam

Human activities have caused the earth to slowly heat up, and now it looks like war – another very human phenomenon – is preventing scientists from accurately measuring how rapidly our climate is changing.

Global temperatures are rising, but temperatures in the Arctic region are rising even faster. Studies suggest a grim reality: that the Arctic is warming nearly four-times faster than the rest of the world. The consequences of this go way beyond just the Arctic. The melting permafrost and rising sea-levels can have devastating effects on local ecosystems as well as the climate.

Collaborations have collapsed

Many research stations in the Arctic are part of the International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT). They continuously monitor environmental conditions in the different countries in the region. One country that makes up almost half of it is Russia, but since it invaded Ukraine, foreign scientists haven't had access to data from Russian field stations. Global collaborations with Russia have collapsed since the invasion, and scientists from outside Russia who were earlier able to travel to field sites in the country to collect data can't do so anymore. Climate projects that run on European funding also don't allow them to officially collaborate with Russian partners for now.

"We have to deal with this invisible wall, where there is no flow of data from the Russian side to our side. It is kind of like a blind spot," said Efrén López-Blanco, an Arctic researcher at Aarhus University in Denmark. "And I want to believe that it is a temporary blind spot."

Dr. López-Blanco and his colleagues recently reported that excluding data from Russia has heavily biased climate data. "When there is an increase in bias, there is a decrease in our ability to either describe or track Arctic changes," he said.

A hidden difference

The researchers used multiple earth-system models (ESMs) to understand ecosystem conditions across the Arctic region. They focused on eight "essential variables" of the Arctic ecosystem, including temperature, vegetation, precipitation, and snow depth. ESMs are fully coupled climate, land, and ocean computational models that can be used to generate data for the entire planet. Those used in the study



More than 1,000 billion tonnes of ice have been lost in the past four decades and not been accounted for, one study found. The INTERACT research stations in the Arctic are key to keeping track of such trends. OLIVER MORIN/AFP

were the same ones the U.N. Intergovernmental Panel on Climate Change uses to assess the world's changing climate.

First, the researchers wanted to use the models to find out if INTERACT stations in the Arctic, including the Russian ones, are able to potentially collect data representative of the pan-Arctic region. They examined 60 of the 94 INTERACT stations, including only those above 59 degrees N latitude. "Monitoring across the Arctic is not standardised," Dr. López-Blanco said. So he and his colleagues primarily used model-generated data.

When they compared all the INTERACT stations' data with the pan-Arctic data on the eight ecosystem variables, they realised there was already a difference in what INTERACT sites could estimate about the changes in the pan-Arctic region. These differences lead to a bias in the representation of ecosystem conditions in the Arctic.

Problem with excluding Russia

It so happens that INTERACT sites are located in warmer and wetter parts of the Arctic and regions with less biomass and soil carbon, which could be contributing to this bias.

Once the 17 Russian stations in Siberia were excluded, they found the differences – and thus the biases – increased further, and the ability to accurately describe changes in the Arctic decreased further.

Specifically, when the researchers used the ESMs to predict the state of ecosystem variables in 2100, they found current biases in the estimation of ecosystem



The Arctic is warming four-times faster than the rest of the world. The consequences of this go beyond just the Arctic. Melting permafrost and rising sea-levels can have devastating effects on ecosystems and the climate

variables after excluding Russian data showed a change similar to what is expected after 80 years of climate change.

Countering the bias

The result, Dr. López-Blanco said, is a decline in "our ability to inform management and conservation strategies and... our chances to properly mitigate the negative consequences of climate change."

With Russian data continuing to stay out of reach, Dr. López-Blanco suggested looking for other regions in the Arctic with similar environments to Siberia, such as parts of northern Scandinavia and Canada, and collecting data from there to partially counter the bias, "at least in the short term until the war is over."

"In the climate change research field, there is already a very good tendency to share data, as we are working together on something that affects us all," according to Dr. López-Blanco. "We still need more coordination between the stations, standardisation in terms of using similar sensors and methods, and more open-source data sharing. These elements

are key to gaining a better understanding of current Arctic conditions and preparing effectively for future changes."

'Already an uphill battle'

Hrishikesh Chandanpurkar, a fellow at the Centre for Sustainability, Environment, and Climate Change at FLAME University, Pune, and a World Bank consultant, said research stations should be as well distributed across a region as possible. Bearing in mind the spatial variability of the data and not just the logistical ease of setting up and maintaining the stations will help mitigate biases.

"Don't stop sharing critical scientific data" is also something that could be worked into the protocols of activities that are permitted to go on even during a war," Dr. Chandanpurkar said. "Each country is co-dependent on other countries because of the causes and the impacts of climate change. So it makes sense to have a system in place where we are safeguarding a continuous observation network and its sharing."

Scientists collecting data in the Arctic already face an uphill battle with the unforgiving weather and polar bears that sometimes accidentally destroy instruments. But lack of data because of war is an additional, and exacerbating, variable. "We people of science care about collecting our data, filling knowledge gaps, and understanding the ecosystem processes that we are interested in," Dr. López-Blanco said. What they quantified in the paper is "the collateral damage of something that is happening elsewhere".

(Rohini Subrahmanyam is a freelance journalist.)

THE GIST

Research stations in the Arctic are part of an Arctic monitoring network. One country that makes up almost half of it is Russia, but since it invaded Ukraine, foreign scientists haven't had access to data from Russian field stations. Global collaborations with Russia have collapsed

Lack of data from the Russian creates a 'blind spot'. Excluding data from Russia heavily biases climate data which 'decreases ability to either describe or track Arctic changes'

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war impact

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CACHE

How neuroscience reshapes marketing strategies in India

Neuroscience is increasingly applied in India to solve business challenges, such as understanding consumer behaviour; ethical considerations arise particularly concerning informed consent and transparency

M. Kalyanraman

Elon Musk's NI implant, introduced to facilitate operating devices by just intending it in the brain, has jolted many into realising how far seemingly exotic neuroscience has been put to practical, commercial use. While the implant may be the outlier in neuroscience, what's common and par for the course today is mapping the brain to understand and predict human responses with data and real insight. This is being used in India to solve business problems from why life insurance buyers typically stop paying premiums after the first two years to whether an online ad can be made to ensure the consumer hits the "buy" button.

Neuroscientific techniques provide a scientific or objective understanding of the brain-behaviour relationship, says Tanusree Dutta, faculty at IIM Ranchi. "Advertisements, product design, aesthetics, store layout, use of music, colour to attract attention, nudges and so on can all be tested with the use of neuroscientific tools to ensure their effectiveness before being launched," she adds.

Anil Pillai, CEO of Tarragni Consulting that specialises in neuroscience, says that questionnaire-based surveys have limitations since the responses are filtered and affected by cognitive biases. Neuromarketing says impressions and therefore decisions are made at the emotional, instinctive and unconscious levels of the human mind.

The Implicit Association Test would be a simple demonstration of plumbing the unconscious mind for deeply held beliefs and biases that may be filtered out by participants in a questionnaire-based survey. The rapid-fire type tests give little time for considered responses that can otherwise filter out biases.

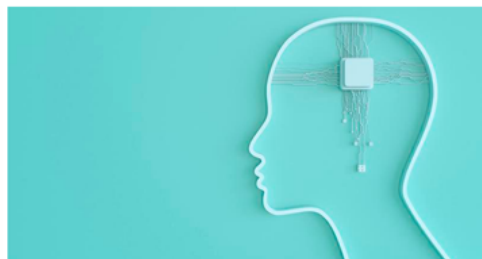
Neuroscience-based market research can give reliable hard data, says Mr. Pillai. Instead of questionnaires, neuroscience employs a range of instruments to directly get information on how the brain is being impacted and what decisions it will take.

Neuroscience had a breakthrough more than 15 years ago in the U.S. when Functional magnetic resonance imaging (fMRI) showed that ads evoking 9/11 attacks triggered fear among voters but the brain activity was different among Republican versus Democratic voters. Neuromarketing experts say that opinion polls in India can be more accurate and probe voter minds better in today's highly polarised, ideological politics by using the FACS (Facial Action Coding System). The fMRI would be prohibitively expensive in India, says Mr. Pillai.

Enabling devices

An enabler of neuroscience in India and across the world is the rapid strides in bio instruments, making some of them cheaper and easier to use. Today wearable watches can deliver much health information. The eyeball tracker, the classic neuroscience tool, is available on Amazon today, says Puneet Garg, co-founder, Story Prediction.

The typical neuromarketing tool is an adaptation of an instrument originally intended for medical diagnostics. They can be broadly divided into those that measure the electrical impulses of the brain and those that generate heat maps through other means. The former set



GETTY IMAGES

includes Electro Encephalo Gram (EEG), Quantitative Electro Encephalo Graphy (QEEG) and so on.

An eye tracking device helps to measure attention, attention span, and shift in attention. What catches the attention in the mind gets processed further. Eye trackers generate heat maps depending on where the eyeballs are focusing. Heatmaps for webpages, for instance, are otherwise generated by mouse movements. Mouse movements can, however, be also used for scrolling and not everyone paying attention to what interests them clicks there. Therefore such heatmaps can be inaccurate. With a jewellery video ad with a timestamp, eye trackers can tell precisely where the interest is going – the product, the model, the discount, or the Purchase button. With this feedback, the vendor can tweak the ad to ensure consumers are drawn towards hitting the purchase button more.

A thermal imaging camera helps to capture temperature changes when a person is interacting with any situation or stimulus. EEGs were intended to measure health parameters such as detecting brain tumour and whether the medicine to treat them is working or not. Wearable EEG senses 21 points in the brain such as pleasure point, fear point, pain point and so on. It measures brain waves, typically beta waves while filtering alpha, gamma and others.

The reptile brain is the seat of pleasure, fear and other emotions. Arousal here can be tracked by the EEG. If the EEG detects that the ad a person is watching has touched his or her pleasure point, then neuro marketers conclude that the ad has impacted the subconscious mind favourable to the product. Neuroscience tells us that such impacts influence decision making on buying a product.

Skin conductance measurement devices originally used in myography applications in physical therapy and sports training are applied in marketing to detect emotional arousal by gauging skin secretions.

Skin conductance devices are probably the least expensive but also the least efficient. Eyeball trackers are more efficient whereas EEGs can have efficiencies of up to 75%. The more sophisticated an instrument is, the more expensive it is. Experts can come up with optimum choices and sample sizes so that the confidence level of the results is above 95%. Sometimes a combination of devices is used.

The neuroscience scene in India features progressive digital companies including multinationals that use these

tools for their business decisions, market research consultants who specialise in the subject, and institutions such as the IITs and IIMs that provide research support. It's still a "rarefied" world featuring forward thinking businesses but with a bright future, says Mr. Pillai.

While neuromarketing may push the boundaries, cost is an issue. Devi Prasanna, AVP digital marketing at Loan Tap, says big companies that are large consumers of TV spots use neuromarketing in advertising. For others, there are a range of tools that offer similar or higher returns and are cheaper too. In the digital space, for instance, insights on ad effectiveness can be tracked by tools such as YouTube's brand lift surveys. While neuromarketing is a predictive model, today there are ads on Connected TVs that place QR codes with UTM to track who took an action, he adds.

The immediate application of neuroscience in India was in advertising and marketing although the problem there was that the application was after the fact and provided feedback for the future, says Mr. Garg. His company is developing an AI-based product that uses large language model (LLM) to predict whether an ad or even a film can be a hit by assessing the script for its power and potential to sustain emotional engagement with the viewer.

Mr. Pillai does acknowledge the cost factor. But he adds that the application of neuroscience is far wider than just advertising and marketing. It can help to solve tough business problems that require hard, highly reliable data and where the returns are substantial.

Indian consumer behaviour

While neuromarketing is several decades old in the west, in India, the activity has picked up in the last ten years, says Ms. Dutta. And in this time, neuroscience has revealed many facets of Indian consumer behaviour at their visceral level.

A study by the consultancy Final Mile that specialises in behavioural science showed that most fatalities of trespassers crossing railway tracks in Mumbai were that of young men, not old people or even women. Further, the fatalities were high in between stations, not at stations, and happened mostly during the day. The study concluded that this was a case of male bravado and that honking by train drivers didn't help. Further, the human mind typically estimates the speed of incoming large objects to be 40% less so the trespassers underestimated the dangers. The solution that Final Mile implemented with success included

posting photographs of the bodies of actual men who had died trespassing to push trespassers' fear buttons. The second part of the solution was that the honking by train drivers didn't consist of one long blast but two staccato sounds since the brain's awareness is known to be heightened during the silence between two musical notes. The third part was to put yellow paint on the ties of the tracks so that they would disappear quickly in the case of an incoming train and the brain would rapidly correct the error in gauging the speed of the train.

Ms. Dutta talks about how Indian consumers respond more to typically Indian themes in ads. Neuroscience has shown that an ad that shows the protagonist achieving something through *jugaad* resonates in India, for instance, she adds.

Mr. Pillai cites a business problem that his firm helped solve for a life insurance provider. It is now received wisdom that the Indian market is price sensitive, so the cheapest product will succeed if it's good enough. The average Indian consumer should then be a cold computer driven by money alone. But, Pillai says neuroscience surveys have shown that "friction" is often the driving factor in India.

Living in India is marked by procedures and systems that is needing much effort to understand and act upon. And at the end of it the intended outcome is not guaranteed.

Anyone who has attempted to navigate through the government provident fund system would testify to it.

Mr. Pillai talks about functional friction that matters more to the semi-urban and rural population due to higher ego depletion. Functional friction is the frictional barrier that prevents one from achieving the base objective they had embarked upon. In this particular case, the base objective is choosing an optimal insurance product, paying for it and acquiring it.

Customers looking for insurance with no external pressure to buy require higher sensitivity and empathy from insurance providers due to the heightened physical, cognitive, and time friction they face. "There is an emerging, young and aspirational segment in Tier 2/3 that has Tier 1 as their benchmark. These customers seek similar levels of service and sophistication from insurance providers, necessitating tailored solutions to meet their expectations. What's often the case in India is that family members, co-beneficiaries, and particularly women of the house play a significant role in decision-making within Tier 2/3," Mr. Pillai says, adding that all these insights come from high component of neuroscience based non-conscious validated by other methods like depth conversations and data.

Ethical concerns

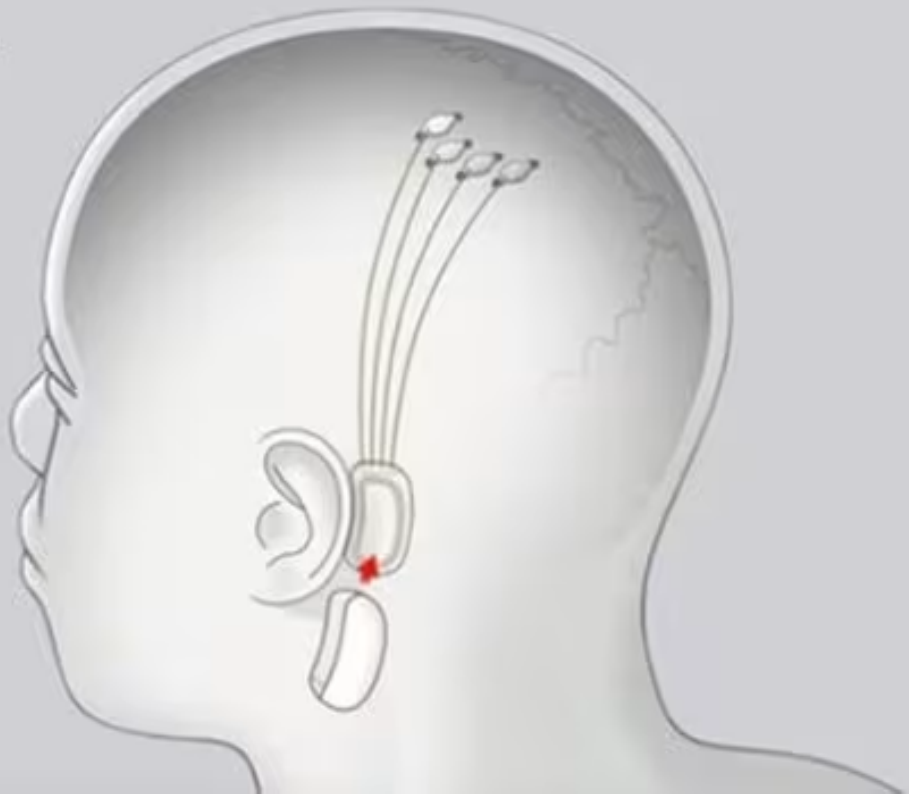
Meanwhile, Mr. Musk's Neuralink has indeed drawn up scary scenarios on neuroscience applications. Mr. Garg raises concerns about the possible misuse of Neuralink data to manipulate consumer responses. Some wonder if the implants would make the implanted susceptible to suggestions from outside. Less exotic, more mundane applications of neuroscience have raised some concerns too. Besides these, the surveys are under the scanner. The Neuromarketing Science and Business Association (NMSBA) has introduced the first neuromarketing code of ethics. It covers areas such as privacy, consent and transparency. The Advertising Standards Council of India, replying to an email, said they have issued no guidelines on neuromarketing. The key issue is informed consent of survey participants – whether they are aware of all the implications of their participation and whether they are being exploited. Using young people below 18 years as survey participants adds another layer of concern. The informed consent of their parent or guardian would be needed, notes NMSBA.



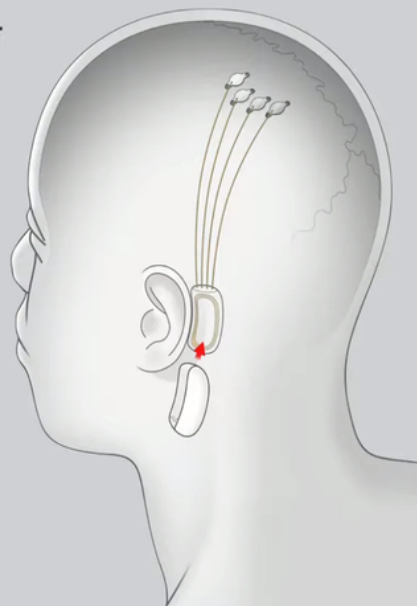
N1 IMPLANT

- Elon Musk's N1 implant, introduced to facilitate operating devices by just intending it in the brain, has jolted many into realising how far seemingly exotic neuroscience has been put to practical, commercial use.
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N1 IMPLANT



N1 IMPLANT



The hindu analysis by saurabh
pandey sir

Philippines leader orders boost to maritime security as China tension rises

Reuters
MANILA

Philippine President Ferdinand Marcos Jr. has ordered his government to strengthen its coordination on maritime security to confront "a range of serious challenges" to territorial integrity and peace, as a dispute with China escalates.

The order, signed on Monday and made public on Sunday, does not mention China but follows a series of bilateral maritime confrontations and mutual accusations over a disputed area of the South China Sea.

China's Ministry of Foreign Affairs did not respond to a Reuters request for comment on Sunday.

Beijing claims almost all of the South China Sea, a conduit for more than \$3 trillion of annual ship-borne commerce.

China's claims overlap those of the Philippines, Vietnam, Indonesia, Malaysia and Brunei.

The Permanent Court of Arbitration in 2016 said China's claims had no legal basis.

Latest flare-up

The latest flare-up occurred last weekend, when China used water cannon to disrupt a Philippine resupply mission to the Second Thomas Shoal for soldiers guarding a warship intentionally grounded on a reef 25 years ago.

"Despite efforts to promote stability and security in our maritime domain, the Philippines continues to confront a range of serious challenges that threaten

The order comes in the wake of a series of confrontations and accusations over a disputed area of the South China Sea

territorial integrity, but also the peaceful existence of Filipinos," Mr. Marcos said in the order.

The President vowed on Thursday to implement countermeasures against "illegal, coercive, aggressive and dangerous attacks" by China's coastguard.

Expanding team

His order expands and reorganises the government's maritime council, adding the national security adviser, solicitor general, National Intelligence Coordinating Agency chief and the South China Sea task force.

The order appears to expand the role of the military by naming the Armed Forces of the Philippines, not just the navy, among the agencies supporting the council.

The renamed National Maritime Council will be the central body to formulate strategies to ensure a "unified, coordinated and effective" framework for the Philippines' maritime security and domain awareness.

Mr. Marcos increased the number of agencies supporting the council to 13 from nine, including the space agency and the University of the Philippines' Institute for Maritime Affairs and the Law of the Sea.





Disputed claims in the South China Sea

Claims

- China
- Philippines
- Malaysia
- Brunei
- Vietnam



Area:

South China Sea covers more than 3 million sq km

Trade:

Over \$5 trillion in ship-borne trade passes through the sea annually

Oil and gas:

Major unexploited oil and gas deposits are believed to lie under the seabed





The hindu analysis by saurabh
pandey sir

Congress 'callously' gave away Katchatheevu to Sri Lanka: PM

The Hindu Bureau
NEW DELHI/COIMBATORE

Prime Minister Narendra Modi on Sunday came down heavily on the Congress over the ceding of Katchatheevu island to Sri Lanka in 1974 by the then-Indira Gandhi government, an issue that has gained prominence during the Lok Sabha election.

He cited a news report and posted on X: "Eye-opening and startling! New facts reveal how Congress callously gave away Katchatheevu...." He added that "weakening India's unity, integrity, and interests has been Congress's way of

working for 75 years and counting". The news report was based on replies received under a Right to Information (RTI) query filed by BJP Tamil Nadu chief K. Annamalai, on the ceding of the island situated in the Palk Strait to Sri Lanka by India in 1974.

The RTI replies give details over the conflicting claims on the island, with Sri Lanka (then-Ceylon) pressing its claims soon after Independence, as detailed in the news report, with the Opposition even during Prime Minister Jawaharlal Nehru's time questioning the Government of India for being in-



Pilgrims from Sri Lanka and India leave Katchatheevu island after the festival of St. Anthony's Church on in March 2023. L. BALACHANDAR

clined to cede the territory.

After agreeing to cede the island to Sri Lanka in 1974, Indira Gandhi informed then-Tamil Nadu

Chief Minister and late Dravida Munnetra Kazhagam leader M. Karunanidhi. The Congress and the DMK are in alliance in Tamil Na-

du for the election. The narrative around the island is not new, with Mr. Modi raising the issue in August last year during a debate on a no-trust motion brought against his government in the Lok Sabha. At that time too, Mr. Modi had pointed out that "those attacking" his government on various issues needed to be questioned on Katchatheevu island and the circumstances under which it had been ceded. The remarks by the Prime Minister on Sunday underscored his attack on the Congress on the question of the integrity of India's sovereign claims, as well as his elec-

toral push towards South India, especially Tamil Nadu.

'Retrieve island'

Speaking near Palladam, Mr. Annamalai said the Tamil Nadu BJP was determined to retrieve Katchatheevu from Sri Lanka. He said it was the only way to have a permanent solution to the problems faced by fishermen in the State. He said the Tamil Nadu BJP had submitted this demand to External Affairs Minister S. Jaishankar about a year ago.

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Katchatheevu

ISLAND DISPUTE

When did Katchatheevu become a part of Sri Lanka?

- During June 26th, 1974, the then Prime Ministers of India and Sri Lanka, Indira Gandhi and Sirim R.D. Bandaranaike, signed an agreement to demarcate the boundary between the two countries in the historic waters from Palk Strait to Adam's Bridge.

How important is Kachatheevu?

- Fisherfolk of the two countries have been traditionally using the islet for fishing.
- Though this feature was acknowledged in the 1974 agreement, the supplemental pact in March 1976 made it clear that fishermen of the two countries “shall not engage” in fishing in the historic waters, territorial sea and exclusive zone or exclusive economic zone of either of the countries “without the express permission of Sri Lanka or India.”
- While certain sections of political parties and fisherfolk in Tamil Nadu believe that the retrieval of Katchatheevu would resolve the problem of fishermen having to illegally cross the International Maritime Boundary Line.



•
” What triggered the negotiations between India and Sri Lanka?

- Sri Lanka claimed sovereignty over Kachatheevu on the ground that the Portuguese who had occupied the island during 1505-1658 CE had exercised jurisdiction over the islet.
- India’s contention was that the erstwhile Raja of Ramnad [Ramanathapuram] had possession of it as part of his zamin

Team led by PRL Ahmedabad finds ozone on Jupiter's moon

Scientists are currently studying various celestial bodies in the solar system that show signs of ozone, suggesting the existence of stable atmospheric conditions and, by extension, the possibility of them being able to host life

Tejari Garang

An international team of scientists, including from India, has discovered strong evidence indicating the presence of ozone on Jupiter's moon, Callisto, shedding light on the complex chemical processes taking place on icy celestial bodies in the solar system.

The study was published in the March 2024 issue of the journal *Nature*. It outlines the researchers' investigation into the chemical evolution of 'SO₂ astrochemical ice', which is ice primarily composed of sulphur dioxide (SO₂) in the presence of ultraviolet irradiation.

This shed light on the chemical processes and composition of the surface of Callisto. By analysing the data of the UV absorption spectra of the irradiated ice samples, the team was able to identify a distinct signature indicating the formation of ozone.

They corroborated their findings by comparing them with data from the Hubble Space Telescope to understand Callisto's environment and the potential habitability of icy moons in the Solar system.

The importance of ozone

The earth has life not just because it found a way to originate here, it also has the resources to thrive, evolve, and diversify. These resources include sunlight containing the "right" frequencies of radiation, water, a stable atmosphere providing a stable supply of the requisite gases at the right temperature, and various compounds required for the life-forms' biochemical processes.

This said, not all emissions from the sun are good for organisms on earth. Ultraviolet radiation in particular is harmful to many species but also useful to some others. Two of its components, called ultraviolet-B and ultraviolet-C, of wavelengths 290-320 nanometres and 100-280 nanometres respectively, can damage DNA, trigger mutations, and increase the risk of skin cancer and cataracts in humans.

Ultraviolet light has also been known to inhibit plant growth and have detrimental effects on various organisms. This is why the ozone layer is a crucial part of the earth's atmosphere: it completely absorbs ultraviolet-B and ultraviolet-C radiation.

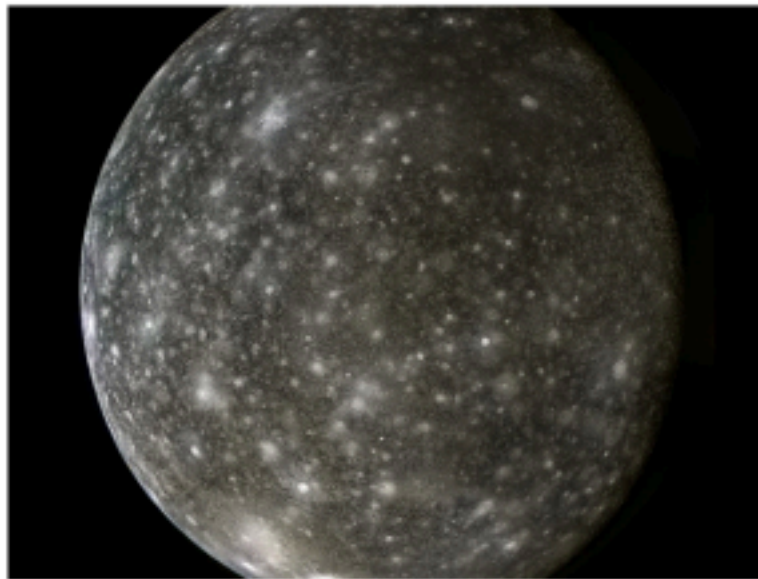
The ozone molecule is composed of three oxygen atoms bonded together. The ozone layer, found in the lower part of the earth's stratosphere, around 15-35 km above ground, serves as a shield. Without the ozone layer, ultraviolet radiation levels would be much higher on the planet's surface, rendering it uninhabitable for many species and disrupting entire ecosystems.

Scientists are currently studying various celestial bodies in the solar system that show signs of ozone, suggesting the existence of stable atmospheric conditions and, by extension, the possibility of them being able to host life.

Callisto and its unique environment

After Saturn, Jupiter has the most moons in the Solar System. Callisto is one of Jupiter's largest moons and the third-largest moon in the Solar System after Ganymede and Titan.

Callisto, despite its impressive size, is



The surface of Callisto imaged in approximately true colour by the Voyager 2 spacecraft in July 1979.

distinguished by its composition. Despite being as big as the planet Mercury, it has less than half as much mass. Callisto is primarily composed of water ice, rocky materials, sulphur dioxide, and some organic compounds. These substances make the moon a potential candidate for supporting life in the solar system beyond the earth.

Callisto's surface is heavily cratered, indicating a long history of being struck by asteroids and comets. It may have the oldest surface in the solar system, in fact. It also lacks the extensive seismic activity seen on some of Jupiter's other moons, such as Io and Europa.

The presence of relatively few geological features suggests Callisto's surface is geologically inactive. In other words, its surface has likely been relatively stable for a long time. This stability could be vital to preserve any subsurface ocean or potential habitats beneath the icy crust.

The detection of sulphur dioxide on Callisto's surface has encouraged this team of scientists to conduct spectroscopic observations to gain a better understanding of the moon's surface composition and formation.

Recreating conditions on the earth

Scientists led by R. Rameshchandra, of the Atomic, Molecular, and Optical Physics Division, Physical Research Laboratory, Ahmedabad, set out to investigate the chemical evolution of sulphur dioxide ice under irradiation, leading to the formation of ozone.

Scientists have previously demonstrated this process in laboratory experiments. The current team's aim was to recreate the conditions required for this process on the surface of Callisto when sunlight hits its surface. To do this, the researchers used vacuum ultraviolet



The ozone molecule is composed of three oxygen atoms bonded together. The ozone layer, found in the lower part of the earth's stratosphere, around 15-35 km above ground, serves as a shield against ultraviolet radiation

photons, which mimic the solar radiation that reaches the moon's surface.

The experiments were conducted at the National Synchrotron Radiation Research Centre (NSRRC) in Taiwan, which provided access to high-energy radiation sources required to recreate the radiation coming from the Sun.

To model the surface of Callisto, the researchers placed a substrate of lithium fluoride in a chamber with very low pressure. This environment recreated conditions similar to those found in outer space. The sulphur dioxide ice samples were deposited onto the substrate, setting the stage for the final step: observing the absorption spectrum.

The absorption spectrum is the unique fingerprint of a substance. It shows the wavelengths of light it absorbs, providing insights into its composition and properties.

The team carefully controlled the temperature of the sulphur dioxide ice samples throughout the experiment.

The samples were initially kept at a low temperature of around 9 K (-264.25 degrees C), in line with the conditions on Callisto's surface. Then they slowly warmed it up to 120 K to resemble different environmental scenarios.

In this process, they irradiated the ice with vacuum-ultraviolet photons (of wavelength 137.7 nanometres) and

recorded its ultraviolet absorption spectrum during and after the irradiation using a photomultiplier tube detector. This device measures low levels of electromagnetic radiation by converting photons into electrical signals.

Ozone and potential habitability

The ultraviolet absorption spectrum revealed the formation of ozone after the sulphur dioxide ice samples were irradiated. This was evidenced by a distinct signature in the absorption spectrum.

The researchers also compared their experimental data with data collected by the Hubble Space Telescope, which had also suggested the presence of sulphur dioxide and ozone on the surface of Callisto in 1997.

The discovery of ozone on Callisto suggests the presence of oxygen, which in turn is a fundamental ingredient required for the formation of complex molecules required for life (as we know it), such as amino acids, raising questions about the moon's habitability. This extends to other icy moons in our solar system, potentially informing our understanding of habitable conditions beyond Earth.

In addition to the ozone, the researchers observed an unidentified band in the absorption spectrum - similar to that observed on Ganymede in 1996 - hinting at a common molecular source in their surface composition or chemical processes.

This finding could provide valuable insights into geological and atmospheric processes on these moons. In particular, it could help us to understand the precise mechanisms that led to the formation of Jupiter and its moons, which remain topics of active research.

(Tejari Garang is a freelance science writer and journalist.)

The hindu analysis by
saurabh pandey sir



Ozone in Jupiter moon

An international team of scientists,

including from India, has discovered strong evidence indicating the presence of ozone on Jupiter's moon, Callisto, shedding light on the complex chemical processes taking place on icy celestial bodies in the Solar System.

researchers' investigation into the chemical evolution of 'SO₂ astrochemical ice', which is ice primarily composed of sulphur dioxide (SO₂) in the presence of ultraviolet irradiation.

This shed light on the chemical processes and composition of the surface of Callisto.





.The importance of ozone

The earth has life not just because it found a way to originate here; it also has the resources to thrive, evolve, and diversify.

These resources include sunlight containing the “right” frequencies of radiation, water, a stable atmosphere providing a stable supply of the requisite gases at the right temperature, and various compounds required for the life forms’ biochemical processes.

This said, not all emissions from the sun are good for organisms on earth.

Ultraviolet radiation in particular is harmful to many species (but also useful to some others).





.Two of its components, called ultraviolet-B and ultraviolet-C, of wavelengths 290–320 nanometres and 100-280 nanometres respectively, can damage DNA, trigger mutations, and increase the risk of skin cancer and cataracts in humans.

Ultraviolet light has also been known to inhibit plant growth and have detrimental effects on various organisms.

This is why the ozone layer is a crucial part of the earth's atmosphere: it completely absorbs ultraviolet-B and ultraviolet-C radiation.

The ozone molecule is composed of three oxygen atoms bonded together.





The ozone layer, found in the lower part of the earth's stratosphere, around 15–35 km above ground, serves as a shield.

Without the ozone layer, ultraviolet radiation levels would be much higher on the planet's surface, rendering it uninhabitable for many species and disrupting entire ecosystems

Callisto and its unique environment

After Saturn, Jupiter has the most moons in the Solar System. Callisto is one of Jupiter's largest moons and the third-largest moon in the Solar System after Ganymede and Titan





Callisto, despite its impressive size, is distinguished by its composition.

Despite being as big as the planet Mercury, it has less than half as much mass.

Callisto is primarily composed of water ice, rocky materials, sulphur dioxide, and some organic compounds.

These substances make the moon a potential candidate for supporting life in the solar system beyond the earth. Callisto's surface is heavily cratered, indicating a long history of being struck by asteroids and comets. It also lacks the extensive seismic activity seen on some of Jupiter's other moons, such as Io and Europa.





The presence of relatively few geological features suggests Callisto's surface is geologically inactive. In other words, its surface has likely been relatively stable for a long time.

This stability could be vital to preserve any subsurface ocean or potential habitats beneath the icy crust.



Sonam Wangchuk's hunger strike in Leh calls for Ladakh's Statehood and inclusion in the Sixth Schedule of the Indian Constitution to empower locals in decision-making, following the reorganisation of Jammu and Kashmir into separate Union Territories in 2019. In August 2019, the State of Jammu and Kashmir was split into two UTs: Jammu and Kashmir and Ladakh.

It ended people's exclusive rights to land and jobs. Under the Jammu and Kashmir Reorganisation Act, 2019, Ladakh became a UT without a legislature.



**The hindu analysis by saurabh
pandey sir**



People viewpoints

“Our UT is administered by a Lieutenant Governor, who is not a Ladakh resident, and

yet is appointed to take decisions for our future,”

Several bureaucrats in key positions, influencing decisions for the region’s future, were also not residents of Ladakh, Sajjad Kargili,

What are the pressures on local resources?

According to recent data from the Ministry of Tourism, Ladakh is witnessing a high influx of domestic tourists.

Rapid urbanisation and increasing tourist footfall are exerting significant pressure on resources in Ladakh, particularly water.



The hindu analysis by saurabh
pandey sir



A study published in 2020 estimated that Ladakh has 192 glacial lakes. Several research articles also state that due to increasing temperature caused by global

warming, the number and sizes of glacial lakes in the Himalaya are increasing, and glaciers are shrinking.

This trend has increased the threat of possible GLOFs in Ladakh, especially from proglacial lakes that are formed at the edge of glaciers.

“The increased temperatures are also resulting in permafrost degradation and are causing mud flows in Ladakh,



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pandey sir**



Despite the challenges posed by climate change, mining and renewable energy companies are eyeing Ladakh, and

tourism-related activities are on a rise. With significant tourist influx, pollutants from vehicular traffic (like black carbon) will settle on snow and ice and expedite melting.



**The hindu analysis by saurabh
pandey sir**

What is Havana Syndrome? The mysterious illness is also sometimes referred to as "Anomalous Health Incidents" (AHI) by U.S. officials.

Symptoms include extreme headaches, dizziness, nausea and ear pain.

Two major National Institutes of Health studies published last month found no evidence of brain injury among patients believed to have Havana Syndrome.



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David Relman, a Stanford University scientist who's led previous research into the condition, took issue with the findings in an accompanying editorial,

noting they contradict some earlier studies.

Where has Havana Syndrome been reported?

The ailment was dubbed "Havana syndrome" after reports of American officials falling ill were first documented at the U.S. Embassy in Cuba in 2016.



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pandey sir



What causes it?

There are a few theories.

A 2020 National Academies of Sciences, Engineering, and Medicine report

proposed that the neurological symptoms could be the result of a radio frequency energy of radiation that includes microwaves.

Some lawmakers have also suggested the cases are a result of directed energy attacks.



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PMLA

1988, held the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances.

All countries were urged to take urgent steps to prevent the laundering of the proceeds of drug crimes and other connected activities.

Subsequent to this, seven major industrial

nations held a summit in Paris (July 1989) and established the Financial Action Task Force (FATF) to examine the problem of money laundering and recommend measures to tackle this menace.

Thereafter, in 1990, the United Nations General Assembly adopted a resolution, namely, the Political Declaration and Global Programme of Action which called upon all member-countries to enact suitable pieces of legislation to effectively prevent the laundering of drug money.



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In pursuance of this resolution of the UN General Assembly, the Government of India used the recommendations of the FATF to formulate a legislation to prevent drug money laundering. As drug

trafficking is a trans-border operation, the UN held a special session on June 10, 1998 on the theme ‘Countering World Drug Problem Together’ and made another declaration on the urgent need to combat money laundering. Accordingly, the Indian Parliament enacted the Prevention of Money Laundering Act in 2002. But it was brought into force in 2005.

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The PMLA’s enactment Further, the PMLA was enacted by India’s Parliament under Article 253 which empowers it to make laws for implementing the international conventions.

This Article indicates that a law Parliament makes to implement any decision of an international body will be confined to the subject matter of that decision.

Item 13 in the Union list of the Seventh Schedule of the Constitution is specific on this point.

Thus, the law on money laundering enacted under Article 253 and Item 13 of the Union list in the context of the UN resolution referred to above can only be on drug money.



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Various amendments made in this Act at different times bloated the schedule which now contains such offences which are either ordinary offences listed in the IPC or for which there are special laws in force.

Since money laundering as an offence is linked to one of the scheduled offences, the offences contained in the schedule become the starting point of the whole process of operationalisation of the PMLA.



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pandey sir**



One such example is the Prevention of Corruption Act, 1988 which is aimed at curbing corruption among public servants. This Act was added to the schedule of offences in 2009.

The PMLA now applies with all its rigour to public servants.

Thus, a public servant charged with corruption

and a hard-core drug trafficker are treated alike. A fundamental principle of Anglo-Saxon jurisprudence is that a person is presumed innocent until proven guilty. PMLA turns this principle upside down.

An accused will be denied bail by the entire hierarchy of courts because the bail provision contained in section 45 of the PMLA says that a judge can give bail only when he is satisfied that the accused is innocent.

Which judge will take such a risk? So the person will rot in jail for years together without trial.



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pandey sir



The judicial perspective on bail was laid out by Justice V.R. Krishna Iyer back in 1978 under the following words in Gudikanti Narasimhulu And Ors vs Public Prosecutor, High Court Of Andhra: “Personal liberty, deprived when bail is refused, is too precious a value of our constitutional

system recognised under Article 21 that the curial power to negate it is a great trust exercisable, not casually but judicially, with lively concern for the cost to the individual and the community”.



**The hindu analysis by saurabh
pandey sir**





AI APPLICATION IN ELECTION

AI can play a far wider role in elections than just disseminating disinformation. It can be used in the entire spectrum of campaign strategies, from the preliminary steps of voter identification to the intricate details of content development and delivery.

With real-time analytics on campaign performances, AI is raising the bar for political campaigns with its data-driven and effective micro-targeting strategy.

The political landscape is changing quickly due to GenAI technology, which presents both the potential and challenges for the 2024 elections.

The United States government has outlawed robocalls using AI-generated voices in its response to the Biden robocall incident.

Technology behemoths including Microsoft, Google, OpenAI, and Meta have vowed to combat AI content that aims to deceive voters

**The hindu analysis by saurabh
pandey sir**



election-related generated contents may shape last-minute attempts to deter voters from exercising their right to vote or create an event with a manufactured portrayal of a candidate that is challenging to swiftly debunk.



Q "Heat waves has multidimensional impact therefore solution demands multipronged strategy" Discuss

प्रश्न "गर्मी की लहरों का बहुआयामी प्रभाव होता है इसलिए समाधान बहुआयामी रणनीति की मांग करता है" चर्चा करें



**The hindu analysis by
saurabh pandey sir**

Is the Katchatheevu islet disputed?

How has the Katchatheevu issue been used by political parties in Tamil Nadu, especially during election seasons? What historical events led to the transfer of Katchatheevu from India to Sri Lanka? What has been the stance of the Union government regarding the issue, and how has it evolved over time?

EXPLAINER

T. Ramakrishnan

The story so far:

Prime Minister Narendra Modi on March 31 raised again the controversial matter of Katchatheevu, a few weeks ahead of the Lok Sabha poll in Tamil Nadu. Citing a report and posting it on X, he said: "New facts reveal how Congress callously gave away Katchatheevu...." Subsequently, the State BJP and the AIADMK sharpened their attacks on the DMK and the Congress. The matter comes back to the fore as political parties use it to attack their adversaries. On March 16, Tamil Nadu Chief Minister and DMK chief M.K. Stalin contended that Katchatheevu was ceded to Sri Lanka despite strong protests by the DMK. He asked the Prime Minister what steps were taken by the latter to retrieve the islet. About one-and-a-half months ago, Katchatheevu was in the limelight as, in late, February, fishermen associations in Ramanathapuram district boycotted the annual two-day festival, as a mark of protest against the Sri Lankan government's continuing arrests of Indian fishermen on charges of poaching.

When did Katchatheevu become a part of Sri Lanka?

During the year 1974, the then Prime Ministers of India and Sri Lanka, Indira Gandhi and Sirima R.D. Bandaranaike, signed an agreement to demarcate the boundary between the two countries in the historic waters from Palk Strait to Adam's Bridge.

A joint statement issued on June 26 and 28, 1974, stated that a boundary had been defined "in conformity with the historical evidence, legal international principles and precedents."

It also pointed out that "this boundary falls one mile off the west coast of the uninhabited" Katchatheevu.

The pact brought to a close the talks held between the two sides since October 1921. Initially, the negotiations were held



Echoes of history: A view of Katchatheevu in Sri Lanka.

between the governments of the then Madras and Ceylon.

How important has been Katchatheevu to the fisherfolk?

Fisherfolk of the two countries have been traditionally using the islet for fishing. Though this feature was acknowledged in the 1974 agreement, the supplemental pact in March 1976 made it clear that fishing vessels and fishermen of the two countries "shall not engage" in fishing in the historic waters, territorial sea and exclusive zone or exclusive economic zone of either of the countries "without the express permission of Sri Lanka or India."

St. Anthony's Church there holds an annual festival drawing devotees from both sides of the Palk Bay, a tradition which has been going on.

What triggered the negotiations between India and Sri Lanka?

Sri Lanka claimed sovereignty over Katchatheevu on the ground that the Portuguese who had occupied the island during 1505-1658 CE had exercised jurisdiction over the islet. India's contention was that the erstwhile Raja of Ramnad (Ramanathapuram) had possession of it as part of his zamin. According to a news article published by

The Hindu on March 6, 1968, which was based on the interview of the erstwhile Raja Ramanatha Sethupathi, Katchatheevu was under the jurisdiction of the zamin "from time immemorial" and it was the "last post" of the Ramnad estate. He added that the zamin had been collecting taxes till 1947 when it was taken over by the State government following the Zamindari Abolition Act. However, replying to the debate on the matter in Lok Sabha in July 1974, the then External Affairs Minister Swaran Singh asserted that the decision had been taken after "exhaustive research of historical and other records" on the islet.

How was the 1974 agreement received?

The present demand for the Katchatheevu retrieval traces its origin to the opposition that the pact generated in 1974. During the debates in both Houses of Parliament in July 1974, most of the Opposition including the DMK, AIADMK, Jan Sangh, Swatantra and the Socialist Party, staged walkouts in the two Houses. Former Prime Minister Atal Bihari Vajpayee, who was Jan Sangh's leader, had contended that the decision to transfer the islet had been taken "behind the back" of the people and the Parliament. He was supported by Madhu

Limaye, a veteran socialist leader. The then Chief Minister M. Karunanidhi, even in 1973 when the talk of the islet transfer had been doing rounds, had urged Indira Gandhi that the popular feeling was in favour of retaining Katchatheevu which "belonged to India and not to Tamil Nadu alone," according to a report published by *The Hindu* on October 17, 1973. Three months later, he wrote a letter reiterating the stand, a copy of which was released a day after the 1974 agreement was signed. M. G. Ramachandran, founder of the AIADMK, which was a fledgling party then, had criticised Mr. Karunanidhi for "his failure to guide the Centre properly" on the issue and sought his resignation.

When did the issue get a fresh lease of life?

After remaining low nearly for over 15 years, the Katchatheevu issue was revived in August 1991 with the then Chief Minister Jayalalithaa demanding retrieval during her Independence day address. She later modified her demand to one of getting back the islet through "a lease in perpetuity." The Tamil Nadu Assembly had witnessed a number of debates on the matter. In the last 15 years, both Ms. Jayalalithaa and Mr. Karunanidhi approached the Supreme Court on the matter.

What has been the stand of the Union government on the issue?

In August 2013, the Union government told the Supreme Court that the question of retrieval of Katchatheevu from Sri Lanka did not arise as no territory belonging to India was ceded to Sri Lanka. It contended that the islet was a matter of dispute between British India and Ceylon (now Sri Lanka) and there was no agreed boundary, a matter which was settled through 1974 and 1976 agreements. In December 2022, the Union government, while referring to the two agreements, pointed out in its reply in the Rajya Sabha that Katchatheevu "lies on the Sri Lankan side of the India-Sri Lanka International Maritime Boundary Line." It added that the matter was *sub judice* in the Supreme Court.

THE GIST

Prime Minister Narendra Modi brought up the controversial matter of Katchatheevu ahead of the Lok Sabha elections in Tamil Nadu, accusing the Congress of giving it away.

In 1974, Prime Ministers Indira Gandhi and Sirima R.D. Bandaranaike signed an agreement defining the boundary between India and Sri Lanka, placing Katchatheevu under Sri Lankan control. This ended negotiations dating back to 1921.

Fishermen from both countries traditionally used Katchatheevu for fishing, though a 1976 pact restricted fishing in the area without express permission.



The hindu analysis by
saurabh pandey sir



Katchatheevu

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Will India experience more heat wave days this summer?

How does the IMD forecast heat wave days across different regions of India? What factors contribute to India's struggle to meet power demand, and how does this relate to falling hydroelectricity output?

Priyali Prakash

The story so far:

The India Meteorological Department (IMD) on Monday announced above-average heat wave days for India, impacting southern, central, east, and northwestern regions. The announcement comes even as India is already struggling to keep up with its power demand. A *Reuters* analysis reported that India's hydroelectricity output fell at the steepest pace in at least 38 years. Hydroelectric output will remain low in the coming months, leading to a greater dependence on coal at a time when India has, in its Nationally Determined Contributions under the Paris Agreement, promised to reduce the emissions intensity of its GDP by 45% by 2030, compared to the 2005 level.

What does the forecast say?

The IMD forecast has said most of India will experience above-normal maximum and minimum temperatures.

The El Niño event, which causes weak rainfall and more heat over India, has weakened since the beginning of the year, the forecast noted. However, moderate El Niño conditions still exist over the equatorial Pacific, increasing the sea surface temperature. The heat redistribution affects airflows above the ocean. Since the Pacific Ocean covers almost a third of the earth, changes in its temperature and changes in wind patterns can disrupt weather worldwide.

January 2024 was the warmest in 175 years, the U.S. National Oceanic and Atmospheric Administration noted. The average global land and ocean surface temperature was also higher.

The El Niño is, however, likely to weaken during the upcoming season. Some models have even predicted the possibility of La Niña conditions developing during the monsoon, which can intensify rainfall across South Asia.

What is a heat wave?

A period of abnormally high

temperatures is called a heat wave. The IMD declares a heat wave if the maximum temperature of a weather station reaches at least 40 degrees C in the plains and at least 30 degrees C in hilly regions, with a departure of around 4.5-6.4 degrees C from the normal maximum temperature. The IMD can also declare a heat wave if the actual maximum temperature crosses 45 degrees C, and a 'severe heat wave' if it crosses 47 degrees C. Qualitatively, a heat wave can also occur when the temperature of the air becomes fatal to the human body.

Heat waves in India are typically recorded between March and June and tend to peak in May.

What is causing an increase in heat wave days?

A study published in the journal *PLOS Climate* in April 2023 found heat waves all over the world are getting more "recurrent, intense and lethal" due to climate change. Data from April 2022 used in the study also showed abnormal

temperatures caused due to climate change could have a severe impact on over 90% of India.

An increase in the number of heat-wave days and their intensity can exact steep costs affecting livelihoods, food production, disease spread, and more, the study noted.

Higher temperatures can affect human health by causing heat stress and even death, according to the World Health Organization.

The ongoing El Niño weather condition also contributes to higher-than-usual temperatures, driving an increased occurrence of heat waves.

What measures has the EC advised to manage the impact of heat waves?

Starting on April 19, general elections will be conducted in seven phases until June 1, coinciding with India's summer and possibly several heat waves. The Election Commission (EC) has issued an advisory to manage the impact of heat waves during voting, including carrying a water bottle and protecting oneself from direct sunlight.

The heat itself can be deadly outside a heat wave if the wet bulb temperature crosses 30-35 degrees C. The wet bulb temperature is the lowest temperature to which a surface can be cooled by water evaporating from it. In other words, it's the lowest temperature at which the surface of the skin can be cooled by sweating. Beyond this threshold, even short periods spent idling in ambient conditions can have deadly health effects.

THE GIST

Indian Meteorological Department predicts above-average heat wave days for India, impacting multiple regions.

El Niño event weakens but contributes to warmer temperatures globally, exacerbating heat wave conditions. Climate change is cited as a key factor in the recurrence and intensity of heat waves.

General elections in India coincide with the summer season and potential heat waves, prompting the EC to issue advisories to manage the impact of heat waves during voting.





Heat Waves

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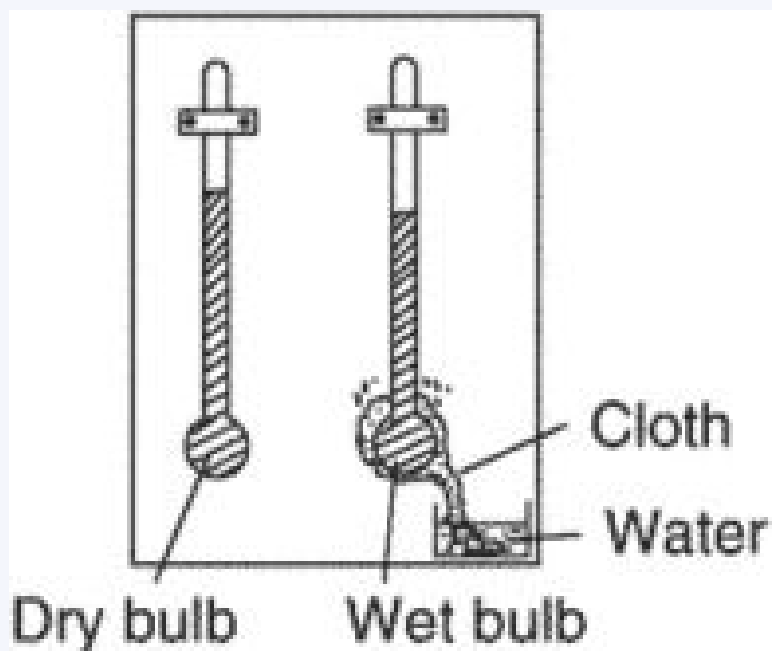


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What is Wet Bulb Temperature ??

- The wet-bulb temperature is the temperature read by a thermometer covered in water-soaked cloth over which air is passed.
- At 100% relative humidity, the wet-bulb temperature is equal to the air temperature; at lower humidity the wet-bulb temperature is lower than dry-bulb temperature because of evaporative cooling



WHAT IS WET-BULB TEMPERATURE

Photo: Piyal Bhattacharjee

- Wet-bulb temperature is the lowest temperature to which air can be cooled by the evaporation of water into the air
- It is measured by factoring in heat and humidity levels
- Theoretically, if wet-bulb temperature reaches 35 degrees Celsius -its highest point- it means humans can no longer lose internal body heat by sweating and cool themselves
- This could potentially lead to heatstrokes

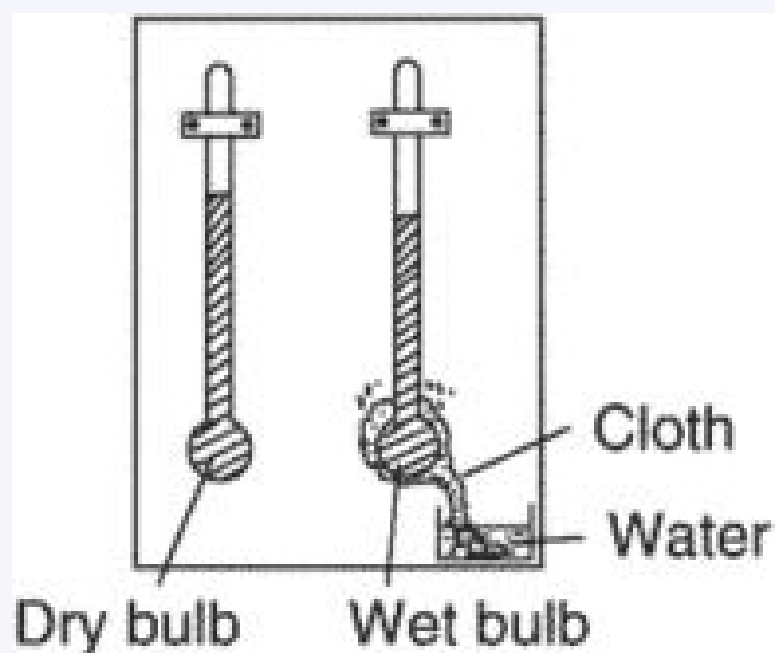


Wet-bulb days in Delhi each year at present | **63 days**

RCP 8.5 or business as usual scenario (2050) | **99 days**

RCP 8.5 or business as usual scenario (2100) | **131 days**

RCP 2.6 (stringent scenario where global temperature rise will be below 2°C by 2100) | **81 days**





'India's new EV policy allows imports from any country, including China'

Reuters

NEW DELHI

India has no restrictions on the import of electric vehicles from any country, in-

cluding China, under a new EV policy, a senior government official told a TV channel on Tuesday. Last month, India announced lowering import taxes on

certain electric vehicles produced by carmakers who commit to invest at least \$500 million and start domestic manufacturing within three years.



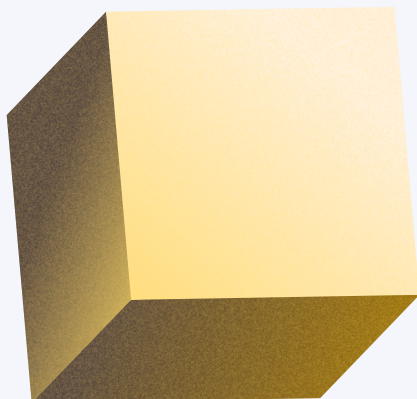


Economy Facts On EV's

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THE HINDU ANALYSIS

4th April 2024
by saurabh pandey



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BY Saurabh pandey sir



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India among countries mulling telescopes on, around the moon

Astronomers are now seriously considering an idea they have toyed with since the 1950s: placing optical and radio telescopes on the moon's far side. The pristine, airless desolation here provides crystal-clear seeing conditions throughout the long lunar night, which lasts two weeks at a time

Prakash Chandra

Astronomers are looking forward to opening a new window on the universe by posting high-resolution telescopes on the moon and in orbit around it. There are numerous proposals to do this from astronomers around the world, including one from India called PRATUSH.

On the earth, optical telescopes (which collect visible light at longer wavelengths) and radio telescopes (which collect radio waves with the shortest wavelengths) have to peer through layers of the planet's atmosphere. While it is becoming increasingly difficult for optical instruments to see through the polluted skies, radio telescopes also contend with radio and TV signals adding to the cacophony of the electromagnetic 'hiss' from the communications channels used by radar systems, aircraft, and satellites. It also does not help that the earth's ionosphere blocks radio waves coming from outer space.

A pristine desolation

Scientists tried to find a way out of this by launching radio telescopes into orbit around the earth. But this only made the problem worse, as orbiting telescopes started receiving radio noise from the whole planet along with signals from outer space. So astronomers are now seriously considering an idea they have toyed with since the 1950s: placing optical and radio telescopes on the far side of the moon, which always faces away from the earth.

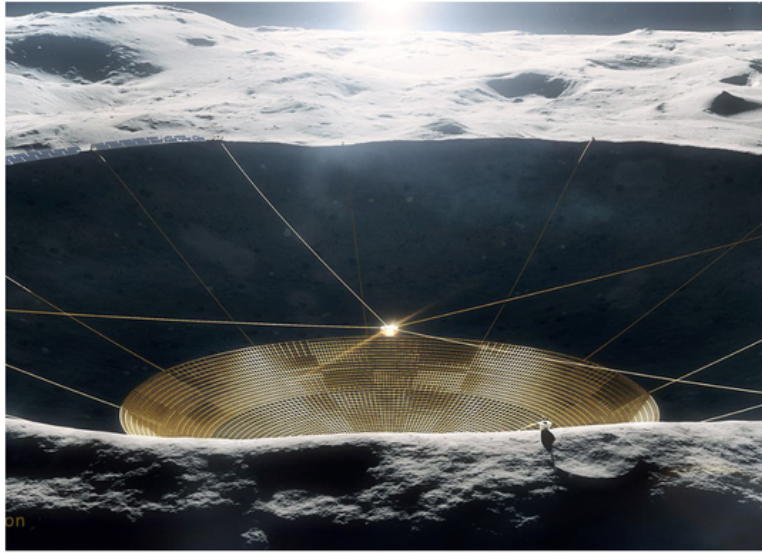
The pristine, airless desolation of the moon provides optical telescopes crystal-clear seeing conditions throughout the long lunar night, which lasts two weeks at a time. Radio telescopes on the lunar far side will also be protected by a 3,475-km-thick wall – a.k.a. the moon (its diameter is 3,476 km) – that blots out radio transmissions from the earth and electrically charged plasma winds blowing from the Sun.

In the past, the enormous costs involved discouraged scientists from setting up lunar telescopes. But renewed interest among spacefaring nations to return to the moon promises to open up "the most radio-quiet location in the solar system", to quote The Royal Society, to astronomers.

The oldest light in the universe

Once upon a time, cosmologists believe, everything in the cosmos was condensed into an infinitesimally small, incredibly dense blob in the void that exploded with a 'Big Bang'. The resulting fireball cooled as it spread and its blinding light faded into a gathering darkness. At some point, the young universe resembled a formless sea of murky matter, highlighted only by traces of primordial hydrogen and helium.

This darkness persisted from some 300,000 to half a billion years after the Big Bang, which is why there is so little direct evidence today of this important period in the cosmic story. The blackness in the heavens was banished only when the first stars switched on their nuclear power-plants and the cosmos continued to expand. We see this expansion now as a faint glow called the cosmic microwave background (CMB), the oldest light in the



The moon's surface is covered in craters and one of these natural depressions could provide a support structure for a radio telescope dish, like this concept art for the NASA Lunar Crater Radio Telescope shows. VLADIMIR VUSTYANSKY/NASA

universe, which can be captured by radio telescopes.

Meanwhile, the universe went 'quiet' for tens of millions of years afterwards as gravity began to build the first stars and galaxies. This period of time between the initial scattering of the CMB radiation and the birth of the first stars is known as the Dark Ages. It is believed the neutral hydrogen pervading the cosmos during the Dark Ages absorbed some of the CMB radiation to produce an extremely small dip in the frequency of the spreading radio waves.

China may be the first, again

Terrestrial instruments can't detect this minute frequency drop. Instead, moon-based instruments are our best bet to spot this signal from the Dark Ages, which would be essentially free from the influence of any starlight (since there were no stars then).

"We want to study the Dark Ages period because it connects how the early universe evolved into the universe we see today," Arifoteg Suzuki, who heads the Lunar Surface Electromagnetic Experiment, or LuSEE Night, a joint NASA-Berkeley Lab project, scheduled for launch in December 2025, told this author via email. "We are going to land on the far side of the moon, near the equator of the moon, and almost exactly opposite from the earth. This location is helpful because it best shields radio frequency noise coming from the earth."

LuSEE Night will be followed by many moon-bound instruments currently in various stages of planning with space agencies like NASA and the European Space Agency (ESA). NASA's Long-Baseline Optical Imaging Interferometer, for instance, is scheduled



Radio telescopes also contend with radio and TV signals adding to the cacophony of the electromagnetic 'hiss' from communications channels used by radar systems, aircraft, and satellites

to be launched in parts before this decade is out. Once assembled on the moon's far side, it will study magnetic activity on stars and the centres of active galaxies in visible and ultraviolet wavelengths.

ESA is getting ready to launch a radio telescope to the moon's far side on board its lunar lander, 'Argonaut', by 2030. Other European projects on the anvil include super-sensitive detectors to hunt for the elusive ripples of gravitational waves in space-time and an infrared telescope located inside a permanently shadowed crater near the lunar south pole.

First off the block, however, could be China, with a moon-orbiting radio telescope scheduled for launch in 2026. Another of its satellites, Queqiao-2, intended as a communications relay between the earth and future missions, probably entered into orbit around the moon on March 24. Its payload includes a 4.2-m antenna that will be used as, among other things, a radio telescope.

PRATUSH radio telescope

Although the technologies for these instruments exist, it is difficult for scientists to deploy them on the moon. "An alternative approach," Dr. Suzuki said, "would be to orbit ... the moon

instead of landing on the surface and study the data when the satellite is behind the moon."

This is what Indian scientists plan to do with the radio telescope PRATUSH (Probing ReionizATIOn of the Universe using Signal from Hydrogen), to study the universe from the moon's far side. PRATUSH is being built by the Raman Research Institute (RRI) in Bengaluru with active collaboration from the Indian Space Research Organisation (ISRO).

Initially, ISRO will place PRATUSH into orbit around the earth. After some fine-tuning, the space agency will launch it moonwards. "Although earth orbit will have significant radio frequency

interference (RFI), it will have advantages compared to ground-based experiments, such as operating in free space and lesser ionosphere impact," Mayuri S. Rao and Saurabh Singh, principal investigators at RRI, explained in an email. "PRATUSH in lunar orbit will have the ideal observing conditions operating in free space with minimal RFI and no ionosphere to speak of." It will carry a wideband frequency-independent antenna, a self-calibrating analog receiver and a digital correlator to catch radio noise in the all-important signal from the Dark Ages.

As astronomers open new windows from the moon to look at the far reaches of the universe, who knows what discoveries await them. One thing is certain: they are in for some exciting times as the cosmos yields clues to some of its greatest mysteries, such as dark energy (which pushes the universe in every direction at an accelerating rate), primordial black holes and, indeed, the very nature of the cosmos.

(Prakash Chandra is a science writer.)



The hindu analysis by saurabh pandey sir



Telescopes on, around the moon

- Astronomers are looking forward to opening a new window on the universe by posting high-resolution telescopes on the moon and in orbit around it.
- There are numerous proposals to do this from astronomers around the world, including one from India called PRATUSH.

Challenges

- On the earth, optical telescopes (which collect visible light at longer wavelengths) and radio telescopes (which collect radio waves with the shortest wavelengths) have to peer through layers of the planet's atmosphere.
- While it is becoming increasingly difficult for optical instruments to see through the polluted skies, radio telescopes also contend with radio and TV signals adding to the cacophony of the electromagnetic 'hiss' from the communications channels used by radar systems, aircraft, and satellites.
- It also does not help that the earth's ionosphere blocks radio waves coming from outer space.



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Telescope in Moon

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- Radio telescopes on the lunar far side will also be protected by a 3,475-km-thick wall — a.k.a. the moon (its diameter is 3,476 km) — that blots out radio transmissions from the earth and electrically charged plasma winds blowing from the Sun.



Dark Age

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- This period of time between the initial scattering of the cosmic microwave background (CMB), radiation and the birth of the first stars is known as the Dark Ages
- The Cosmic Microwave Background (CMB) is the cooled remnant of the first light that could ever travel freely throughout the Universe.
- This 'fossil' radiation, the furthest that any telescope can see, was released soon after the 'Big Bang'. Scientists consider it as an echo or 'shockwave' of the Big Bang



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For most people, the determination of which hand is dominant may come down to chance.
SINDY SOSSENGUT/UNSPLASH

Genes involved in cell shape offer clues on left-handedness

Reuters

Why are some people left-handed while most are righties? This is an area of active research, and a new study sheds light on a genetic component of left-handedness in some people. Researchers identified rare variants of a gene involved in controlling the shape of cells and found them to be 2.7-times more common in left-handed people.

While these genetic variants account for only about 0.1% of left-handedness, the researchers said the study shows that this gene, called TUBB4B, may play a role in the development of the brain asymmetry that underlies the determination of a dominant hand.

In most people, the two halves, or hemispheres, of the brain have slightly different anatomies and are dominant for different functions.

"For example, most people have left-hemisphere dominance for language and right-hemisphere dominance for tasks that require directing visual attention to a location in space," said neurobiologist Clyde Franks of the Max

The identification of rare mutations in TUBB4B that are more common in left-handers suggests that it is responsible for setting up the brain's normal asymmetries

Planck Institute for Psycholinguistics in the Netherlands, senior author of the study published on April 2 in the journal *Nature Communications*.

"In most people, the left hemisphere also controls the dominant right hand. The relevant nerve fibres cross from left to right in the lower part of the brain. In left-handers, the right hemisphere is in control of the dominant hand. The question is: what causes the asymmetry of the brain to develop differently in left-handers?"

TUBB4B controls a protein that gets integrated into filaments called microtubules that provide internal structure for cells. The identification of rare mutations in this gene that are more common in left-handers suggests that microtubules are involved in setting up the brain's normal asymmetries, Mr. Franks said.

The two cerebral hemispheres start to develop differently in the human embryo, though the mechanism has remained unclear.

"Rare genetic variants in just a handful of people can pinpoint genes that give clues to developmental mechanisms of brain asymmetry in everyone. TUBB4B could be a good example of this," Mr. Franks added.

The findings were based on genetic data covering more than 350,000 middle-aged to older adults in Britain in a dataset called the U.K. Biobank. About 11% were left-handed.

For most people, the determination of which hand is dominant may come down to chance.

"We think that most instances of left-handedness occur simply due to random variation during development of the embryonic brain, without specific genetic or environmental influences. For example, random fluctuations in the concentrations of certain molecules during key stages of brain formation," Mr. Franks said.



The hindu analysis by saurabh
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TUBB4B

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Should State Governments borrow more?

How does the Reserve Bank of India categorise the budgetary expenditures of the Union and State governments? What has been Kerala's track record when it comes to spending on the social sector? From where do State governments receive their funds?

ECONOMIC NOTES

Jayan Jose Thomas

The financial relation between the Union and various State governments has been a matter of vigorous debate. In a recent development, the Government of Kerala has approached the Supreme Court for a resolution of the following question: how much can the State government borrow from the market to bridge the excess of its expenditures over receipts? The Union government says that the borrowing should be limited to 3% of the State's income or Gross State Domestic Product (GSDP). Kerala contends that by curtailing its borrowing powers, the Centre is undermining the State's ability to fulfil some of its basic financial commitments and violating the principle of federalism.

How States spend more

It is well known that in India the power to raise taxes rests largely with the Union government while a greater part of the overall government spending is done by the State governments. More importantly, when it comes to spending on sectors which affect people's daily lives, the overwhelming responsibility lies on the shoulders of the State governments. On social services, which include health and education, the expenditure incurred in 2022-23 was ₹2,230 billion (₹1 billion = ₹100 crore) by the Union government while the combined expenditure by all State governments was ₹19,182 billion. The expenditures of all the States put together was bigger than the expenditure of the Union by 8.6 times in social services as a whole; 2.6 times in education; and by 3.8 times in health.

Of course, the spending priorities of the Union and the States are guided by the constitutionally allocated powers and functions for them. Compared to its expenditure on social services, the Union government's spending on defence was approximately twice as high, while its spending on transport, urban development and energy combined was 2.4 times higher.

The Reserve Bank of India (RBI) has categorised the budgetary expenditures by the Union and the State governments as 'developmental' and 'non-developmental'. The former includes expenditures on social services and economic services (such as on agriculture and industry) while the latter refers to interest payments, pensions, subsidies, and so on. It is remarkable that developmental expenditures, and within that, the expenditures on social services incurred by the State governments have risen significantly over the last two decades. As a proportion of the country's Gross Domestic Product (GDP), the combined developmental expenditures by all State governments increased from 8.8% in 2004-05 to 12.5% in 2021-22. On the other hand, the social and developmental expenditures by the Union government remained somewhat unchanged over the two-decade period. The upsurge in spending during the 2008-12 period was reversed over the next eight years, with a brief revival after 2020 (Chart 1). In the end, it was the spending by the State governments that has helped to alleviate the livelihood crisis in the country, caused due to the slow growth of rural incomes and employment.

Kerala's experience

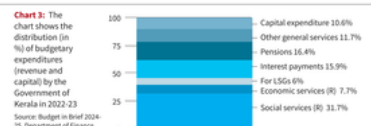
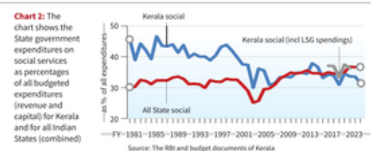
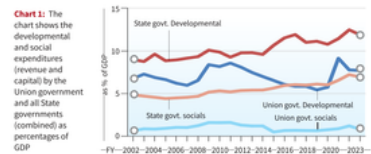
Kerala provides an excellent illustration of the power of government spending to positively transform a region's economy

A Union-State expenditure comparison

The RBI has categorised budgetary expenditures by the Union and the State governments as 'developmental' and 'non-developmental'. A look at these expenditures in different sectors over the years



A common issue: Delhi Chief Minister Arvind Kejriwal, Kerala Chief Minister Pinarayi Vijayan, Punjab Chief Minister Bhagwant Mann and others during a protest against the Centre over distribution of Central funds to States, at Jantar Mantar, in New Delhi on February 8. SANKU SHIKHAR KASIMP



and society. The expenditure on education, health and other social sectors as a proportion of the total budgeted expenditures by the State government in Kerala ranged between 40% and 50% for four decades, from the 1960s until the end of the 1990s. The proportion of social sector spending in Kerala was way ahead of the corresponding average of all other States until the middle of the 2000s. From the mid-2000s, while the average proportion of all other States rose

upward, the proportion for Kerala stagnated. A substantial part of Kerala's budget (6% in 2022-23) is now devoted to Local Self Governments (LSGs). If the spending by the LSGs on social sectors is taken into account, the proportion for Kerala could still be higher than the average of all other Indian States (Chart 2).

A sizeable chunk of the government expenditure on social services is in the revenue account, paid as salaries and for

covering day-to-day expenses. In fact, the large body of teachers, nurses, and other government employees in Kerala – half of them women – have been a key driver of the State's social achievements over the decades.

At the same time, the pensions paid to retired government employees as well as to members of the disadvantaged sections (such as the elderly, agricultural workers, widows) make up 16.4% of all budgeted expenditures by the Kerala government. This is markedly higher than the average proportion allotted for pensions by all Indian States (9.7%). It is indeed a concern that only 10.6% of Kerala's budgetary resources was directed to capital expenditure (in 2022-23), which is much needed to build new infrastructure and institutions to speed up future growth (Chart 3).

State governments receive funds from three sources: own revenues (tax and non-tax); transfers from the Union government as shares of taxes and as grants; and market borrowings. In 2020-21, the Kerala government had sharply increased its spending to 18% of its GSDP, to provide economic relief in the wake of the COVID-19 pandemic, aided by the relaxation in borrowing norms then. As ratios of GSDP, the Union government's transfers to Kerala declined to 2.8% in 2023-24, significantly lower than previous years, even as the State's own revenues remained at around 8.0%. This meant that, in 2023-24, the State government could meet its modest budget expenditure, equivalent to 14.2% of GSDP, only by raising the borrowing to 3.4% of the GSDP – which, however, would cross the borrowing limit set by the Centre (Chart 4).

The Supreme Court has now referred Kerala's plea for additional borrowing to a Constitution Bench.

A case for more government spending
For Kerala to translate its enormous advantage in the social sphere to advances in domestic income creation, there need be more – not less – government spending.

Especially so on higher education and research that will help build a facilitative environment for a knowledge-driven economy. Given the current state of federal fiscal relations, such an increase in government spending can occur only with greater market borrowings.

A large part of the government borrowing in Kerala, as elsewhere in India, is from domestic financial institutions, including public sector banks and insurance companies, which mobilise savings from the wider public. Kerala is a region with a large reserve of private savings, which could be channelled for productive purposes.

The concerns about debt-financed government expenditures are often exaggerated. Economists in the Keynesian tradition have shown that government borrowing can generate a virtuous cycle if the borrowed resources are deployed effectively to create new incomes and jobs. Many of the development dilemmas that Kerala faces today – an ageing population, the large outgo for pensions, outmigration of its youth – are problems that most other States will also face in the coming years. The Union and the State governments should join hands to ward off these challenges. On its part, Kerala should be able to convince that its borrowing is part of a larger plan to rebuild the economy and not a firefighting exercise to meet immediate financing needs.

Jayan Jose Thomas is a Professor of Economics at the Indian Institute of Technology Delhi.

THE GIST

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Article 293 & state borrowing

- Article 293, which confers executive power on the States to borrow money within limits prescribed by the State legislature.
- It also allows the Union to extend loans and guarantees to the States, and requires the Centre to give its consent and impose conditions for States to raise further loans while earlier ones are outstanding.
- Kerala contends that the Article does not confer on the Centre any power to regulate all State loans and that it can impose conditions only on borrowings from the Centre



- The Union government says that the borrowing should be limited to 3% of the State's income or Gross State Domestic Product (GSDP).
- Kerala contends that by curtailing its borrowing powers, the Centre is undermining the State's ability to fulfill some of its basic financial commitments and violating the principle of federalism.

How States spend more

- power to raise taxes rests largely with the Union government while a greater part of the overall government spending is done by the State governments.
- More importantly, when it comes to spending on sectors which affect people's daily lives, the overwhelming responsibility lies on the shoulders of the State governments.

- the spending priorities of the Union and the States are guided by the constitutionally allocated powers and functions for them.
- Compared to its expenditure on social services, the Union government's spending on defence was approximately twice as high, while its spending on transport, urban development and energy combined was 2.4 times higher.
- The Reserve Bank of India (RBI) has categorised the budgetary expenditures by the Union and the State governments as 'developmental' and 'non-developmental'.
- The former includes expenditures on social services and economic services (such as on agriculture and industry) while the latter refers to interest payments, pensions, subsidies, and so on.
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Systems science for a better future

The Pew Research Center surveyed the citizens of many countries in 2023 to gauge how many prefer authoritarian rulers to multi-party democracy. The numbers choosing dictators will dismay democrats. In the Global South: India (85%), Indonesia (77%), South Africa (66%) and Brazil (57%). In the West: the United Kingdom (37%) and the United States (32%), which are significant numbers too. China and Russia were not surveyed.

Citizens of democratic countries have lost trust in their governments' economic policies. Average incomes may be rising but the very rich are becoming much richer, faster. Large corporations and financial institutions are compelling governments to set the rules of the game in their favour by reducing taxes for them, emasculating labour institutions, and exploiting the natural environment for their profit.

Moreover, the growth of the global economy and human population has brought humanity to the brink. Scientists predict that the overuse of fossil energy for fuelling modern consumptive lifestyles will make life on earth impossible beyond this century. Water, fundamental for life, is also running out. India is among the most water stressed large countries in the world.

India has 17.5% of the world's population living on only 2.4% of the world's land. In 2014, India ranked 155 out of 178 countries in the global Environment Performance Index, meanwhile, in 2022, India slipped to the very bottom – 180 out of 180. India, also the world's most populous country, has an additional problem, viz. to increase the incomes of its citizens faster. While economists chase GDP targets, inequality is increasing and we are spilling the earth which supports the economy and sustains our lives.

The science of systems

Keeping the forest in sight, do not get lost in the trees, is good advice. Many things must be known, and their interconnections mapped, to understand how the world works. All sciences – social, medical, and natural – are fragmented into narrow silos. Locked within their echo-chambers, scientists in different disciplines do not learn from each other. As the sciences advance, experts know more but about less. No



Arun Maira
is the author of
'Shaping the Future: A
Guide for Systems
Leaders'

Rather than specialised sciences focused on parts, a higher-level science is required – one of holistic, self-adaptive systems

one sees the whole. Politics and economics are integral parts of complex social systems. It is moot whether the weakening of democratic institutions empowers large capitalist institutions or whether capitalist institutions corrode democracy. What has broken down is the comprehension of complex systems with diverse forces, and human egos, within them.

Economics emerged as a distinct science out of philosophy and the humanities in the early 20th century. Modern economists do not understand how societies function. By the century's end, free market fundamentalism had become an ideology. Leave it to the "invisible hand" of the market because it knows best, these economists say. Behind the invisible hand is the power of capital. The rights of capital, and its freedom to roam the world across national boundaries and make more profits, trump the rights of human beings moving across borders searching for safer lives.

Systems' knowledge has been devalued by specialisation. Heart specialists can keep the heart alive with amazing technologies. Brain specialists delve deeper into the biology of the brain. They lose sight of the whole human being. Climate scientists research how to remove carbon from the atmosphere, but the effects of their solutions on the livelihoods of citizens are not in their science's scope. High-tech solutions can improve parts of complex systems while reducing overall health and well-being.

Any intelligence within a system cannot comprehend the system that produced it. Modern science gave human beings hubris that they could conquer "unruly nature" as Francis Bacon declared at the emergence of the European Enlightenment. The arrogant scientific man thought he could change the system that had created him. His scientific fixes of the world, and scientific improvements of his own genes, are threatening humanity's existence.

In times of uncertainty, people yearn for certainty. They follow godmen, dictators, and wealthy technologists because these people claim to know the truth and have the power to apply it. When economists and scientists with their incomplete understanding of the world become the guides of leaders and steer social and economic policies, the losers are both common

people and the natural environment that sustains everyone's lives. Recalling the idea of the ancient Greek poet Archilochus – "A fox knows many things, but a hedgehog knows one big thing" – philosopher Isaiah Berlin divided thinkers into "foxes" and "hedgehogs". Great writers, like Leo Tolstoy, who combined many perspectives in their histories were both hedgehogs and foxes, Berlin said. They understood the fundamental nature of existence and the limits of any rational scientific approach to it.

Rather than specialised sciences focused on parts, a higher-level science is required: a science of holistic, self-adaptive systems which include human egos in them. Complex self-adaptive systems have three components: systems being, systems thinking, and systems acting. Systems being requires humility. Systems thinking requires the mind of the "hedgehog-fox" to see patterns among the details.

Enterprises for cooperation

Systems acting to improve the world for everyone must be driven by organisations whose purpose is cooperation, not by organisations driven by competition. The purpose of business corporations and armies is to make more profit and gain more power, whereas the purpose of families is to improve the well-being of their members. Family members have natural differences in sex and generational abilities. Yet, they cooperate with each other for the well-being of all.

Women's contributions to the well-being of families and societies are under-valued in money terms and not counted in GDP. Economists say that few Indian women are in the labour force, whereas, for centuries, women have been working harder than men, producing social and economic value for their families and communities.

The world needs more caring, less competition. Women are natural family builders and systems facilitators whereas men are brought up to compete. Rather than men teaching women to think like men and compete with them in hierarchies of the formal labour force, men must learn the caring ways of women to make the world better for everyone.



What is system science??

- Systems Science, also referred to as systems research, or, simply, systems, is a transdisciplinary field that is concerned with understanding simple and complex systems in nature and society, which leads to the advancements of formal, natural, social, and applied attributions throughout engineering, technology and science, itself.
- To systems scientists, the world can be understood as a system of systems.
- The field aims to develop transdisciplinary foundations that are applicable in a variety of areas, such as psychology, biology, medicine, communication, business, technology, computer science, engineering, and social sciences

Topics

- **Pharmaceutical industries**
- **Bharatiya Nyaya Sanhita (BNS), 2023,**
- **How are symbols allotted to political parties?**
- **The Purchasing Managers Index (PMI)**
- **Derivatives**
- **Basel III endgame**
- **Mains**

Govt. body hikes prices of essential medicines again, says 'it's miniscule'

In an election year after double digit hikes in ceiling price of essential drugs over the past two years, the Central government says it flat lined the hike this year. The annual change works out to (+) 0.00551% during the calendar year 2023 over the corresponding period in 2022

Bindu Shajan Perappadan

An increase in the prices of essential medicines came into force on April 1, earlier this week. The National Pharmaceutical Pricing Authority (NPPA) enforced an increase in the Maximum Retail Price (MRP) this year of 0.00551 percent for scheduled formulations (of drugs) from the beginning of the fiscal year 2024-25. The Department of Pharmaceuticals issued its annual list of revised ceiling prices for 923 scheduled drug formulations and revised retail prices for 65 formulations, with the ceiling rates coming into effect on April 1. The price revision, according to the Central Government, is in line with the change in the Wholesale Price Index (WPI). "Based on the WPI data provided by the office of the Economic Advisor, Department of Industry and Internal Trade, Ministry of Commerce and Industry, the annual change in WPI works out to (+) 0.00551% during the calendar year 2023 over the corresponding period in 2022," said the notice by the NPPA.

Increase based on WPI

According to the recent notice, manufacturers may increase the MRP of the scheduled formulations based on this WPI and no prior approval will be required from the government. Notably, this increase in prices comes after medicine prices were hiked by 12 per cent last year and 10 per cent in 2022. Despite this, the government will have you believe that the current hike will only marginally increase the cost of antibiotics, painkillers and other essential drugs. Currently, India has approximately 400 molecules and 960 formulations covered under the National List of Essential Medicines. The prices of non-essential drugs are also monitored by the government to ensure that the manufacturers of these drugs don't increase MRP by more than 10% annually. NPPA follows DPCO (2013), which allows for price hikes in line with the changes in the WPI index.

"The NPPA under the Department of Pharmaceuticals annually revises the ceiling prices of scheduled medicines on the basis of WPI. The scheduled medicines included in Schedule-I of the DPCO, 2013 are essential medicines. During the calendar year 2023 compared to the corresponding period in 2022, the annual change in WPI with the base year of 2011-12 was +/- 0.00551%, according to data published by the Department for Promotion of Industry and Internal Trade (DPIIT). Accordingly, the Authority, in its meeting held on March 20, has approved the WPI increase of +/- 0.00551% for the scheduled medicines," said the Health Ministry. It added that the ceiling prices on 923 medicines are effective as of date. Based on the mentioned WPI factor of (+) 0.00551%, there will be no change in the prevailing ceiling prices for 782 medicines, and the existing ceiling prices will continue to prevail up to March 31, 2025.

Almost no change

Fifty-four medicines with ceiling prices ranging from ₹90 to ₹261 will see a miniscule increase of ₹0.01. As the permissible price increase is so low, the companies may or may not avail of this



The Department of Pharmaceuticals issued its annual list of revised ceiling prices for 923 scheduled drug formulations and revised retail prices for 65 formulations, with the ceiling rates coming into effect on April 1. GETTY IMAGES

increase. Thus, in FY 2024-25, there will be almost no change in the ceiling price of medicines based on WPI, said the Ministry.

NPPA, constituted by the government of India in 1997 under the Ministry of Chemicals and Fertilizers, regulates drug pricing while ensuring the availability and accessibility of medicines at affordable prices. The authority is allowed to direct a price hike of over 10% for the drugs and devices listed on the National List of Essential Medicines (NLEM). All medicines under the NLEM are subject to price regulation.

"With the announcement of the new National Pharmaceutical Pricing Policy, 2012, and the DPCO, 2013, there has been a shift in regulation of prices from economic and cost-based criteria to essentiality and market-based criteria, which involves creating and maintaining a data base and strengthening the existing monitoring system of the NPPA," the Central Government stated. The WPI is a measure that tracks average changes in prices of goods at the wholesale level, providing insights into inflation and price trends for goods sold to retailers and businesses rather than individual consumers.

The marginal hike this year has the pharmaceutical companies concerned, as they claim to be facing high input costs, stringent price controls, and diminishing profit margins.

The lower-than-expected hike in drug prices has seen pharma companies discontinue production of drugs that they claim have become economically unviable. Also earlier this year, India's pharmaceutical industry sought a one-time exemption from price control measures tied to the declining WPI.



Fifty-four medicines with ceiling prices ranging from ₹90 to ₹261 will see a miniscule increase of ₹0.01. As the permissible price increase is so low, the companies may or may not avail of this increase

Prices hiked to save firms

In 2019, for instance, NPPA used its emergency powers to raise the ceiling prices of 21 essential drugs by 50% after several companies applied for the discontinuation of products due to their high cost. Pharma companies maintain that a rational increase in the cost of drugs contributes to quality control. According to information shared by the Centre in the Lok Sabha, the key principles for regulation of prices in the 2012 National Pharmaceuticals Pricing Policy are the essentiality of drugs, control of formulation prices, and market-based pricing.

It added that all manufacturers of scheduled medicines have to sell their products within the ceiling price (plus applicable Goods and Service Tax) fixed by the NPPA. DPCO, 2013, which also allows an annual price rise for scheduled formulations based on WPI. NPPA also fixes the retail price of a new drug under DPCO, 2013 for existing manufacturers of scheduled formulations. Hence, the annual increase allowed in the case of scheduled formulations is up to the level of annual revision in WPI. Further, in cases of non-scheduled formulations, no manufacturer can increase the MRP by more than 10% of the MRP during the

preceding 12 months. Instances of overcharging are dealt with by NPPA under the relevant provisions of DPCO 2013.

"The fixation of prices has resulted in a notional savings of about ₹12,447 crore per annum to the public after the implementation of DPCO, 2013," Parliament was informed. Meanwhile, though some consumers are happy with the almost steady pricing for medicines for another year, experts point to the country's dependence on China for raw materials for drug manufacture. The country faced major challenges with these high-cost imports, especially during the COVID pandemic.

Dependence on China

In a discussion paper 'India's Import Dependence on China in Pharmaceuticals: Status, Issues, and Policy Options' author Sudip Chaudhuri argues that while India has one of the most advanced pharmaceutical industries among developing countries, being the third largest in the world in volume terms and the 13th largest in value, it is critically dependent on China for supplies of bulk drugs and drug intermediates, with China accounting for about two-thirds of the total imports. The paper further notes that the largest export destination of bulk drugs from India is the US, which has the strictest regulatory standards, followed by Brazil, Bangladesh, Turkey, China, the Netherlands, Nigeria, Vietnam, and Egypt. India is among the top five suppliers of bulk drugs to many developing countries, like, Bangladesh, Nigeria, Vietnam, Egypt, Iran, and Pakistan. China is a larger supplier, but India is also a substantial exporter, it said. (bindu.p@thehindu.co.in)



The hindu analysis by saurabh pandey sir



Pharmaceutical industries

- India has one of the most advanced pharmaceutical industries among developing countries, being the third largest in the world in volume terms and the 13th largest in value, it is critically dependent on China for supplies of bulk drugs and drug intermediates, with China accounting for about two-thirds of the total imports.
- The paper further notes that the largest export destination of bulk drugs from India is the US, which has the strictest regulatory standards, followed by Brazil, Bangladesh, Turkey, China, the Netherlands, Nigeria, Vietnam, and Egypt.
- India is among the top five suppliers of bulk drugs to many developing countries, like, Bangladesh, Nigeria, Vietnam, Egypt, Iran, and Pakistan.
- China is a larger supplier, but India is also a substantial exporter,



➤ **“Active pharmaceutical ingredients or Bulk drug”-** means any pharmaceutical, chemical, biological or plant product including its salts, esters, isomers, analogues and derivatives, conforming to pharmacopoeial standards specified in the Drugs and Cosmetics Act, 1940 and which is used as such or as an ingredient in any formulation.

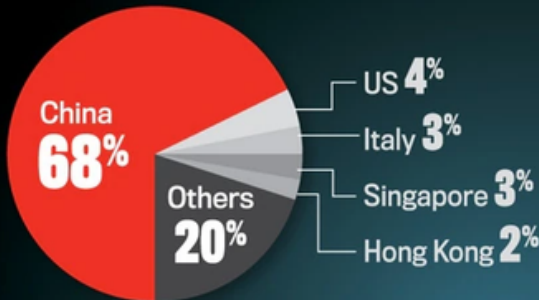
ON THE DRIP

Indian pharma's focus on the lucrative formulations side of the business has led to a heavy dependence on China for basic APIs and key starting material

INDIA'S API IMPORTS BY COUNTRY (FY19)

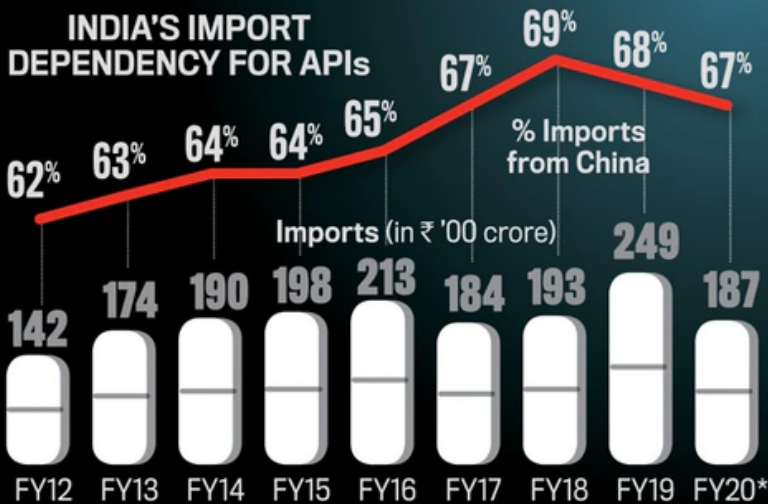
Total imports*

₹18,700 cr



10.3% India's share of China's bulk drug exports**

INDIA'S IMPORT DEPENDENCY FOR APIs



INDIA'S IMPORTS OF SELECT APIs (FY19)

	By value	By volume
Tetracycline	99.8%	100%
Oxytetracycline	100%	100%
Doxycycline*	58%	91%
Gentamicin*	85%	86%
Neomycin*	92%	98%
Azithromycin*	99%	100%
Erythromycin* and derivatives	63%	56%
Norfloxacin	98.5%	100%
Heparin*	86%	72%
Vitamin B1	74%	75%
Vitamin B6	77%	77%
Vitamin B12	93.5%	68%

*APIs are part of National List of Essential Medicines, 2015

DPCO

- **National Pharmaceutical Pricing Policy (NPPP)** is the policy *governing price control* and DPCO is the order by which *price control is enforced*.
- The Drug Price Control Orders are issued by Ministry of Chemicals and Fertilizers, which is the main nodal administrative ministry for pharmaceutical companies.
- They are issued under the "Essential Commodities Act 1955" whereby certain medicines could be declared to be essential commodities.



Revisit these sections of the Bharatiya Nyaya Sanhita

The central government has notified July 1, 2024 as the day on which the recently enacted three criminal laws will come into effect. Section 106(2) of the Bharatiya Nyaya Sanhita (BNS), 2023, which provides for a maximum 10 years of imprisonment in the case of a fatal accident if the accused person escapes without reporting to the police or a magistrate, has been put on hold. The Ministry of Home Affairs (MHA) press statement of January 2 said that the decision to implement Section 106(2) would be taken up after discussions with the All India Motor Transport Congress. This was prompted by a strike by truck drivers who alleged that the provision was too harsh. Besides the pending decision with regard to Section 106(2), it will be pertinent for the central government to reconsider a few more provisions of the BNS. These are "petty organised crime" defined under Section 112, "theft" defined under Section 303(2) and two sub-sections of Section 143 pertaining to human trafficking.

A reconsideration of Section 106(2) is significant for two reasons. First, the increase in sentence from five to 10 years of imprisonment for just fleeing the scene without reporting to the police or a magistrate soon after the accident seems disproportionate. There is no other provision in the law with similar consequences. It is not even a case of saving the persons who might have been grievously injured and in need of medical assistance. This clause applies to accidents that cause the death of any person. The only benefit seems to be that the appropriate motor accident claim could be sought if the vehicle details are known. Second, this clause seems to be in conflict with the fundamental right of prohibition against self-incrimination enshrined under Article 20(3) of the Constitution of India. Article 20(3) says that "no person accused of any offence shall be compelled to be a witness against himself".

The Supreme Court of India, in *Nandini Satpathy vs P.L. Dani*, widened the scope of Article 20(3) and held that compelled testimony must be read as evidence procured not merely by physical threats or violence but by psychic torture, overbearing and intimidatory methods and the like. Therefore, disclosure of culpability by informing the police or a magistrate due to fear of enhanced punishment may not qualify the test of constitutionality.

Second, a new offence, 'petty organised crime', has been introduced in Section 112 of the BNS. Here, "whoever, being a member of a group or gang, either singly or jointly, commits any act of theft, snatching, cheating, unauthorised selling of tickets, unauthorised betting or gambling, selling of public examination question papers or any other similar criminal acts, is said to commit petty organised crime".

Offences not defined in the BNS, such as "unauthorised selling of tickets" and "selling of



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public examination question papers" are not linked with any special Act. However, the phrase 'any other similar criminal acts' of the section is more indefinite and open-ended. While theft and snatching prescribe imprisonment of up to three years (Section 303 of the BNS), theft in a dwelling house or means of transportation gets up to seven years (Section 305 of the BNS), and theft after preparation made for causing death, hurt or restraint in order to commit theft gets up to 10 years (Section 307 of the BNS). Similarly, cheating provides for imprisonment from three years to seven years (Section 318 of the BNS).

Therefore, what will fall within the range of 'any other similar criminal acts' is unspecified. Similar criminal acts, *inter alia*, could include criminal breach of trust, criminal misappropriation of property, and receiving stolen property. However, the sentence for these offences varies from two years to 10 years. Obviously, an offence punishable with up to 10 years of imprisonment cannot be called a petty crime, particularly when the maximum sentence provided for a petty organised act is seven years. Therefore, unless some specific maximum limit of sentence is prescribed, this provision may not stand the scrutiny of the Supreme Court. It is important to mention that Section 66A of the Information Technology Act, 2000 was struck down by the Supreme Court in *Shreya Singhal vs Union of India* (2015) as it found the expression "grossly offensive" used in the Section to be open-ended, undefined and vague.

Property theft, a specific value

Third, the offence of theft, as provided for under proviso to Sub-section (2) of Section 303 of the BNS, also needs to be revisited. The proviso to the sub-section says that "provided that in cases of theft where the value of the stolen property is less than five thousand rupees, and a person is convicted for the first time, shall on the return of the value of property or restoration of the stolen property, shall be punished with community service". The First Schedule to the Bharatiya Nagarik Suraksha Sanhita (BNSS) categorises the offence under this category as a non-cognisable offence.

While making theft of any moveable property of less than ₹5,000 a non-cognisable offence may reduce the workload of the police, this may raise some complications that are both legal and practical. First, in cities and towns, while the value of ₹5,000 may not impact the pocket of a well-off person, it is a huge sum for say a daily wage earner. Think of a student whose bicycle is stolen and the police refusing to file a first information report, being a non-cognisable case. He may not be able to afford approaching a court for justice, thus feeling totally helpless. It is known that bicycles are distributed even by the governments to students under welfare schemes to encourage them to pursue school and even

college education. Second, if property offences, of whatever value, are not registered, property offenders will be out of the police radar for surveillance unless they are found to be involved in some other cognisable offence. Legal issues may also arise with regard to the return of such property if recovered with some other stolen or looted property.

Third, if the stolen property of value less than ₹5,000 is not returned or restored by the convict as provided for, the only option available with the court will be to award imprisonment which may extend up to three years – as provided for other cases of thefts (of higher value) in the first paragraph of Sub-section (2) of Section 303, categorised as a cognisable offence in the First Schedule to the BNSS. The interplay between the two parts of the sub-section is intricate. While this obfuscation may be removed by tweaking the definition and adding alternate punishment for such cases for which the value of stolen property is not returned, or the stolen property is not restored, making theft of property of any value a cognisable offence (which would require only a minor change in the First Schedule to the BNSS) will resolve other stated issues of legal and practical implications as well.

No discretion to judiciary

Section 303 of the Indian Penal Code pertaining to 'punishment for murder by life-convict' was struck down as being void and unconstitutional by the Supreme Court in *Mithu vs State of Punjab* (1983). One of the grounds of unconstitutionality was that it gave no discretion to the judiciary and, hence, the law was not just, fair, and reasonable within the meaning of Article 21 of the Constitution.

Section 303 of the IPC has been restored in the form of Section 104 of the BNS, by removing the defect for which it was held unconstitutional. Section 104 of the BNS now provides for either death punishment or imprisonment for life, which shall mean the remainder of that person's natural life.

However, Sub-sections (6) and (7) of Section 143 of the BNS which punish trafficking of a child on more than one occasion and trafficking of a person by a public servant or a police officer respectively, and provide only for life imprisonment (which shall mean the remainder of that person's natural life) under both provisions, also seem to suffer from the same illegality as they do not provide any discretion to the judiciary to award punishment.

In view of these points, sub-section (2) of Section 106, Section 112, sub-section (2) of Section 303, and sub-sections (6) and (7) of Section 143 of the BNS (which seem to have serious legal and/or constitutional and practical consequences) need to be revisited before they become operational.

The views expressed are personal

The sections on reporting of a fatal accident, petty organised crime, theft and human trafficking have flaws

The hindu analysis by saurabh pandey sir





Bharatiya Nyaya Sanhita (BNS), 2023,

- **Section 106(2) of the Bharatiya Nyaya Sanhita (BNS), 2023, which provides for a maximum 10 years of imprisonment in the case of a fatal accident if the accused person escapes without reporting to the police or a magistrate, has been put on hold.**
- **A reconsideration of Section 106(2) is significant for two reasons.**
- **First, the increase in sentence from five to 10 years of imprisonment for just fleeing the scene without reporting to the police or a magistrate soon after the accident seems disproportionate.**
- **There is no other provision in the law with similar consequences.**
- **It is not even a case of saving the persons who might have been grievously injured and in need of medical assistance.**



- **The Supreme Court of India, in Nandini Satpathy vs P.L. Dani, widened the scope of Article 20(3) and held that compelled testimony must be read as evidence procured not merely by physical threats or violence but by psychic torture, overbearing and intimidatory methods and the like.**
- **Therefore, disclosure of culpability by informing the police or a magistrate due to fear of enhanced punishment may not qualify the test of constitutionality.**

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- **Here, “whoever, being a member of a group or gang, either singly or jointly, commits any act of theft, snatching, cheating, unauthorised selling of tickets, unauthorised betting or gambling, selling of public examination question papers or any other similar criminal acts, is said to commit petty organised crime”. Offences not defined in the BNS, such as “unauthorised selling of tickets” and “selling of public examination question papers” are not linked with any special Act.**
- **However, the phrase ‘any other similar criminal acts’ of the section is more indefinite and open-ended.**



- Third, the offence of theft, as provided for under proviso to Sub-section (2) of Section 303 of the BNS, also needs to be revisited.
- The proviso to the sub-section says that ‘provided that in cases of theft where the value of the stolen property is less than five thousand rupees, and a person is convicted for the first time, shall on the return of the value of property or restoration of the stolen property, shall be punished with community service’.
- The First Schedule to the Bharatiya Nagarik Suraksha Sanhita (BNSS) categorises the offence under this category as a non-cognisable offence.
- While making theft of any moveable property of less than ₹5,000 a non-cognisable offence may reduce the workload of the police, this may raise some complications that are both legal and practical.
- First, in cities and towns, while the value of ₹5,000 may not impact the pocket of a well-off person, it is a huge sum for say a daily wage earner.



- **Sub-sections (6) and (7) of Section 143 of the BNS which punish trafficking of a child on more than one occasion and trafficking of a person by a public servant or a police officer respectively, and provide only for life imprisonment (which shall mean the remainder of that person's natural life) under both provisions, also seem to suffer from the same illegality as they do not provide any discretion to the judiciary to award punishment.**

How are symbols allotted to political parties?

Why was the Viduthalai Chiruthaigal Katchi denied a common symbol by the ECI in Tamil Nadu?

Rangarajan. R

The story so far:

The Naam Tamilar Katchi (NTK) that secured 3.9% and 6.5% votes in Tamil Nadu in 2019 and 2021 respectively, has been allotted a new common symbol (Mike). The Viduthalai Chiruthaigal Katchi (VCK) that secured 1.09% and 0.99% votes in 2019 and 2021 has been denied a common symbol (Pot). This has raised questions about the allotment of symbols to 'registered unrecognised parties'.

What do the rules specify?

A party is recognised as a 'national' or 'state' party under the provisions of the Election Symbols (Reservation and Allotment) Order, 1968 (Symbols Order) by the Election Commission of India (ECI). The criteria for recognition at the State level consists of (a) winning one Lok Sabha seat for every 25 seats or 3% of Legislative Assembly seats or (b) winning one Lok Sabha or two Assembly seats

along with 6% of votes polled or (c) securing 8% of votes polled in a general election. Symbols are allotted to political parties and contesting candidates as per the provisions of the Symbols Order by ECI. In the largest democracy where a sizeable population is still illiterate, symbols play a crucial role in the voting process. A recognised political party has a reserved symbol that is not allotted to any other candidate in any constituency. For registered but unrecognised political parties, one of the free symbols is allotted as a common symbol during an election if that party contests in two Lok Sabha constituencies or in 5% of seats to the Assembly of a State as the case may be.

What is the current issue?

Rule 10B of the Symbols Order provides that the concession of a common free symbol shall be available to a 'registered unrecognised party' for two general elections. Furthermore, a party shall be eligible for a common symbol in any subsequent general election if it had

secured at least 1% of votes polled in the State on the previous occasion when the party availed of this facility. Such an unrecognised party should however apply for a symbol every time in the prescribed format. This application can be made any time during the period commencing six months prior to the expiry of the term of the Lok Sabha or State Assembly as the case may be. The symbols are thereafter allotted on a 'first-come-first-served' basis.

In the above cases, the NTK had secured more than 1% of votes in the last two elections with the common symbol of 'Ganna Kisan'. However, since they applied for that symbol only in February 2024, the ECI had allotted that symbol to Bharatiya Praja Aikya Party (BPAP), that had applied earlier, based on the 'first-come-first-served' rule. However, the BPAP has not contested elections in Tamil Nadu before. The VCK was declined allotment of a common symbol as it had failed to secure 1% of votes polled in the elections to the State Legislative Assembly

in 2021. The VCK notably has one Lok Sabha MP and four MLAs in Tamil Nadu contesting on the 'Pot' symbol in 2019 and 2021 elections.

What can be the way forward?

The ECI has decided on the applications of NTK and VCK as per existing rules. However, it is counter intuitive from a layman's perspective that the NTK which secured more than 6% of votes polled is not allotted the previous common symbol of its choice. It would be equally baffling for an average voter that the VCK which has elected representatives is ineligible to obtain a common symbol. The two VCK candidates have been eventually allotted the free symbol of 'Pot' by the respective returning officers.

The existing threshold for recognition of a party may continue. The candidates set up by recognised parties enjoy the advantage of being listed at the top of the ballot in the Electronic Voting Machine. Nevertheless, the ECI may consider amending the rules that registered unrecognised parties that secure at least 1% of votes polled in a previous election or have an elected representative in the Lok Sabha or State Assembly, shall have the right to be allotted a common symbol of their choice. This would ensure a fair weightage being given for their past electoral performance and strengthen the democratic process.

Rangarajan R is a former IAS officer and author of 'Polity Simplified'. Views expressed are personal.

THE GIST

▼
The Viduthalai Chiruthaigal Katchi (VCK) that secured 1.09% and 0.99% votes in 2019 and 2021 has been denied a common symbol (Pot).

▼
The VCK was declined allotment of a common symbol as it had failed to secure 1% of votes polled in the elections to the State Legislative Assembly in 2021.

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- The criteria for recognition at the State level consists of (a) winning one Lok Sabha seat for every 25 seats or 3% of Legislative Assembly seats or (b) winning one Lok Sabha or two Assembly seats along with 6% of votes polled or (c) securing 8% of votes polled in a general election.
- Symbols are allotted to political parties and contesting candidates as per the provisions of the Symbols Order by ECI.
- In the largest democracy where a sizeable population is still illiterate, symbols play a crucial role in the voting process



- **What is the current issue?**
- **Rule 10B of the Symbols Order provides that the concession of a common free symbol shall be available to a ‘registered unrecognised party’ for two general elections.**
- **Furthermore, a party shall be eligible for a common symbol in any subsequent general election if it had secured at least 1% of votes polled in the State on the previous occasion when the party availed of this facility.**
- **Such an unrecognised party should however apply for a symbol every time in the prescribed format.**
- **This application can be made any time during the period commencing six months prior to the expiry of the term of the Lok Sabha or State Assembly as the case may be.**
- **The symbols are thereafter allotted on a ‘First-come-first-served’ basis.**

'March Services PMI survey signals activity grew to strongest since 2010'

HSBC index shows services added jobs at the fastest pace since August as new export orders grew at the quickest rate since 2014; the rate of charge inflation accelerated to the highest since July 2017 and business sentiment slid to a four-month low

The Hindu Bureau
NEW DELHI

Business activity in the services sectors likely clocked their fastest expansion in more than 13 and a half years in March, aided by a record uptick in export orders, as per the HSBC India Services Purchasing Managers' Index (PMI) which rose to 61.2 from February's 60.6.

With fresh work orders increasing capacity pressures at service providers, firms raised employment

Surge in services

HSBC's March survey shows sales and business activity in services likely clocked the fastest expansion in more than 13 and a half years



- The Services PMI reading rose to 61.2, from 60.6 in February
- Barring real estate and business services, input costs and output charges rose at a stronger pace for all sectors
- Firms reported higher labour and material costs as key challenges

levels at the joint-fastest pace since November 2022 and the highest pace since August 2023. On the flip

side, input costs as well as charges levied on customers grew at a faster pace, with output charges raised

at the highest rates since July 2017.

Barring real estate and business services, input costs and output charges rose at a stronger pace for all sectors, with the highest input cost inflation seen in consumer services and finance and insurance seeing the steepest surge in selling prices. Firms surveyed for the index reported higher labour and material costs as key challenges.

Though business sentiment levels remained positive, they slipped to a four-month low, with some con-

cerns emerging about competitive pressures.

"India's services PMI rose in March, following a small dip in February, on the back of strong demand that spurred sales and business activity," said Ines Lam, HSBC economist.

Finance and insurance firms saw the highest increase in output and sales. New export business rose at the fastest rate since the PMI series started in September 2014, with orders reported from Africa, Asia, Australia, Europe, the Americas and West Asia.



The hindu analysis by saurabh
pandey sir



The Purchasing Managers Index (PMI)

- **The Purchasing Managers Index (PMI) is a measure of the prevailing direction of economic trends in manufacturing.**
- **The PMI is based on a monthly survey of supply chain managers across 19 industries, covering both upstream and downstream activity.**
- **The value and movements in the PMI and its components can provide useful insight to business decision makers, market analysts, and investors, and is a leading indicator of overall economic activity**



- The headline PMI is a number from 0 to 100. A PMI above 50 represents an expansion when compared with the previous month.
- A PMI reading under 50 represents a contraction, and a reading at 50 indicates no change. The further away from 50 the greater the level of change.
-
- The PMI is calculated as:
-
- $PMI = (P1 * 1) + (P2 * 0.5) + (P3 * 0)$
- Where:
- P1 = percentage of answers reporting an improvement
- P2 = percentage of answers reporting no change
- P3 = percentage of answers reporting a deterioration
-

RBI holds firm on rupee derivatives, defers rules to May 3

The Hindu Bureau

MUMBAI

The Reserve Bank of India (RBI) on Thursday reiterated that its stance on the regulatory framework for Exchange Traded Currency Derivatives (ETCD) had remained consistent over the years and underlined there would be no change in its policy approach.

Defers implementation

However, following feedback from participants, the RBI said it was deferring the implementation of the

consolidated currency derivative rules to May 3, from April 5.

“As hitherto, participants with a valid underlying contracted exposure can continue to enter into ETCDs involving the Indian Rupee up to a limit of \$100 million without having to produce documentary evidence of the underlying exposure,” the RBI said.

The RBI is emphasising the norm relating to ‘underlying contracted exposure’ to curb the potential for speculative trading in currency derivatives.



The hindu analysis by saurabh
pandey sir



Derivatives

- **Derivatives are contracts that get their value from an underlying asset – equities, bonds, commodities, and currencies, among many.**
- **In layman terms, if the cost of raw material of a particular product increase, the price of that product will also rise. The same principle applies to derivatives.**



What are Currency Derivatives?

- **Currency Derivatives are exchange-traded contracts deriving their value from their underlying asset, i.e., the currency.**
- **The investor buys or sells specific units of fixed currency on a pre-specified date and rate.**
- **These contracts are actively traded on the stock exchanges and are mainly used by importers and exporters to hedge against domestic currency fluctuation**

What is 'Basel III endgame' and why are U.S. banks worked up about it?

The rules, applying to banks with over \$100 bn in assets, would overhaul the way the biggest banks manage their capital, with knock-on implications for lending, trading activities; banks say additional capital is unnecessary and will hurt the economy and have aggressively lobbied against the project

EXPLAINER

Reuters

The U.S. Federal Reserve said last month it will make significant changes to a sweeping proposal for stricter bank capital requirements known as the "Basel III endgame" in a win for Wall Street banks that have waged an unprecedented campaign to water down the rule. What is Basel and why is it so contentious?

The rules, which would apply to banks with over \$100 billion in assets, would overhaul the way the biggest banks manage their capital, with knock-on implications for lending and trading activities.

Banks say additional capital is unnecessary and will hurt the economy, and have aggressively lobbied against the project.

'Basel III endgame'

The Basel Committee on Banking Supervision is a panel convened by the Bank for International Settlements (BIS) in Basel, Switzerland, which aims to ensure regulators globally apply similar minimum capital standards so that banks can survive loan losses during tough times.

The committee's "Basel III" standard was agreed after the 2007-09 global financial crisis. It includes



Sweeping overhaul: The U.S. proposal would overhaul how banks gauge their risk. REUTERS

numerous capital, leverage and liquidity requirements. Regulators across the world have worked for years to implement many of those standards, and the so-called "endgame," agreed in 2017, is the final iteration. The "endgame" proposal, unveiled in July, refines Basel's approach to setting capital based on the riskiness of banks' activities.

The U.S. proposal would overhaul how banks gauge their risk, and in turn, how much capital they should set aside as a cushion against potential losses. The main areas of focus are credit risk, market risk and operational risk.

On credit risk, regulators are seeking to end banks' ability to use their own internal risk models

when determining how much capital should be held against lending activities, like mortgages or corporate loans.

Federal Reserve Vice Chair for Supervision Michael Barr said those internal models can often underestimate risk, as banks are incentivised to keep their capital costs low. Instead, regulators would prefer uniform modelling standards across large banks. Similarly, the proposal would establish new requirements for how banks gauge the risk posed by swings in the markets and potential losses from trading. Regulators say these market risks are currently being understated.

When assessing these risks, banks will be permitted to continue using inter-

nal models approved by regulators, although Mr. Barr has said standardised models may be required for particularly complex risks. Banks will also have to model trading risks at the level of the individual trading desk, as opposed to at an aggregate level.

All told, the changes would result in higher capital needs for banks with large trading operations.

Gauging operational risk is a key new area of the Basel Endgame. This refers to the potential losses banks could face from unexpected sources, such as failed internal policies, management mistakes, litigation costs or external events. Similar to credit risk, regulators are looking to replace existing internal models with a stan-

dardised approach, which would take into account a bank's various activities and historical operational losses when calculating capital levels.

Banks warned this approach could lead to significantly higher costs for some banks that rely heavily on non-interest fee income, such as credit card and investment banking fees. These fees are included in a formula used to help calculate operational risk, and banks warn it could lead to disproportionately higher capital requirements for some firms if not capped.

'Well capitalised'

While the rules have been years in the making, banks had hoped U.S. regulators would offer relief elsewhere by making tweaks to existing capital requirements to help offset the new hikes. They argue banks are well-capitalised, having withstood the COVID-19 pandemic and regularly clearing the Fed's annual stress tests, and any capital hikes are unjustified. Banks have also complained that regulators have not provided sufficient data to justify the new increases, and have even threatened to sue.

Mr. Barr said that most banks already have enough capital to meet the requirements, and those that need to raise funds could do so by retaining earnings for

less than two years while still paying dividends. And regulators have also pointed to the failure of three lenders in 2023 as evidence they need to be vigilant.

Following months of criticism and pressure from the industry, U.S. regulators are expected to meaningfully reduce the impact of the proposal in a broad rewrite. Reuters reported in March the agencies are expected to significantly lower the overall capital impact of the new rules. Fed Chair Jerome Powell confirmed that trajectory when he told Congress last month he expects "broad, material" changes to the plan.

The Fed and other regulators are currently digesting hundreds of public comments submitted on the proposal, most of which have been critical. Regulators are also expected to conduct additional data analysis around the proposal.

No timeline has been set for completing the rule-writing project, and an open question is whether regulators opt to re-propose the rule following the rewrite. Such a step could ease industry complaints by giving them a chance to offer more feedback, but would significantly delay the effort and potentially imperil it, as regulatory leadership could change following the November presidential election.



The hindu analysis by saurabh
pandey sir



Basel III endgame'

- The Basel Committee on Banking Supervision is a panel convened by the Bank for International Settlements (BIS) in Basel, Switzerland, which aims to ensure regulators globally apply similar minimum capital standards so that banks can survive loan losses during tough times.
- The committee's "Basel III" standard was agreed after the 2007-09 global financial crisis.
- It includes numerous capital, leverage and liquidity requirements.
- Regulators across the world have worked for years to implement many of those standards, and the so-called "endgame," agreed in 2017, is the final iteration.
-



- **The “endgame” proposal, unveiled in July, refines Basel’s approach to setting capital based on the riskiness of banks’ activities.**
- **The U.S. proposal would overhaul how banks gauge their risk, and in turn, how much capital they should set aside as a cushion against potential losses.**
- **The main areas of focus are credit risk, market risk and operational risk.**



- **The U.S. Federal Reserve said last month it will make significant changes to a sweeping proposal for stricter bank capital requirements known as the “Basel III endgame” in a win for Wall Street banks that have waged an unprecedented campaign to water down the rule**



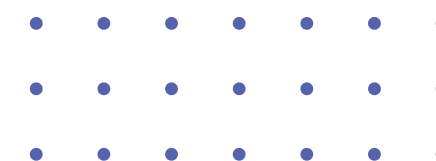
Topics



- **Forest Fire**
- **Dam Burst In russia (mapping, Types of Dam)**
- **UNHRC**
- **Antimicrobial resistance**
- **Essay**



By saurabh pandey sir



Forest Fire



Understanding the

TYPES OF WILDFIRE



GROUND FIRES

Fueled by buried, dead vegetation such as peat

Move slowly underground, but can ignite surface fires

Difficult to extinguish if fuel is abundant

Can last for months or even years

SURFACE FIRES

Fueled by surface detritus, such as fallen leaves, twigs & dry vegetation

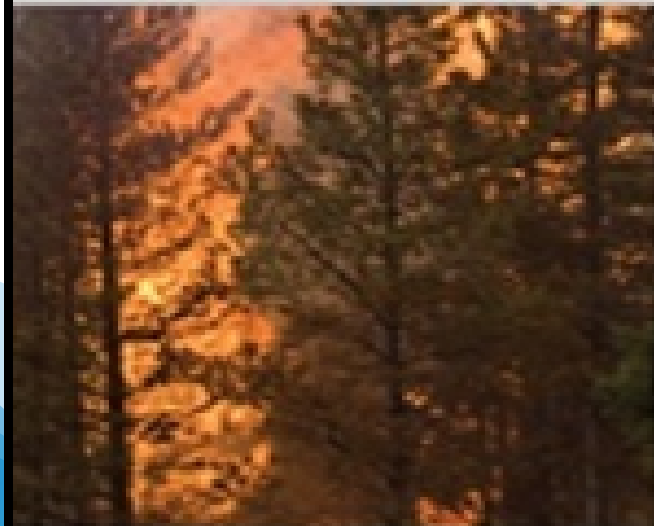
Generally the easiest to extinguish



CROWN FIRES

Burn in the tree canopy

Most dangerous type of wildfire, burning extremely hot & often spreading rapidly



Forest Fire

• ——— FOUR WAYS ——— • FIRE CAN STOP NATURALLY

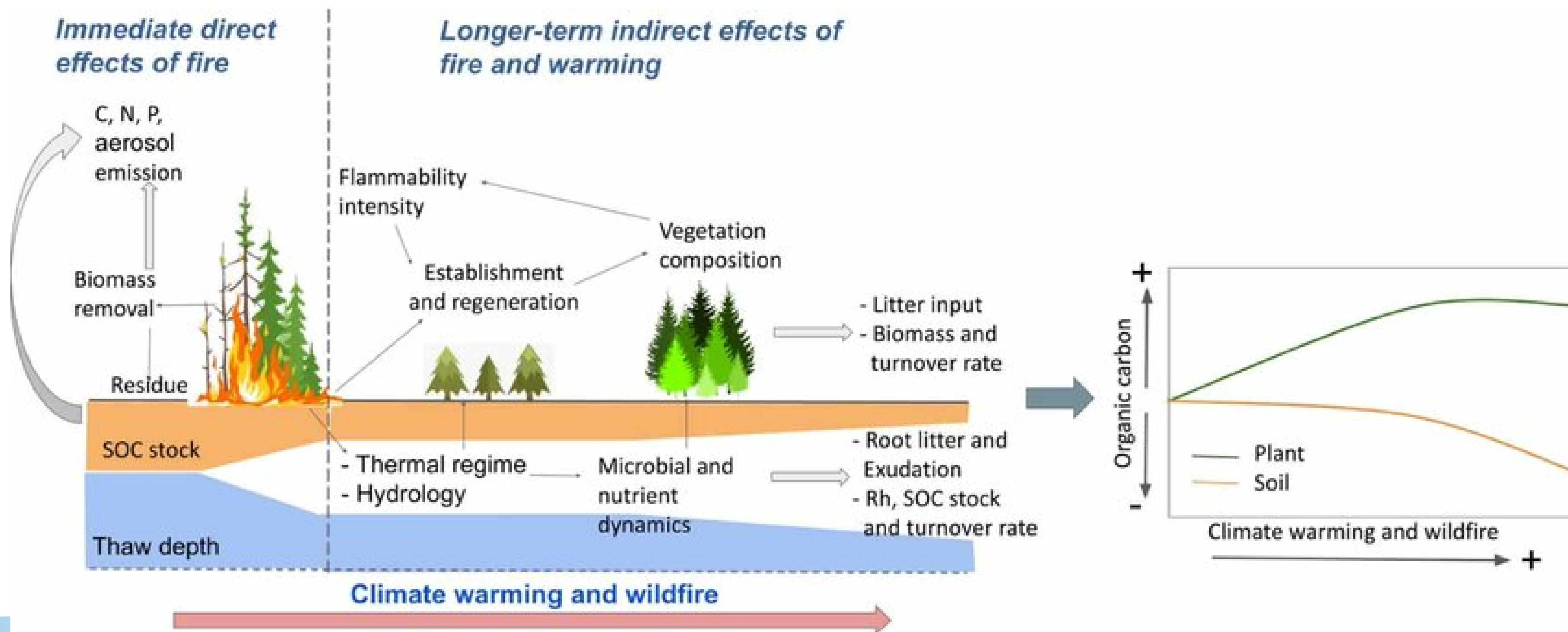
Higher Humidity &
Lower Wind Speeds

Existing Human-Made
Barriers, Such as Roads

Natural Barriers,
Such as Bodies of Water

Lack of Fuel, Such as Areas
with Recent Burns

 **WESTERN
FIRE CHIEFS
ASSOCIATION**



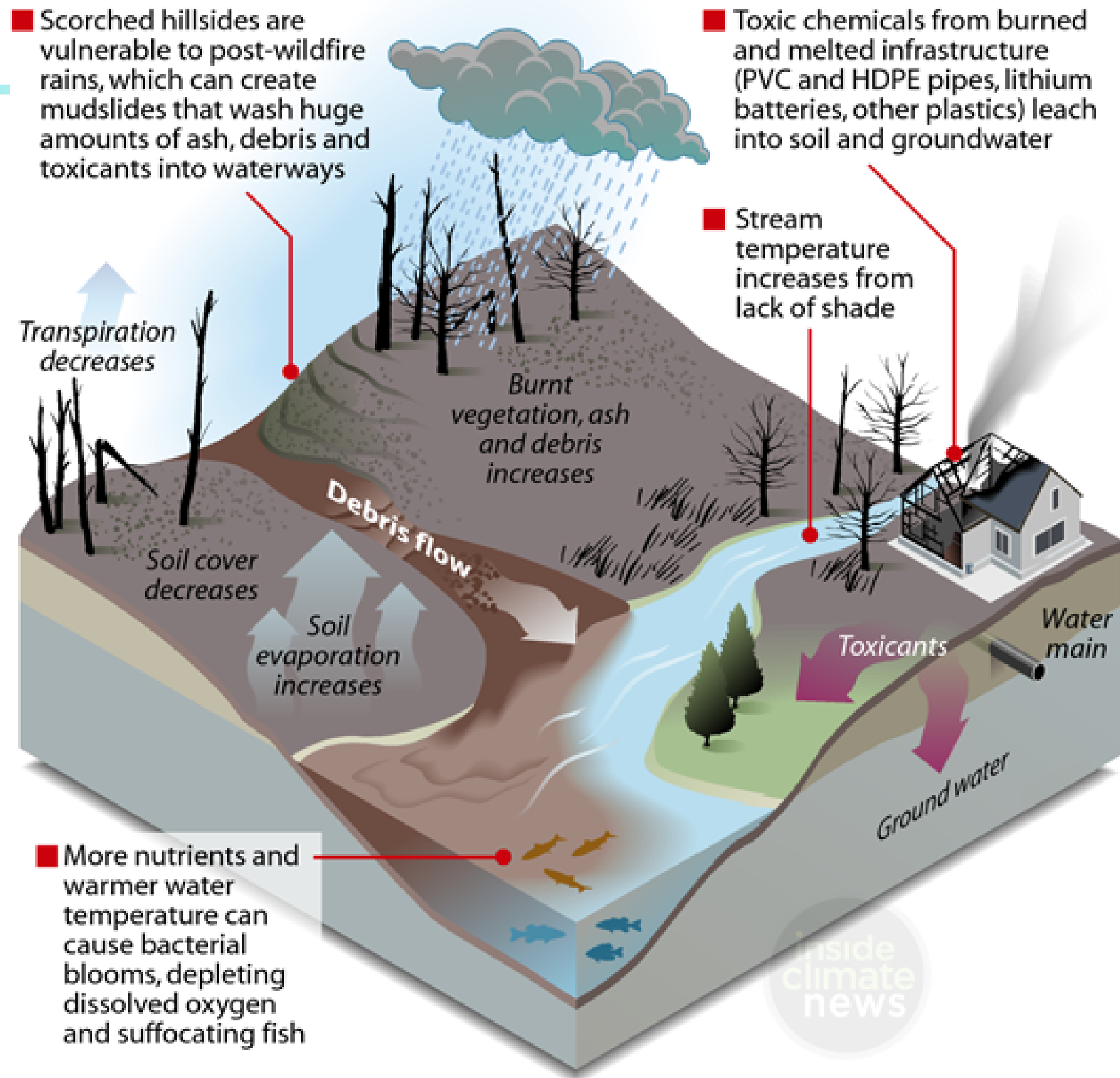
How Wildfires Can Negatively Impact Water Quality

Intense fires cause chemical reactions that release metals, nutrients and other toxicants into the soil. Subsequent rains can wash these contaminants into rivers and reservoirs, which can negatively affect wildlife, agriculture and humans. Here are some examples:

■ Scorched hillsides are vulnerable to post-wildfire rains, which can create mudslides that wash huge amounts of ash, debris and toxicants into waterways

■ Toxic chemicals from burned and melted infrastructure (PVC and HDPE pipes, lithium batteries, other plastics) leach into soil and groundwater

■ Stream temperature increases from lack of shade



■ More nutrients and warmer water temperature can cause bacterial blooms, depleting dissolved oxygen and suffocating fish

Dam bursts in Russia's Urals; evacuation under way

Reuters

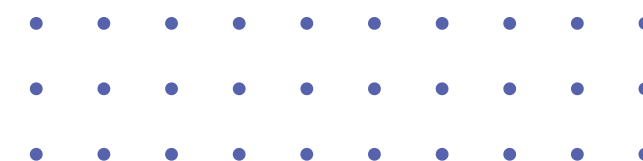
MOSCOW

A dam burst in the Russian Urals mountain city of Orsk on Friday and an evacuation was under way, local emergency services said.

State news agency TASS quoted the Emergencies Ministry as saying that up to 4,000 houses accommodating 10,000 residents of a suburban area of Orsk, which has a total population of around 2,30,000, could be inundated as a result of the dam breach.

Local emergency services said in a statement that they were working to evacuate residents and shore up the dam in Orsk.

A state of emergency has been declared in the Orenburg region, the Emergencies Ministry said.



Dam Brust In Russia

- an emergency was declared across the entire Orenburg region after levels in the Ural River rose dangerously because of melting ice.

The region - which includes Orsk, other Urals provinces and parts of neighbouring Kazakhstan - has been hit by widespread flooding in recent days



The Hindu analysis by saurabh pandey sir



- The region - which includes Orsk, other Urals provinces and parts of neighbouring Kazakhstan - has been hit by widespread flooding in recent days



The Hindu analysis by saurabh pandey sir



- Last year Dam Burst in pic shown .

Kakhovka dam and reservoir



■ Russian military control
 ▨ Limited Russian military control
 ■ Held or regained by Ukraine since 12 May 2023
 Russia annexed Crimea in 2014

Source: ISW (21:00 GMT, 5 June)

BBC

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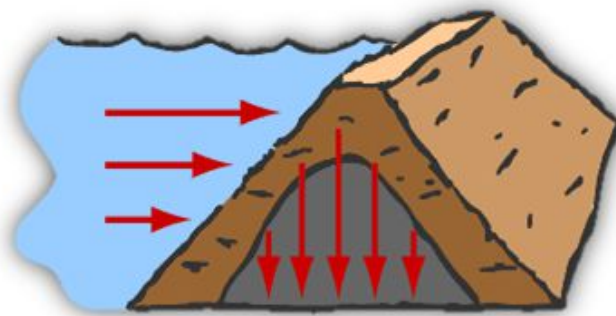
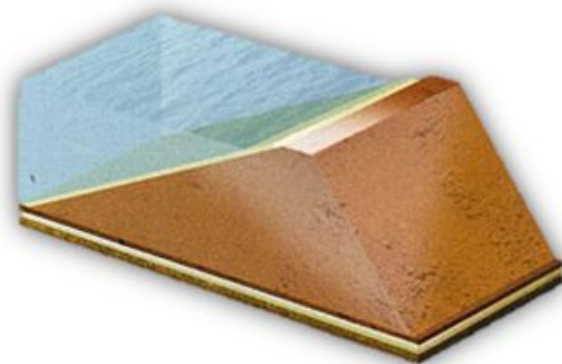


Types of DAM

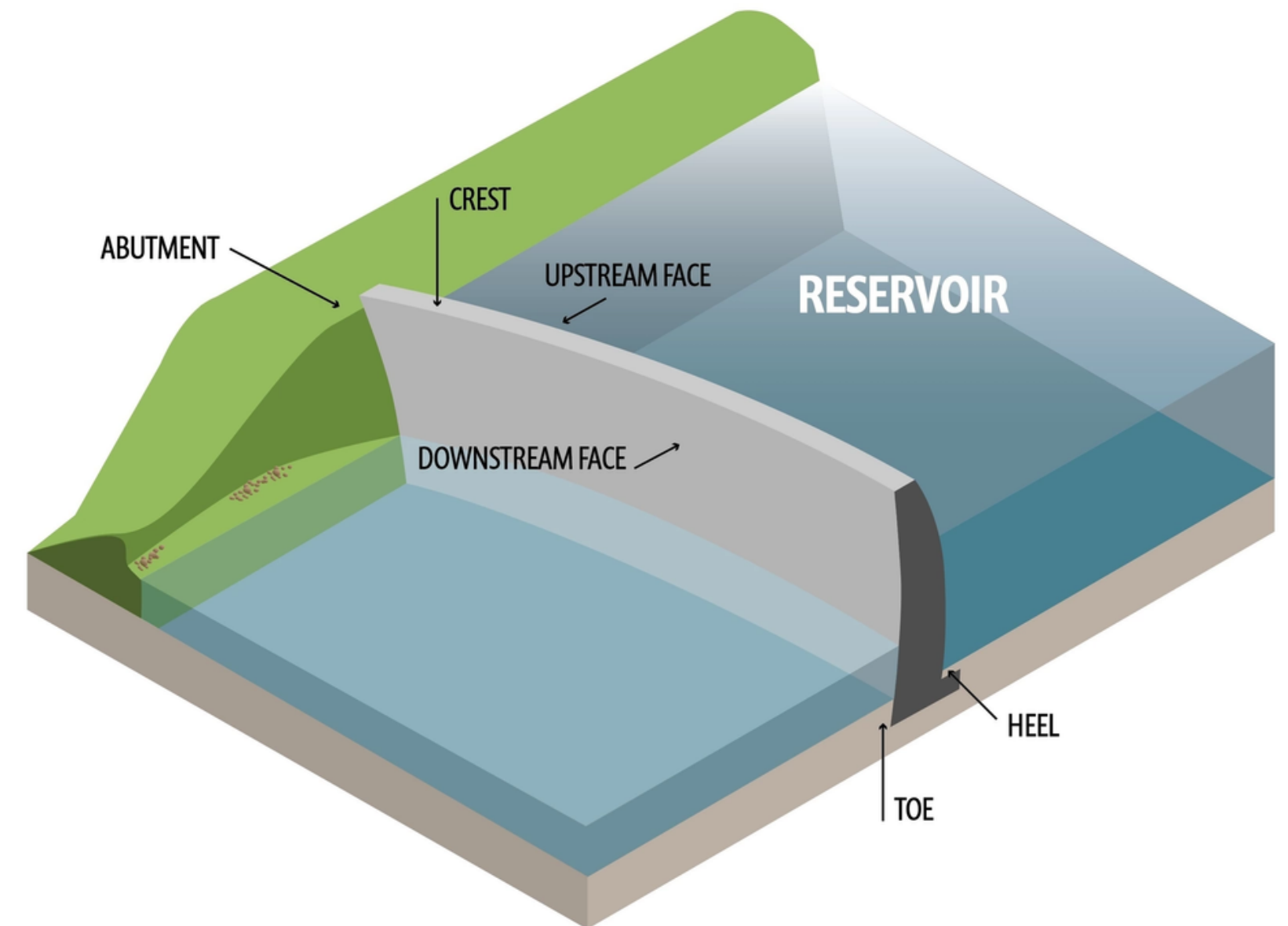


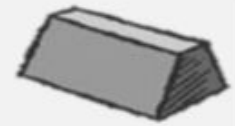
EMBANKMENT DAM

- It is a non-rigid dam which resists the forces acting on it by its shear strength and upto some extent by its own weight
- Earth dams are constructed where the foundation or the underlying material are weak to support the masonry dam.
- They are trapezoidal in shape and mainly built with clay, sand and gravel, hence they are also known as Earth fill dam or Rock fill dam.



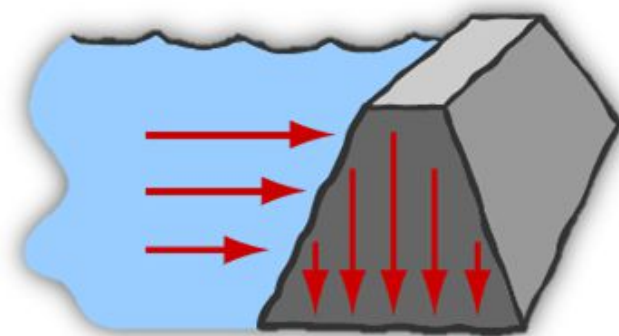
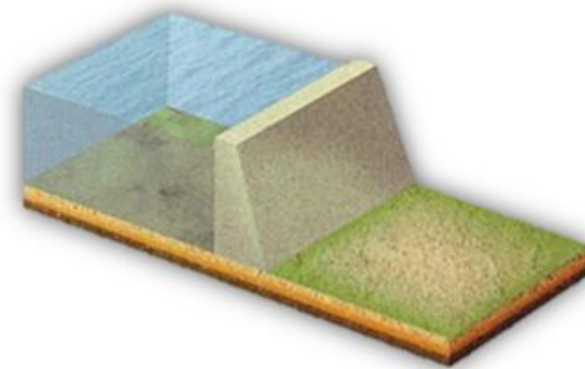
ARCH DAM





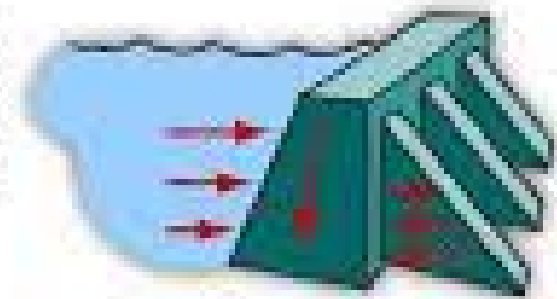
GRAVITY DAM

- It is a masonry or concrete dam which resists the forces acting on it by its own weight.
- These dams are heavy and massive wall-like structures of concrete in which the whole weight acts vertically downwards. Its c/s is approximately triangular in shape.
- As the entire load is transmitted on the small area of foundation, such dams are constructed where rocks are competent and stable.



BUTTRESS DAM

- It is a masonry or concrete dam which resists the forces acting on it by series of structural supports called buttresses.
- Buttresses transmit force from wall of dam to wider area of ground. These buttresses are in the form of triangular or multiple arch masonry or reinforced concrete walls.
- This type of structure can be considered even if the foundation rocks are little weaker.



The Hindu analysis by saurabh pandey sir



Stop selling or shipping arms to Israel, UNHRC tells nations

The rights body also called on UN-backed independent investigators to report on shipments of weapons, munitions and ‘dual use’ items that could be used by Israel against Palestinians

Associated Press
GENEVA

The UN’s top human rights body called on countries to stop selling or shipping weapons to Israel in a resolution passed on Friday that aims to help prevent rights violations against Palestinians amid Israel’s blistering military campaign in Gaza.

The 47-member-country Human Rights Council voted 28-6 in favour of the resolution, with 13 abstentions.

The sweeping measure takes aim at an array of Israeli actions such as impeding access to water and limiting shipments of humanitarian aid into Palestinian areas. It also calls on UN-backed independent



A screen showing the result of the UNHRC vote on a resolution on the Israeli military campaign in Gaza, in Geneva on Friday. AP

investigators to report on shipments of weapons, munitions and “dual use” items – that have both civilian and military applications – that could be used by Israel against Palestinians.

While non-binding, the resolution is bound to raise

international pressure on Israel as a sign of widespread concern about its military campaign in Gaza, begun in response to the attacks in Israel by armed militants on October 7, that has led to the killings of nearly 33,000 Palestinians.

Western countries were divided. The U.S. and Germany opposed the resolution, France and Japan abstained, while Belgium, Finland and Luxembourg voted in favour.

Tough line

In a sign of Washington’s growing impatience with Israel’s handling of the military campaign, U.S. President Joe Biden issued a stark warning to Israeli Prime Minister Benjamin Netanyahu on Thursday that future U.S. support for Israel’s Gaza war depends on the swift implementation of new steps to protect civilians and aid workers.

On Friday, Israel announced it would allow “temporary” aid deliveries into famine-threatened northern Gaza.



The Hindu analysis by saurabh pandey sir





About UNHRC

- The Human Rights Council is the main intergovernmental body within the United Nations responsible for human rights.
- Established in 2006 by the General Assembly, it is responsible for strengthening the promotion and protection of human rights around the globe.
- The Council, composed of 47 Member States, provides a multilateral forum to address human rights violations and country situations. It responds to human rights emergencies and makes recommendations on how to better implement human rights on the ground.
- The Council benefits from substantive, technical, and secretariat support from the Office of the High Commissioner for Human Rights (OHCHR).
- The Human Rights Council replaced the former United Nations Commission on Human Rights.

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Functions

- Serves as an international forum for dialogue on human rights issues with UN officials and mandated experts, states, civil society, and other participants;
- Adopts resolutions or decisions during regular sessions that express the will of the international community on given human rights issues or situations. Adopting a resolution sends a strong political signal which can prompt governments to take action to remedy those situations;
- Holds crisis meetings known as special sessions to respond to urgent human rights situations, 36 of which have been held to date;
- Reviews the human rights records of all United Nations Member States via the Universal Periodic Review;

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Membership and Election

- **The Human Rights Council consists of 47 Member States elected directly and individually by a majority of the 193 states of the UN General Assembly. Elections take place every year.**
- **Seats are equitably distributed among the five UN regional groups, with one-third of the members being renewed each year.**
- **Each member serves a three-year term. Membership is limited to two consecutive terms.**
- **As of December 2022, 123 of the 193 Member States of the United Nations have served as Council members.**

The Hindu analysis by saurabh pandey sir





If not checked, AMR is expected to reduce life expectancy by an average of 1.8 years by 2035. ISTOCKPHOTO

Should take action against antimicrobial resistance, says report

Agence France-Presse
GENEVA

Political leaders are ignoring the growing danger of antimicrobial resistance, which could lead to an unprecedented health and economic catastrophe, a high-level task force warned on Thursday.

“The world now has a limited and critical window of opportunity to respond at the scale and with the urgency proportionate to the rapidly increasing threats posed by AMR,” according to a report published on Thursday by the Global Steering Group on Antimicrobial Resistance.

Resistance to antimicrobials (AMR) – antibiotics, antifungals, and antiparasitics – is already wreaking havoc, and is the result of the massive use of these products to treat humans, animals and food. Evidence is mounting that “changes occurring in the natural environment due to the climate crisis are increasing the spread of infectious disease, potentially including drug resistant infections”, the report added.

The report is part of an effort to spur action by global leaders ahead of a meeting in New York on September 26.

Microbes that are not completely eradicated by a given substance can develop resistance to that product, gradually reducing the arsenal of drugs available to treat infections. AMR is already one of the world’s leading causes of death, directly responsible for 1.27 million deaths a year, the report said.

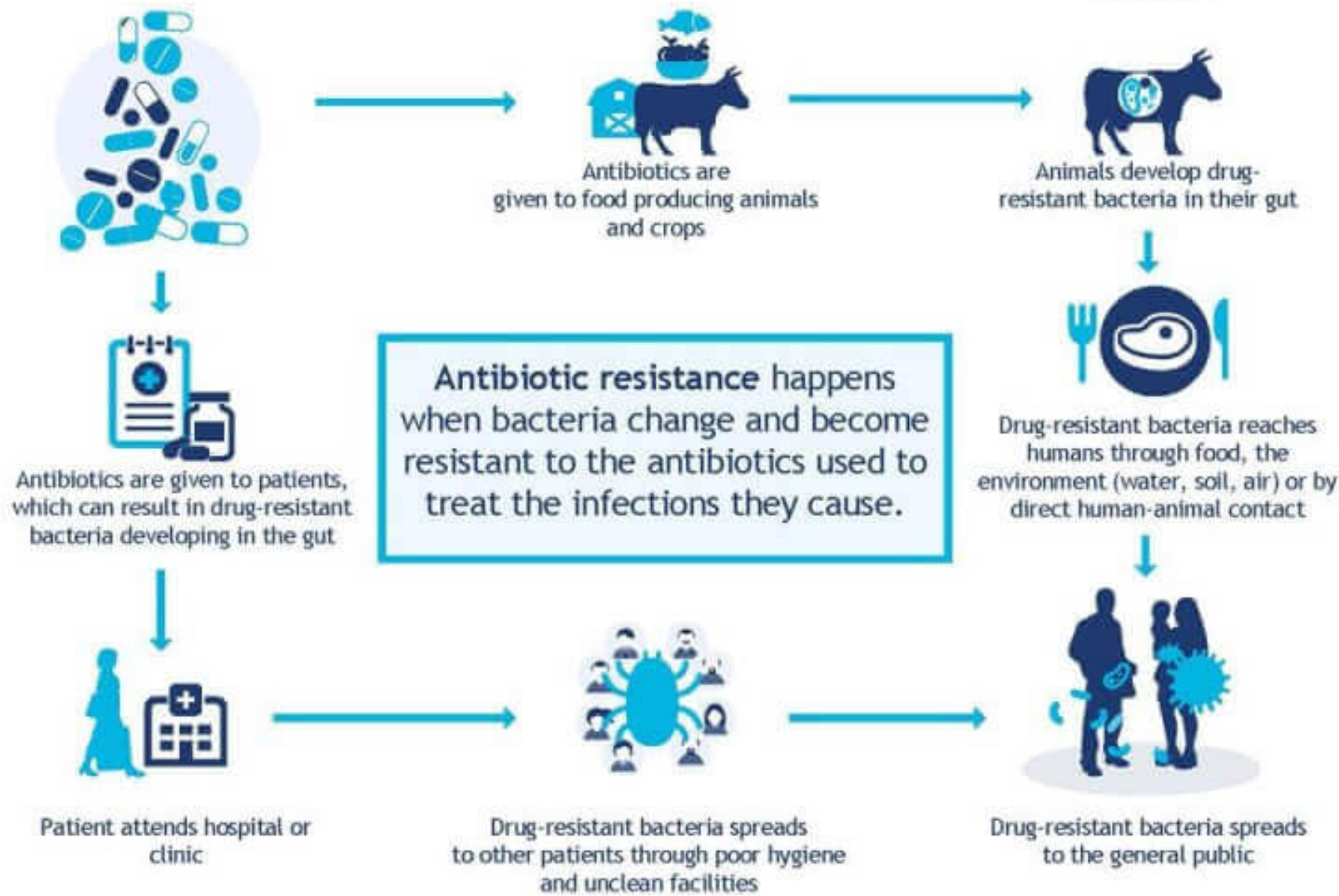
If left unchecked, AMR is expected to reduce life expectancy by an average of 1.8 years by 2035, leading to unprecedented healthcare costs and economic losses. Within a decade, AMR is estimated to cost the world \$412 billion a year in additional health costs and \$443 billion a year in lost labour productivity, according to an economic impact study commissioned by the Global Steering Group.



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ANTIBIOTIC RESISTANCE HOW IT SPREADS



www.who.int/drugresistance

#AntibioticResistance



CAUSES OF ANTIBIOTIC RESISTANCE



Antibiotic resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause.



Over-prescribing of antibiotics



Patients not finishing their treatment



Over-use of antibiotics in livestock and fish farming



Poor infection control in hospitals and clinics



Lack of hygiene and poor sanitation



Lack of new antibiotics being developed

www.who.int/drugresistance

#AntibioticResistance



The Hindu analysis by saurabh pandey sir



Antimicrobial resistance

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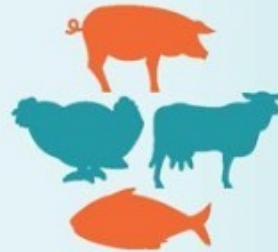
CAUSES OF ANTIBIOTIC RESISTANCE



Over-prescribing of antibiotics



Patients not taking antibiotics as prescribed



Unnecessary antibiotics used in agriculture



Poor infection control in hospitals and clinics



Poor hygiene and sanitation practices



Lack of rapid laboratory tests

Consequences of AMR

Greater number of AMR deaths (currently 5mn per year)



Economic loss

Routine treatment becomes riskier to perform



Steps taken

India

- **Chennai declaration (2012):** It promotes antibiotic stewardship
- **Red-line campaign**
- **National action plan** on AMR (2017-21)

Global

- **EU:** ban on preventive mass medication in animals using antibiotics or other drugs.
- **UN:** One Health Approach
- **WHO:** AWaRe Classification of antibiotics

The Hindu analysis by saurabh pandey sir





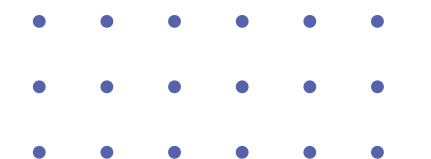
Topics



- **Mass death of Penguin (h5N1)**
- **electronic Fibre**
- **hu1F5**
- **SMEAR MICROSCOPY**
- **New solar power rules Essay**



By saurabh pandey sir



Influenza A H5N1 detected in dairy cows in 6 states in the U.S.

The exact extent of the spread of H5N1 in cows has not yet been ascertained since cattle are not routinely tested for avian influenza and the symptoms have been relatively mild

Bani Jolly
Vinod Scaria

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

In late March 2024, a multistate outbreak of H5N1 in dairy cows was detected in the U.S. In what started as a mystery disease affecting dairy herds in Texas, the U.S. Department of Agriculture (USDA) detected the highly pathogenic strain of the virus in herds across the states of Texas and Kansas. The affected animals displayed symptoms including loss of appetite, low-grade fever, and reduced lactation. This marked the first time H5N1 had been

H5N1 outbreak in dairy cows

The H5N1 outbreak in dairy cows began in late March 2024 in Texas



Symptoms: The affected animals displayed symptoms including loss of appetite, low-grade fever, and reduced lactation. SPECIAL ARRANGEMENT

■ This is the first time that H5N1 has been detected in cattle. It raises concerns about potential transmission routes

■ So far, H5N1 has been detected in over 12 herds from six states — Texas, Kansas, Michigan, New Mexico, Idaho and Ohio

■ In Texas, wild birds and cats that were in proximity to the affected farms have tested positive for the virus

■ Transmission of the virus within cattle has not yet been ruled out

■ In April 2024, a human infection of H5N1 was

reported from Texas

■ In general, the risk of infections for humans remains low, but farm workers are at a higher risk of getting infected

■ H5N1 infections in humans can range from mild symptoms to severe illness and even death

■ So far, 800 sporadic human H5N1 cases have been reported from over 20 countries, with a case-fatality ratio of 53%

transmission routes and the broader impact on the dairy and meat industry. To date, H5N1 has been detected in over 12 herds from six states — Texas, Kansas, Michigan, New Mexico, Idaho and Ohio.

In Texas, other animals in proximity to the affected farms — wild birds and cats — also showed signs of illness and have tested positive for the virus. The exact extent of the spread of H5N1 in cows has not yet been ascertained since cattle are not routinely tested for avian influenza and the symptoms have been relatively mild, leaving possibilities that there may be other undetected infected herds. The initial detections in late March in Texas, Kansas, and Michigan

sion. Given the pace of the spread of infection across herds, the transmission of the virus within cattle has not yet been ruled out. Investigations are ongoing to determine the exact source of the spread to cows.

Genomic insights

In April 2024, a human infection of H5N1 was reported from Texas. The infected individual had contact with cows presumed to be infected with the virus. Fortunately, the patient had mild illness, with symptoms like eye redness, and has recovered after being treated with antivirals. Following this case, the CDC has reiterated that the risk of infections for humans remains low, although people with pro-

such as farm workers, are at a higher risk. This is the second case of human H5N1 infection reported from the U.S. A previous case was reported in 2022 from Colorado. Human H5N1 infections are rare but have been sporadically reported in several countries.

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

ly one resulting in death.

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

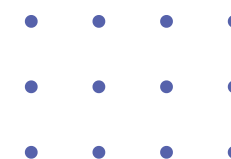
Globally, 2023 also saw potential spillover events with H5N1 linked to the deaths of seals in Russia and infections in marine mammals in Peru. Early in 2023, dead seals in Russia and infected marine mammals in Peru suggested H5N1 might jump from birds to mammals. Additionally, the U.K. reported deaths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

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

(Bani Jolly is a senior scientist at Karkinos Healthcare and Vinod Scaria is a senior



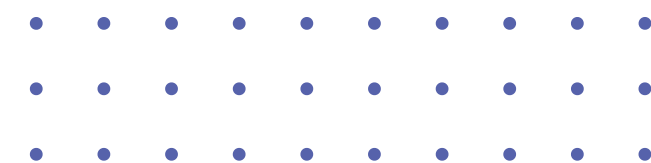
- En masse deaths of a penguin species was reported on the remote southern continent of Antarctica.
- H5N1 influenza cases were first reported in South America in 2022, and have spread aggressively among wildlife species.
- The disease subsequently made its way to Antarctica.



H5N1



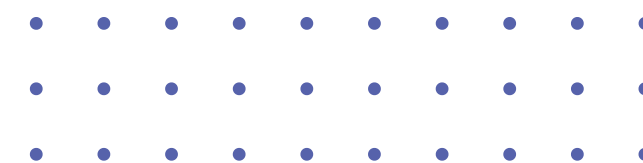
- H5N1 is primarily spread by poultry, but it can also infect humans and other mammals, which could be dangerous for the general public's health.
- Direct contact with infected birds or their droppings, as well as contaminated surfaces or settings, are the ways in which the virus is spread
- Influenza type A subtype H5N1 can cause an illness known as 'avian influenza' or 'bird 'flu' in birds, humans and many other animal species.
- HPAI A(H5N1) – 'highly pathogenic avian influenza virus of type A of subtype H5N1' – is the causative agent and is enzootic in many bird populations,





Fiber coupled to the body enables textile electronics

A flexible electronic fiber that utilises the human body as part of the circuit enables textile-based electronics without the need for batteries or chips, a study report. According to the researchers, the approach is well-suited for scalable manufacture of comfortable fiber-based electronics for a wide range of applications, including “smart” clothing. The soft, thin fiber that enables wireless visual-digital interactions utilises the human body as part of the circuit. The approach harvests electromagnetic energy.



Electronic Fibre

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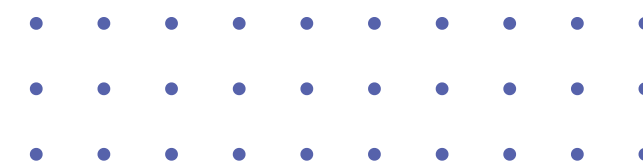
The Hindu analysis by saurabh pandey sir





Antibody therapy protects large animals from Nipah

Scientists have developed a potent antibody treatment that can protect large and small animals from infections with the Nipah virus, a deadly emerging pathogen with mortality rates as high as 40% to 90% in humans. The antibody treatment named hu1F5 targets the prefusion form of the Nipah virus F protein. In hamsters, the researchers found that administering the antibody one day after infection led to a 100% survival rate. It protected macaques.



hu1F5

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The Hindu analysis by saurabh pandey sir



What is Nipah virus?



NIPAH VIRUS (NiV) INFECTION IS A NEWLY EMERGING ZOOONOSIS THAT CAUSES SEVERE DISEASE IN BOTH ANIMALS AND HUMANS

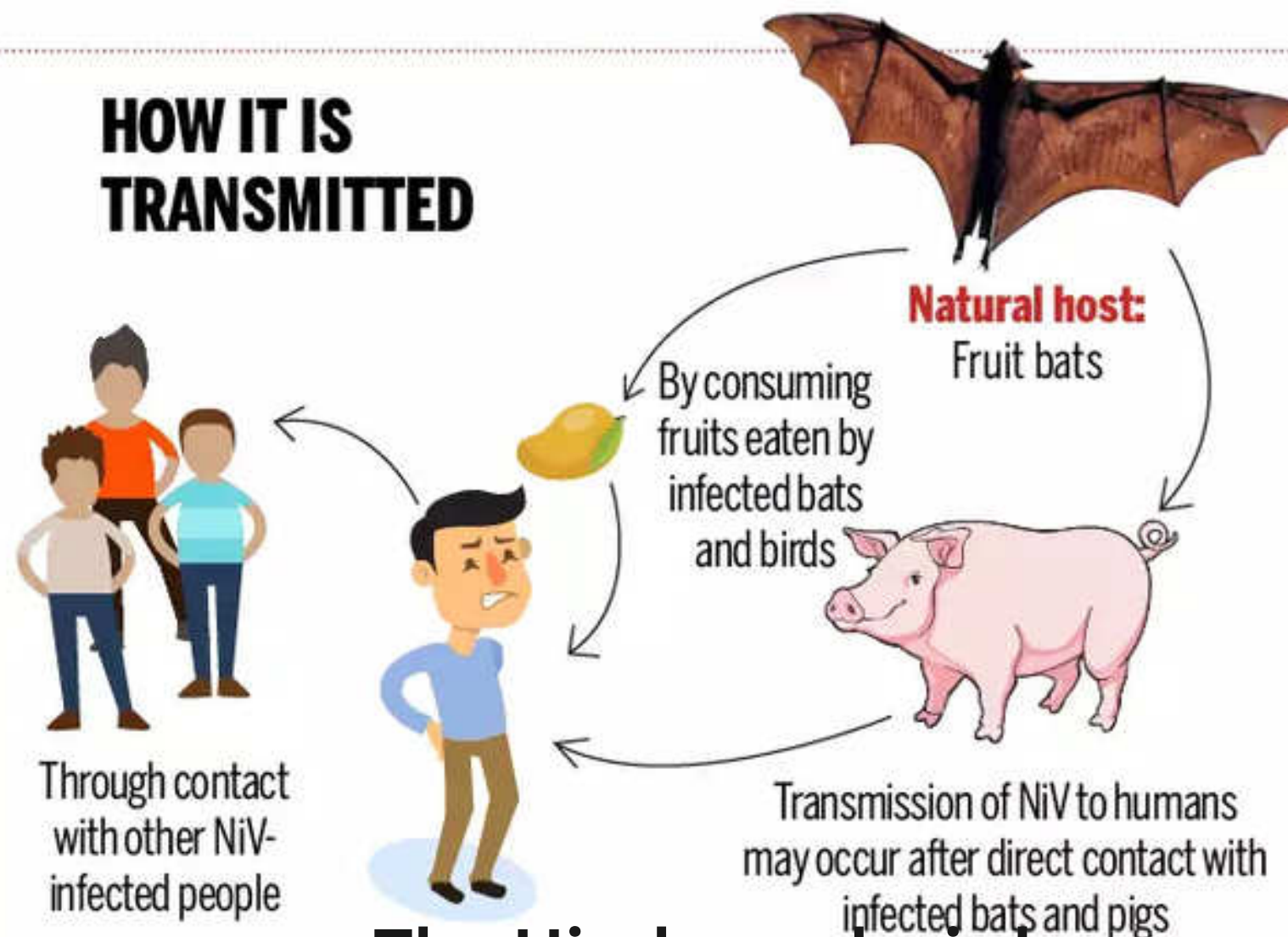


NiV first identified in 1998 during an outbreak in Malaysia



Fruit bats are natural hosts of NiV

HOW IT IS TRANSMITTED



The Hindu analysis by saurabh pandey sir

Over-reliance on smear microscopy for TB detection

R. Prasad

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

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

testing offered upfront using a molecular test in 2023.

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

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



Grim choices: The proportion of molecular testing in 2023 has not increased compared with 2022.

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

smear microscopy, of the 1.89 crore persons tested, only 5.78 lakh were diagnosed with TB, representing a yield of just 3%.

Smear microscopy

The National Strategic Plan 2017-2025 wanted to reduce the number of presumptive TB patients who are offered sputum smear

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

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

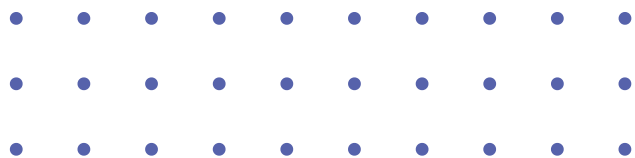
Four years after the launch of the revised NSP, India is nowhere near meeting the targets. One of the main objectives of the revised NSP 2020-2025 is

the early detection of presumptive TB cases.

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

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

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

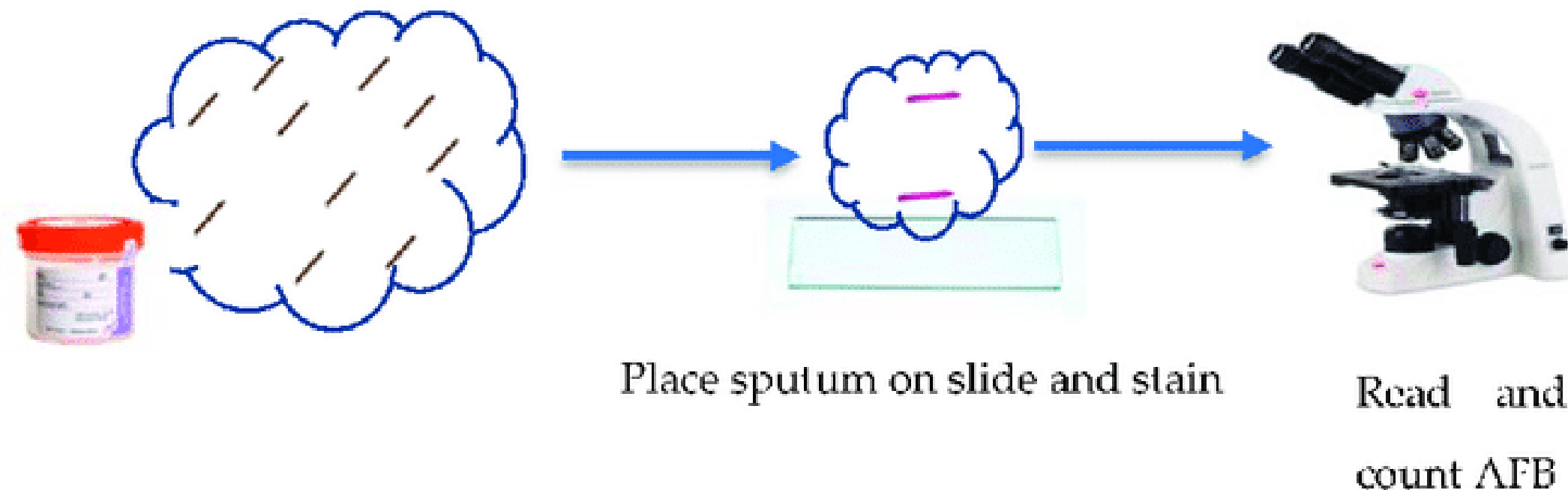




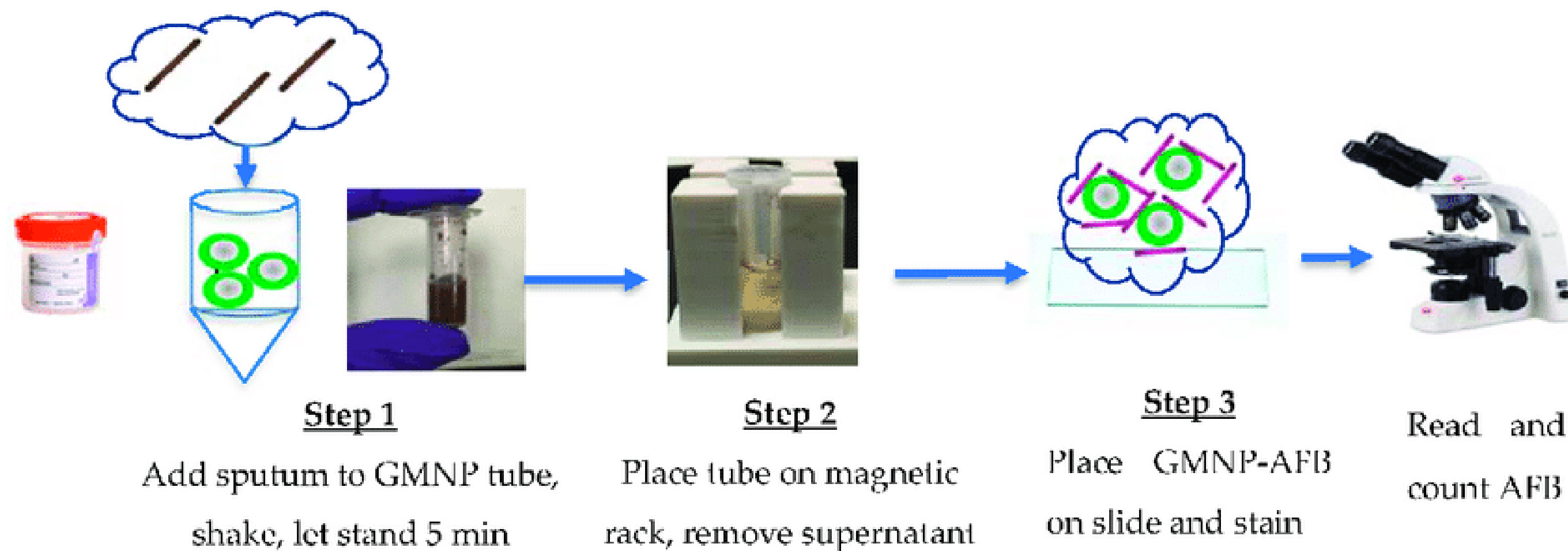
SMEAR MICROSCOPY

- **Smear Microscopy: Microscopic. examination of specially stained smears to. detect acid-fast organisms such as.**
- **Mycobacterium tuberculosis and non- tuberculous mycobacteria (NTM)**

Conventional AFB Smear Microscopy (SSM)



Nanoparticle-based Colorimetric Biosensing Assay (NCBA)



The Hindu analysis by saurabh pandey sir

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New solar power rules

- To incentivise India's solar module manufacturing industry, the Ministry of New and Renewable Energy (MNRE) has brought into effect from April 1 an executive order, The Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019.

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What is the context of the executive order?

- Being on the list as an ‘approved’ manufacturing facility certifies a company as a legitimate manufacturer of solar panels and not a mere importer or assembler.
- This became necessary because India’s solar industry, its claim of indigenouness notwithstanding, is heavily reliant on imports of cheaper and comparable-quality solar modules from China.
- Modules are multiple solar panels joined together. Solar panels are an assembly of solar cells.
- Despite being among the top manufacturers in the world and a commitment to scale solar installation four-fold by 2030, local production of these cells and modules is much below demand. India also has limited capacity to make the raw material of a cell – ingots, wafers – and is dependent on imported cells.

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What is the context of the executive order?

- Why is India reliant on imports?
- The creation of such a list was also aimed at restricting imports from China, which controls nearly 80% of the global supply, with the downturn in diplomatic relations between the countries also being a factor.
- India has ambitious plans of sourcing about 500 GW, nearly half its requirement of electricity, from non-fossil fuel sources by 2030.
- This would mean at least 280 GW from solar power by that year or at least 40 GW of solar capacity being annually added until 2030.
- In the last Five years, this has barely crossed 13 GW though the government has claimed that COVID-19 affected this trajectory.

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The Reserve Bank of India's Monetary Policy Committee (MPC) has unanimously and wisely decided to apply a temporary pause to its inflation battling monetary tightening by keeping the repo rate unchanged

developments in the global financial system, particularly the banking sector turmoil and the volatility and uncertainty they have triggered, have weighed heavily on policymakers' decision to wait and watch



it is the spectre of rising credit costs posing risks to both consumption demand and private investment that was a key factor in the World



Monetary policy

Global economy still facing headwinds including from unabated geopolitical tensions



could result in a recession

RBI's policymakers have judiciously chosen to subordinate their concerns over inflation

Upside risks to the inflation outlook

emanate from factors including higher global crude and commodity prices and extreme weather conditions and deficient monsoon rains

Mr. Das acknowledged, the sudden recent announcement of an output cut by OPEC+ producers



resulted in a jump in crude prices

could well upset the RBI's assumption of crude averaging \$85 a barrel (for the Indian basket) this year

outlook for food prices too is beset with uncertainty



unseasonal rains in parts of the country combined with the likelihood of an El Niño, which could raise summer temperatures and depress monsoon rainfall



Union Cabinet's approval to set up a gravitational wave detection facility in Maharashtra, a ₹2,600 crore project

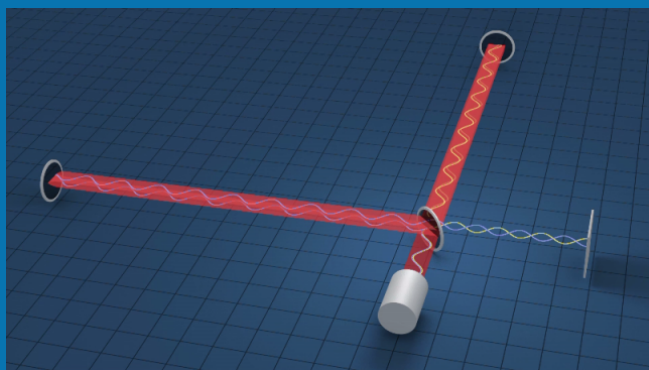
consist of a detector called the Laser Interferometer Gravitational-wave Observatory (LIGO)

to be built in the image of the twin LIGO instruments already operational in the U.S.

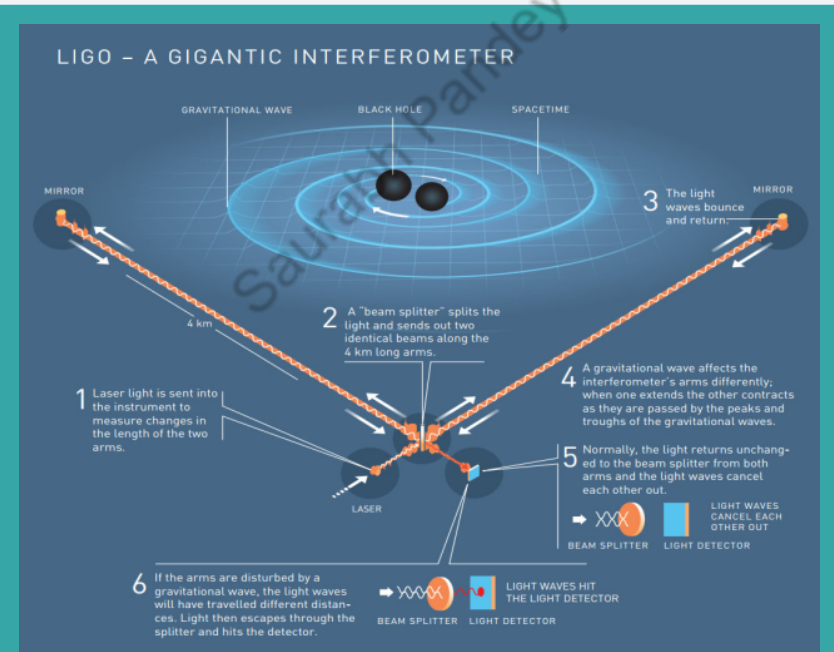
Their detection of gravitational waves, in 2016, launched a new era of astronomy

LIGO India can demonstrate an ability to reckon intelligently with Indian society's relationship with science, using the opportunities that Big Science affords

exploits the physical properties of light and of space itself to detect and understand the origins of gravitational waves (GW)



Laser Interferometer Gravitational-wave Observatory (LIGO)



does not see electromagnetic radiation (e.g., visible light, radio waves, microwaves)

doesn't have to because gravitational waves are not part of the electromagnetic spectrum

completely different phenomenon altogether



Investment facilitation agreement
(IFA)



Backed by more than 100 countries (it does not include India), the proposed IFA is meant to create legally binding provisions aimed at facilitating investment flows

This agreement will be very different from investment protection agreements such as bilateral investment treaties

known as investor state dispute settlement (ISDS)



(BITs) that allow foreign investors to bring claims against the host state for alleged treaty breaches

Centre-backed initiative to sequence 10,000 Indian human genomes and create a database

About 20 institutions across India are involved in the project

analysis and coordination is done out of the Centre for Brain Research, Indian Institute of Science (IISc), Bangalore

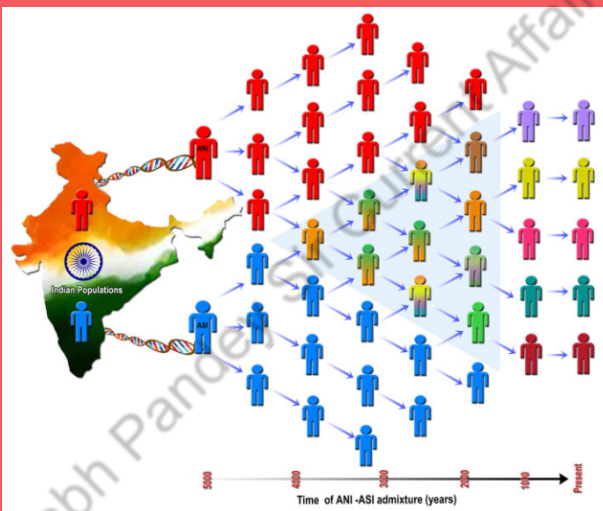
aim is to ultimately build a grid of the Indian “reference genome”

fully understand the type and nature of diseases and traits that comprise the diverse Indian population

The mega project hopes to form a grid after collecting 10,000 samples in the first phase from across India, to arrive at a representative Indian genome



Genome India project



Creating a database of Indian genomes means that researchers anywhere can learn about genetic variants that are unique to India's population groups and use that to customise drugs and therapies

Indian population of 1.3 billion consists of over 4,600 population groups, and many of them are endogamous



necessary to create public infrastructure such as genomic databases – similar to what the Information Technology industry has created – for India's biotechnology sector to expand and have more valuable companies and startups



Topics



Why Human lack tail?

Total solar eclipse

Disruptive Technology in Defence

AI Regulation

Why earthquake in Taiwan?

Mains



By saurabh pandey sir

A freak DNA change 25 million years ago is why humans lack tails

Around 25 million years ago, the chance insertion of a transposable element occurred in a gene in the zygote of an ancient creature. The probability of the insertion occurring in that exact region was around one in a million. Yet it did, causing the creature to not develop a tail, a study has found

Arun Panchapakesan

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

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

The compact genome

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

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

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

'Junk' DNA

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

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

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

For example, if it happens in an essential gene, only that cell will die;



Tale of tails: Tail loss has been implicated in bipedalism: our ability to walk on two legs. But we don't know what evolutionary benefit was conferred on the ancestral tailless ape. GETTY IMAGES

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

The Alu accident

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

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

New York University (NYU) scientists reported the discovery of this fateful insertion in a paper in *Nature* in February. Identifying the insertion was not easy.

The NYU group first searched for DNA changes in 31 genes implicated in tail formation, and compared them across apes and monkeys. As a result, they identified 85,064 mutations (single changes to the DNA sequence), 5,533 deletions, and 13,820 insertions that could be the cause. While many of them were possibly involved in tail-loss, none of them stood out because the scientists were looking for changes in the part of the DNA that made the protein.



As scientists began to determine the genome sequence of organisms, they realised simple organisms like bacteria keep their genomes compact while more complex life forms don't

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

A tailoring defect

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

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

The researchers proceeded to compare the size of the TBXT mRNA produced in human and mouse stem cells. They found that while the mouse mRNA was intact, a

large fraction of the human mRNA was defective – which they had predicted.

An unfinished tail

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

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

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

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

(Arun Panchapakesan is an assistant professor at the Y.R. Gaitonde Centre for AIDS Research and Education, Chennai.)



Why HUMAN lack tail?



one of the

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

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The Hindu analysis by saurabh pandey sir

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That creature was the ancestor of all modern apes. The Hindu analysis by

saurabh pandey sir

Imagine a weapon that can take down a country's entire communication satellite system, completely cutting them off the global grid, or picture hackers manipulating an enemy's radar defences from miles away, paving the way for a smooth, unobstructed air strike.

**Unfortunately, it's not just a fragment of imagination anymore; it has become an increasingly alarming reality:
Emerging and Disruptive Technologies**

The Hindu analysis by saurabh pandey sir



The term 'Disruptive Technology' was coined in 1997 by Harvard Business School's professor Clayton M. Christensen in his book

“The Innovator's Dilemma” to refer to completely new or enhanced technologies that bring about a radical, not incremental, shift, have the potential to change how the world operates, and disrupt the pre-existing notions of affairs.

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ARTIFICIAL INTELLIGENCE

By enhancing the capabilities of militaries in areas of



Lethal Autonomous Weapon Systems (LAWS),

aka “Killer Robots,” which will employ sensor data to select and engage targets without human instructions, are currently being developed.

Unmanned vehicles have already started impacting warfighting in the past decade. Unmanned Aerial Vehicles, Unmanned Surface Vehicles, Unmanned Underwater Vehicles, and Unmanned Ground Vehicles have revolutionised surveillance and reconnaissance.

The Hindu analysis by saurabh pandey sir



QUANTUM TECHNOLOGY

~~Quantum~~ cryptography can encode data in a way that is almost impossible to intercept, quantum communication can create secure lines of communication that will be unhackable, and quantum sensors can detect very weak signals and miniscule changes in magnetic and electric fields, making them very useful for monitoring radio conversations and detecting submarines and mines. **DIRECTED ENERGY WEAPONS**

DEWs operate by using highly concentrated and coherent beams of light to neutralise their targets.

AI REGULATION

the United Nations's Resolution on Artificial Intelligence, the AI Act by the European Parliament, laws introduced on AI in the U.K. and China and the launch of the AI mission in India. These efforts to formalise AI regulations at the global level will be critical to various sectors of governance in all other countries.

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A global acknowledgement of the risks associated



with AI systems and the urgent need to promote responsible use was at the centre of the adopted resolution.

~~It was~~ recognised that unethical and improper use of AI systems would impede the achievement of the 2030 Sustainable Development Goals (SDGs), weakening the ongoing efforts across all three dimensions — social, environmental, and economic.

Another controversial aspect mentioned in the UN resolution has been the plausible adverse impact of AI on the workforce. It would be imperative, especially for developing and least developed countries, to devise a response as the labour market in such countries is increasingly vulnerable to the use of such systems.

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The EU's approach



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

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The U.K.'s framework



The U.K., on the other hand, has adopted a principled and context-based approach in its ongoing efforts to regulate AI systems.

The approach requires mandatory consultations with regulatory bodies, expanding its technical know-how and expertise in better regulating complex technologies while bridging regulatory gaps, if any.

The U.K. has thus, resorted to a decentralised and more soft law approach rather than opting to regulate AI systems through stringent legal rules. This is in striking contrast to the EU approach.

The Hindu analysis by saurabh pandey sir



India's position

India will be home to over 10,000 deep tech start-ups by 2030. In this direction, a ₹10,300 crore allocation was approved for the India AI mission to further its AI ecosystem through enhanced public-private partnerships and promote the start-up ecosystem.

Amongst other initiatives, the allocation would be used to deploy 10,000 Graphic Processing Units, Large Multi-Models (LMMs) and other AI-based research collaboration and efficient and innovative projects. With its economy expanding, India's response must align with its commitment towards the SDGs while also ensuring that economic growth is maintained.

This would require the judicious use of AI systems to offer solutions that could further the innovation while mitigating its risks.

. Taiwan lies along the Pacific “Ring of Fire,” the line of seismic faults encircling the Pacific Ocean where most of the world’s earthquakes occur.

The area is particularly vulnerable to temblors due to the tension accumulated from the interactions of two tectonic plates, the Philippine Sea Plate and the Eurasian Plate, which may lead to sudden releases in the form of earthquakes.

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Health risks are increased by overcrowding, poor sanitation, and restricted access to clean water.

Non-communicable diseases (NCDs) account for more than 60% of all fatalities in India.

WHO data indicating only 0.8 doctors per 1,000 people, which is below the advised ratio.

Even though over 75% of health-care professionals work in metropolitan regions, which only account for 27% of the population, the shortage is particularly severe in rural areas.

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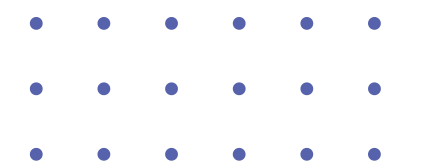
Topics



- Telemedicine:
- ~~Volga~~, Orenburg region
- IMPACT OF CLIMATE CHANGE ON WOMEN
- urbanisation
- climate change and fundamental right
- Approved List of Models and Manufacturers of Solar Photovoltaic Modules
- GOD PARTICLE
- Mains



By saurabh pandey sir



Health sector can't ignore green gains from telemedicine: study

Vehicular emissions are a major contributor to local pollution and global warming. In India, about 88% of the carbon dioxide emissions come from traffic. Across cities alone, over a three-month period, the study found that teleconsultation led to 1,666 fewer kilometres of travel and an average reduction of 176.6 kg of carbon dioxide emissions

Sayantan Mitra

A study by researchers at the L.V. Prasad Eye Institute (LVPEI), Hyderabad, has found that around 70-80% of people who visit an eye hospital can benefit from teleconsultations because their problems aren't serious enough to require attention at a hospital. The study was published in the journal *Eye*.

Telemedicine has emerged as a viable alternative to in-person consultations with doctors in many contexts because it saves patients' time and expenses, which can be considerable if they are located in remote areas and/or are not well to do. But as more people pick this option, another advantage is coming to the fore: lower emissions.

Footprint of healthcare delivery

Studies in high-income countries have shown that telemedicine is a patient-friendly means of healthcare service delivery. It is also environment-friendly.

It is relevant to India, where 70% of the population lives in villages. A hospital visit often requires expensive long-distance travel to urban centres, which have their own carbon footprint.

Vehicular emissions are a major contributor to local pollution and global warming. In India, about 88% of the carbon dioxide emissions come from road traffic. Across cities alone, over a three-month period, the study found that teleconsultation led to 1,666 fewer kilometres of travel for patients and an average reduction of 176.6 kg of carbon dioxide emissions – figures the healthcare sector can't afford to ignore.

According to one analysis, India's healthcare sector emitted 74 million tonnes of carbon dioxide in 2014, or around 3% of India's total emissions of the gas that year.

It is likely to have increased since: as the demand for health services increases, so too will the paradoxical harm to health due to their emissions.

"Every healthcare system should work towards carbon neutrality," Padmaja Kumari Rani, the lead author of the study and network head of teleophthalmology at LVPEI, said. "Teleophthalmology is an efficient and effective tool that can help the eye health sector to achieve that goal."

The teleophthalmology process

The teleophthalmology process
For the study, LVPEI researchers evaluated teleophthalmology, a specialised form of telemedicine that is customised for eye care.

In a teleophthalmology session, a patient remotely consults with an



Positive impact: Telemedicine has emerged as a viable alternative to in-person consultations with doctors in many contexts because it saves time and money. GETTY IMAGES/ISTOCKPHOTO



Around 70-80% of people who visit an eye hospital can benefit from teleconsultations because their problems aren't serious enough to require attention at a hospital

Impact of teleophthalmology

The study involved 324 patients who received teleconsultations within a three-month period. This included 173 patients who visited LVPET's rural primary eye centres and 151 that visited urban tertiary hospitals. The researchers assessed their carbon footprint based on the type of transport the patients used to commute to the clinic. They also evaluated the economic impact using estimated cost savings from travel, food, and lost wages.

"Most Indians live in rural areas while most doctors operate from urban locations. This leads to a gap in health care access. Teleconsultations bridge this gap," Dr. Rani continued.

"By helping to defer travel, we can also save a significant amount of carbon emissions. All we need is a stable internet connection."

Half of the patients in rural areas (49.5%) said they would have travelled by bus, while 38.7% would have used a two-wheeler to access care. Researchers estimated that teleophthalmology saved 80 km of travel and reduced 2.89 kg of carbon dioxide emissions per rural-area patient on average. That translated to around 1.2 litres of petrol saved per person over three months (with an emission factor of 0.135 kg of carbon dioxide per passenger per km).

The numbers were more pronounced for urban tertiary-care hospitals. Care-seekers from around India came to LVPEI's tertiary centres in four southern Indian cities. Some 41% of them travelled by train; 19% flew; and 11% took buses. Each deferred patient visit saved an average of 1,666 km of travel and reduced carbon dioxide emissions by 176.6 kg over three months. Each decision to defer also saved around 76 litres of fuel.

Similarly, on average, each rural patient saved ₹370 and each urban patient ₹8,339 on travel expenses alone. When the researchers factored in indirect costs like food and lost wages, total savings among rural patients ballooned to ₹29,100 and ₹3.45 lakh among their urban counterparts. "Patients with minor eye problems like mild refractive errors or regular preventive eye check-ups are the target demographic for teleconsultations," Dr. Rani said.

(Sayantan Mitra is a science writer associated with the L.V. Prasad Eye Institute.)

THE GIST

Telemedicine is a patient-friendly means of healthcare service delivery. It is relevant to India, where 70% of the population lives in villages. A hospital visit requires expensive travel to urban centres, which creates its own carbon footprint

India's healthcare sector emitted 74 million tonnes of carbon dioxide in 2014. And since emissions would have increased with the demand for health services since then, the impact on health will also have grown

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Telemedicine:

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- A hospital visit requires expensive travel to urban centres, which creates its own carbon footprint □
- India's healthcare sector emitted 74 million tonnes of carbon dioxide in 2014.
- And since emissions would have increased with the demand for health services since then, the impact on health will also have grown □

WHAT IS TELEMEDICINE

According to WHO, telemedicine is the delivery of healthcare services by using information and communication technologies for the exchange of information for diagnosis, treatment and prevention of disease



WHY TELEMEDICINE

The practice cuts down one-on-one interactions between the patient and the doctor or healthcare provider, and is useful when handling infectious diseases

The Hindu analysis by saurabh pandey sir



- Using teleophthalmology every rural patient saved ₹370 and each urban patient ₹8,339 on travel.
- When costs like food and lost wages were factored in, total savings among rural patients ballooned to ₹29,100 and ₹3.45 lakh among their urban counterparts.
- Teleophthalmology may potentially provide health services to underserved and remote rural populations who otherwise may not have access to specialized eye care.

BIG SHOT



Residents being evacuated from the flooded city of Orsk, in Orenburg at the southern tip of the Ural Mountains, on Monday. Russia said more than 10,000 residential buildings were flooded across the Urals, the Volga area, and western Siberia as emergency services evacuated cities threatened by rising rivers. The previous day, the country had declared a federal emergency in the Orenburg region. AFP





Volga, Orenburg region

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The climate crisis is not gender neutral

The climate crisis is already here and does not impact everyone equally. Women and girls experience disproportionately high health risks, especially in situations of poverty, and due to existing roles, responsibilities and cultural norms. According to the United Nations Development Programme (UNDP), women and children are 14 times more likely than men to die in a disaster. The Supreme Court of India has just ruled that people have a right to be free from the adverse effects of climate change, and the right to a clean environment is already recognised as a fundamental right within the ambit of the right to life.

Agriculture is the most important livelihood source for women in India, particularly in rural India. Climate-driven crop yield reductions increase food insecurity, adversely impacting poor households that already suffer higher nutritional deficiencies. Within small and marginal landholding households, while men face social stigma due to unpaid loans (leading to migration, emotional distress, and sometimes even suicide), women experience higher domestic work burdens, worse health, and greater intimate partner violence. In fact, when compared to districts without droughts in the past 10 years, National Family Health Survey (NFHS) 4 and 5 data showed that women living in drought-prone districts were more underweight, experienced more intimate partner violence and had a higher prevalence of girl marriages. For women, the increasing food and nutritional insecurity, work burdens and income uncertainties lead not only to poor physical health, but also impact their mental health and emotional well-being.

Extreme events and gender-based violence

The world is witnessing an increasing frequency of extreme weather events and climate-induced natural hazards. A report from the Council on Energy, Environment and Water (CEEW) in 2021 found that 75% of Indian districts are vulnerable to hydromet disasters (floods, droughts and cyclones). NFHS 5 data showed that over half of women and children living in these districts were at risk. Studies are increasingly showing a direct correlation between these natural disasters and gender-based violence against women. Also, extreme weather events and subsequent changes in water cycle patterns severely impact access to safe drinking water, which increases the drudgery and reduces time for productive work and health care of women and girls.

The past decade has been the hottest ever



Dr. Soumya Swaminathan

is Chairperson,
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While climate action requires 100% involvement of the population, at the same time, empowering women would mean better climate solutions

recorded in human history and countries such as India are likely to face unprecedented heatwaves. Prolonged heat is particularly dangerous for pregnant women (increasing the risk of preterm birth and eclampsia), young children, and the elderly. Similarly, exposure to pollutants in the air (household and outdoor) affects women's health, causing respiratory and cardiovascular disease, and also the unborn child, impairing its physical and cognitive growth. One of the most worrying aspects of air pollution is its impact on the growing brain. Emerging data from cohort studies in India show that for every 10 micrograms per cubic meter increase in PM_{2.5}, the risk of lung cancer increases by 9%, the risk of cardiovascular deaths on the same day by 3%, and stroke by 8%. For dementia, the risk increased by 4% for 2 micrograms increase in annual PM_{2.5}.

Of course, not all women are equally at risk, even within the same geographic or agro-ecological zone. Thus, though climate change has a distinct gender dimension, there is a need for more evidence on the intersectionalities that make certain sub-groups more vulnerable and therefore in need of more protection.

Why does climate action need women?

Climate action requires 100% of the population if we want to achieve the Paris Agreement goal of limiting global temperature rise to 1.5° C. At the same time, empowering women means better climate solutions; when provided with the same access to resources as men, women increased their agricultural yields by 20% to 30%. Tribal and rural women, in particular, have been at the forefront of environmental conservation. Giving women and women collectives (Self-help Groups and Farmer Producer Organisations) the knowledge, tools and access to resources would encourage local solutions to emerge. Adaptation measures will necessarily be different in rural and urban areas as exposure to heat, air pollution and access to water and food will vary by context.

On heatwaves and water shortage

While gaps in data (sex disaggregated data for multiple social outcomes) and knowledge need to be filled by more research, there are areas where immediate action is needed. First, we should reduce the impact of prolonged heat on priority groups (outdoor workers, pregnant women, infants and young children and the elderly). Data from many Indian cities show that there are excess deaths during the heat wave days, though they may not be recognised as such. Loss of productivity will impact small and large businesses and our economy. Urban local bodies,

municipal corporations and district authorities in all vulnerable districts need to have a plan and provide training and resources to key implementers. Heat wave warnings (based on local temperature plus humidity), change of timings for outdoor work and schools, cooling rooms in health facilities, public drinking water facilities, and immediate treatment of those with heat stroke will minimize deaths. In addition, urban planning to improve tree cover, minimising concrete, increasing green-blue spaces and designing housing that is better able to withstand heat are longer-term actions. The Mahila Housing Trust in Udaipur showed that painting the roofs of low-income houses with reflective white paint reduced indoor temperatures by 3° C to 4° C and improved quality of life.

Water shortage is probably the biggest threat to our very existence and needs concerted societal action. Traditionally, India had one of the most advanced systems for rainwater harvesting and storage with a system of ponds and canals. Work done by the M.S. Swaminathan Research Foundation in a few districts of Tamil Nadu showed that using geographic information systems, the panchayat could map key water sources, identify vulnerabilities and climate hazards and develop a local plan to improve water access by directing government schemes and resources.

Working at the village level

Convergence of sectors and services and prioritisation of actions can happen most effectively at the village or panchayat levels. Devolution of powers and finances and investing in building the capacity of panchayat and SHG members can be India's way of demonstrating how to build resilience in a community-led and participatory way.

Finally, a gender lens needs to be applied to all State-action plans on climate change. The National Action Plan on Climate Change (NAPCC) and State Action Plan on Climate Change (SAPCC) highlight the impacts on women, yet often default to portraying them as victims, missing deeper gender dynamics. A review of 28 SAPCCs showed a lack of transformative approaches, with only a few recognising women as agents of change. Recommendations for the ongoing revision of SAPCCs lay stress on the need to move beyond stereotypes, recognise the vulnerabilities of all genders, and implement gender-transformative strategies, ensuring a comprehensive and equitable approach to climate adaptation. Instead of being labelled as victims, women can lead the way in climate action.



IMPACT OF CLIMATE CHANGE ON WOMEN



- According to the United Nations Development Programme (UNDP), women and children are 14 times more likely than men to die in a disaster.
- The Supreme Court of India has just ruled that people have a right to be free from the adverse effects of climate change, and the right to a clean environment is already recognised as a fundamental right within the ambit of the right to life.
- Agriculture is the most important livelihood source for women in India, particularly in rural India.
- Climate-driven crop yield reductions increase food insecurity, adversely impacting poor households that already suffer higher nutritional deficiencies.

The Hindu analysis by saurabh.pandey sir

- Within small and marginal landholding households, while men face social stigma due to unpaid loans (leading to migration, emotional distress, and sometimes even suicide), women experience higher domestic work burdens, worse health, and greater intimate partner violence.
- In fact, when compared to districts without droughts in the past 10 years, National Family Health Survey (NFHS) 4 and 5 data showed that women living in drought-prone districts were more underweight, experienced more intimate partner violence and had a higher prevalence of girl marriages.
- .

- For women, the increasing food and nutritional insecurity, work burdens and income uncertainties lead not only to poor physical health, but also impact their mental health and emotional well-being.
- Studies are increasingly showing a direct correlation between these natural disasters and gender-based violence against women.
- Also, extreme weather events and subsequent changes in water cycle patterns severely impact access to safe drinking water, which increases the drudgery and reduces time for productive work and health care of women and girls

- Prolonged heat is particularly dangerous for pregnant women (increasing the risk of preterm birth and eclampsia), young children, and the elderly.
- Similarly, exposure to pollutants in the air (household and outdoor) affects women's health, causing respiratory and cardiovascular disease, and also the unborn child, impairing its physical and cognitive growth.
- One of the most worrying aspects of air pollution is its impact on the growing brain

STEPS

- First, we should reduce the impact of prolonged heat on priority groups (outdoor workers, pregnant women, infants and young children and the elderly).
- Urban local bodies, municipal corporations and district authorities in all vulnerable districts need to have a plan and provide training and resources to key implementers.
- The Mahila Housing Trust in Udaipur showed that painting the roofs of low-income houses with reflective white paint reduced indoor temperatures by 3° C to 4° C and improved quality of life.

- **Water shortage is probably the biggest threat to our very existence and needs concerted societal action**
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The corridor of Kolkata's bypass urbanism

Urbanisation in India is shaped by three important factors. First, colonialism played a catalytic role in creating urban spaces, which continued even after Independence until the 1960s. Second and third, the Green Revolution and neoliberalisation in the 1970s and 1990s have consolidated these urban spaces into concrete enclaves. Metropolitan cities such as Chennai, Mumbai, and Kolkata, which are products of colonial urbanism, metamorphosed radically in later years.

These cities have expanded quite substantially and witnessed rapid urbanisation to accommodate more people and their demands. The wealth generated due to the Green Revolution and neoliberal policies has further accelerated urban expansion, albeit in an unequal manner. Newer forms of consumer culture have seeped effortlessly into these urban spaces, thus bringing revolutionary changes in the housing, health, and education sectors.

A city within a city

With reference to Calcutta, in the initial years of Independence, the city was called entangled, congested, and decaying by the then State government. A political decision was initiated to build Salt Lake City, a city within Calcutta city, eventually envisioned as a supposedly clean Tabularasa city. The entanglements in the existing city, notably pertain to its poor infrastructure facilities, such as water, sanitation, and slums, with poverty, traffic, and, with oblivious governance, and minimal accountability for public city spaces.

In the process of expanding the city, the State further developed by building the Eastern Metropolitan Bypass (EM Bypass) in the 1980s, connecting Kolkata's north-east part with its southern part. The construction of the MAA flyover and EM Bypass roads certainly eased or 'bypassed' the congestion, poverty, and, of course, the free flow of traffic. The infrastructural developments around the road yielded enormous benefits by significantly increasing the flow of goods, people, and ideas too. But they also resulted in a host of other problems. The economist, the late Kalyan Sanyal, along with Rajesh Bhattacharya from the Indian Institute of Management Calcutta, made the brilliant observation that approaching urbanisation



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Urban
infrastructural
developments
have created
estrangements,
rather than
integration,
based on social
and class
identities

through the 'bypass route' was to replace the old with a new class of producers and consumers. This replacement also brought up a relevant question: 'whose city is it'?

'Urban outcasts'

Seven-star hotels, luxury residential apartments, clubs, international schools, hospitals, and malls are all situated on this 40-kilometre stretch of bypass. It is evident that the echo system built around (parallel to) the bypass, either with or without the intervention of the state, was meant solely for the consumption of the rich. The clear outcome (of this replacement) is the creation of a socio-spatial hierarchical system that creates neighbourhoods that are stigmatised. Some of the high-rise building complexes have blocks that are demarcated based on income groups: high income group (HIG), middle income group (MIG), and lower income group (LIG). These demarcations point to an urban crisis.

The problems are much worse for the social groups that live outside these ivory towers. They embraced mutely to these uninvited social problems just by living adjacent to these swanky hotels and apartments, only to become urban outcasts – a phrase used by Bourdieuan sociologist Loic Wacquant (2008). The socio-spatial techniques of inquiry make it evident that the inhabitants living in these ghettos may be insiders of the city but are still outsiders – a mix of dispossessed and dishonoured people. The small *padas* have turned into territories of deprivation, subjugation, and inequality, disrupting respectful social life. It is vital to understand the negative effects of the growth of urbanisation to unpack the breadth and depth of these disruptions. The bourgeois capitalist economy and the public policies of the communist regime created a 'servicing class' and labour market pockets to cater to the needs of elites within arm's reach.

The moral right they possess, historically and sociologically, to choose a neighbour was snatched by the remarkable development called real estate that created swanky condominiums that sit right next to shanty houses, more so in the last three decades. The combination of the sociological matrix of caste, class, and religion has come together to produce urban marginality, not to forget the importance of different avatars

of the state. The 'wretched' of the city were deeply exploited in neoliberal globalisation policies, along with colonial and nationalist policies that eventually broke their socio-spatial premises. Kolkata became a place where anti-colonial movements sprang, and which later became a communist bastion, thus making it a textbook case to examine the contemporary dynamics of urbanisation. Importantly, the newer dimensions, such as the construction of a single new town, a city within the city, a real estate project, or an ensemble of various independent but related projects, all of them either adjacent to or parallel to the road or bypass, not in a systematic manner but in a sporadically or sparsely manner, can be called 'bypass urbanism', manifestly a slow but strongly emerging concept in urban studies.

Roads and change

Roads are traditionally meant to be a means for the circulation of goods, ideas, and human beings. For historian David Arnold, their functions are much more than that. He interpreted them as "a manifestation of linear modes of power and... as a salient site of social observation, engagement, and friction". They have different nomenclatures, reflects heterogeneity. For instance, a bypass is a road that avoids or 'bypasses' built-up areas to let traffic flow through without any interference or congestion.

They are called truck routes in the United States which are intended to create hassle-free routes for the transportation of goods. In a number of European countries, the Americas, and a few Asian countries, these bypasses are quite popular. In these places, they are referred to as circular roads or orbital roads. Historically speaking, the roads in India, especially since Independence, have brought a significant 'dynamism and assumed a new sociability' that reiterates the past (Arnold, 2013).

Urban infrastructural developments, instead of creating assimilation or integration between different sections, have invariably created estrangements based on their social and class identities. The bypass is not just a road that connects one point to another by avoiding bottlenecks. It also, unintentionally, does socio-economic bypassing in everyday life.



urbanisation

- Urbanisation in India is shaped by three important factors.
- First, colonialism played a catalytic role in creating urban spaces, which continued even after Independence until the 1960s.
- Second and third, the Green Revolution and neoliberalisation in the 1970s and 1990s have consolidated these urban spaces into concrete enclaves. Metropolitan cities such as Chennai, Mumbai, and Kolkata, which are products of colonial urbanism, metamorphosed radically in later years.
- These cities have expanded quite substantially and witnessed rapid urbanisation to accommodate more people and their demands.

- The wealth generated due to the Green Revolution and neoliberal policies has further accelerated urban expansion, albeit in an unequal manner.
- Newer forms of consumer culture have seeped effortlessly into these urban spaces, thus bringing revolutionary changes in the housing, health, and education sectors

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A distinct right

Right to be free of climate change effects comes amid a conservation dilemma

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

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



climate change and fundamental right



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The Hindu analysis by saurabh.pandey sir

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The ‘import restrictions’ on solar PV cells

What is the Approved List of Models and Manufacturers of Solar Photovoltaic Modules? Why was it re-implemented after being 'kept in abeyance' for two years? How did China become a dominant player in the import of solar PV modules?

EXPLAINER

Kunal Shankar
Saptaparno Ghosh

The story so far:

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

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

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

The government's re-introduction of this rule has been premised on the estimation that following measures, such as the Production Linked Incentive (PLI) scheme, India's domestic sector has boosted its production capacities and bettered price competitiveness to meet local demand. This is an import



Towards the sun: Solar panels in Pavagada Solar Park in Kyataganacharulu, Karnataka. GETTY IMAGES

substitution effort, and not an attempt to restrict imports.

Does India rely on solar PV imports?

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

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

How have our policies responded?

To address this over dependence, India made three significant efforts over the past five years. It began with the notification of the ALMM order in January 2019. But the issue attained centre stage in the wake of severe global supply chain disruptions during the COVID-19 pandemic. Finance Minister Nirmala Sitharaman proposed the ₹19,500 crore PLI scheme in the Union Budget of 2022-23. This was to scale domestic manufacturing of the entire solar supply

chain – from polysilicon to solar modules. The government also introduced a steep 40% customs duty on PV modules and 25% on PV cells. These duties were halved as solar capacity additions slowed and as *Reuters* had reported, developers had quoted “aggressively low tariffs” to win power purchase contracts based on imports of Chinese equipment that put cost pressure on about 30 GW capacity worth projects.

Why is China a leading exporter?

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

What is the scope for solar in India?

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

THE GIST

▼ India is overwhelmingly import dependent to meet its demand for solar cells and modules – with China and Vietnam being the country's major suppliers.

▼ Following measures, such as the Production Linked Incentive (PLI) scheme, India's domestic sector has boosted its production capacities and bettered price competitiveness to meet local demand.

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Approved List of Models and Manufacturers of Solar Photovoltaic Modules



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The Hindu analysis by saurabh pandey sir



Peter Higgs, who proposed existence of ‘God particle’, dies

Associated Press
LONDON

Nobel prize-winning physicist Peter Higgs, who proposed the existence of the so-called “God particle” that helped explain how matter formed after the Big Bang, has died at age 94, the University of Edinburgh said Tuesday.

The university, where Mr. Higgs was emeritus professor, said he died on Monday “peacefully at home following a short illness.”

Mr. Higgs predicted the existence of a new particle – the so-called Higgs boson – in 1964. But it would be almost 50 years before the particle’s existence could be confirmed at the Large Hadron Collider.

Mr. Higgs’ theory related to how subatomic particles that are the building blocks of matter get their mass. This theoretical understanding is a central part of the so-called Standard Model, which describes the physics of how the world is constructed.

Edinburgh University said his groundbreaking 1964 paper demonstrated how “elemental particles achieved mass through the existence of a new subatomic particle” which became known as the Higgs boson.



Peter Higgs

In 2012, scientists at CERN, the European Organization for Nuclear Research, announced that they had finally found a Higgs boson using the \$10 billion particle collider built in a 27-km tunnel under the Swiss-French border.

Mr. Higgs won the 2013 Nobel Prize in Physics for his work, alongside Francois Englert of Belgium, who independently came up with the same theory.

Edinburgh University Vice-Chancellor Peter Mathieson said Mr. Higgs, who was born in Newcastle, was “a remarkable individual – a truly gifted scientist whose vision and imagination have enriched our knowledge of the world that surrounds us.”

“His pioneering work has motivated thousands of scientists, and his legacy will continue to inspire many more for generations to come.”



GOD PARTICLES

- Researchers at the Large Hadron Collider at CERN discovered the particle in 2012.
- Noble prize-winning physicist Peter Higgs, responsible for the one the greatest scientific discoveries in the last century, died at the age of 94 .
- In 1964, he theorised the existence of the Higgs boson, a fundamental force-carrying particle, which gives other particles their mass. His ground-breaking work helped explain how everything in the universe has mass.
-

What is Higgs Boson?

- Particles make up everything in the universe but they did not have any mass when the universe began. They all sped around at the speed of light, according to the European Council for Nuclear Research (CERN).
- Everything we see -- planets, stars and life -- emerged after particles gained their mass from a fundamental field associated with the particle known as the Higgs boson.
-

Why is it called the God Particle?

- The Higgs boson is popularly known as the "the God Particle".
- The name originated from Nobel Prize-winning physicist Leon Lederman's book on the particle which he titled the "Goddamn Particle" -- owing to frustration over how difficult it was to detect.

If there's a theory of AI, computer science is unlikely to provide it

Pure empiricism and inductive reasoning from data, using fake-it-till-you-make-it types of optimisation or even logical deductions, can't possibly be adequate theories of intelligence. We don't even know how to make wild guesses and hypotheses algorithmically, let alone critique and analyse them

Subhashis Banerjee

The popular understanding seems to be that the day is not far off when artificial intelligence (AI) will be able to think like humans and interact, at least through languages, in a way that is indistinguishable from real humans. Such a day has been called "the singularity," a pivotal moment for the human race. With the recent success of large language models (LLMs) like ChatGPT, which are capable of interpreting language use and composing sentences, many think this day is imminent.

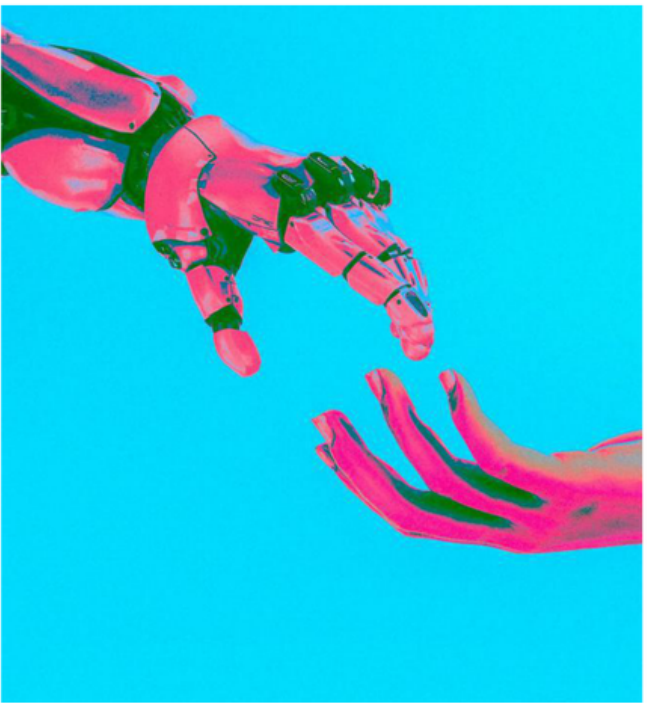
When confronted with such a possibility, Ludwig Wittgenstein, one of the most influential philosophers of the 20th century, famously said, "But a machine surely cannot think!" He perhaps meant the concepts of thinking and intelligence can only apply to living objects; it would be grammatically and logically incorrect otherwise. Nevertheless, machines can indeed share some traits of human behaviour, so even without precise definitions of these terms, their increasing use for machines is perhaps germane. In fact, in the eventuality that we do go past the "singularity" – a proposition that sounds frightening – a machine may have to be treated someday like a person.

The universal computer

Most people trained in computer science believe such AI must be possible. This is because central to the accepted theory of computation, as obtained among others by Alan Turing in 1936, is the existence of the abstract algorithmic concept of a universal computer, a device that can simulate the actions of all other computers.

At the risk of some oversimplification, we can think of this universal computer as one that can execute any programme written in any modern programming language given unbounded memory and time. Of course, it may not be able to do so "efficiently," but that is only because we may not yet have discovered a sufficiently efficient model of computation. Given adequate time and memory, the universal computer can, in principle, simulate with arbitrary precision all physical and chemical processes of the brain and other parts of the human body, and actually all of nature's, provided their theories are understood. The physicist, philosopher, and computer scientist David Deutsch calls this a fundamental law of physics and computer science.

Of course, Turing fully understood universality and believed AI must be possible. If it is, it will also need sensorimotor perception because it cannot possibly rely on external intelligence to provide it with the essential methods to survive and exchange signals with the outside world. Turing also estimated that the resources required to simulate a human brain, which he argued must also be a universal computer, will not be very large – in fact, less than that of a typical modern laptop. After all, the average size of the human brain is not all that much. And the fact that there must



The ultimate test of AI will have to be based on explanatory theories of AI. And if we understand them, we should be able to programme them. CASH MACANAYA/UNSPLASH

exist computational problems that can't be solved by a universal computer, as established by Gödel's incompleteness theorem and Turing's own results on computability, did not deter his arguments because humans also can't solve many problems.

He also formulated a test for AI where a human judge should be unable to tell whether it is a human or a programme based on interacting with it. Many believe that current state-of-the-art LLM-based AI software like ChatGPT, built using deep neural networks, may have come close to passing this Turing test.

The right theory of intelligence

Thus, the question arises: do we know how the brain works to be able to programme a universal simulator for AI? That is, can a parametrised neural network model with parameters estimated using a purely data-driven inductive method become a programme for the universal simulator? Unfortunately, the answers to these have to be a resounding 'no'. We are not even close.

Indeed, as the example below demonstrates, ChatGPT does not seem to understand even the basic logic of numbers, despite its copious training from examples.

User: Can you give me a reason why 793 is smaller than 787?

ChatGPT: It appears to be a typo. 787 is smaller than 793.

User: Okay. Why is 787 smaller than 793?

ChatGPT: In numerical order, 787 is smaller than 793 because the digit in the



No amount of training data can give us a mathematical abstraction like the Pythagorean theorem. It had to be deduced logically using created representations like numbers

hundreds place (7) is smaller in 787 compared to 793.

User: But the digit in the hundreds place is the same in both numbers!

ChatGPT: My apologies for the confusion in my previous response. I made an error in my explanation. Let me clarify: In both 787 and 793, the digit in the hundreds place is indeed the same (7). To determine the comparison, we need to look at the digits in the tens place. In this case, the digit in the tens place is 8 in both numbers. Since the tens place is the same, we then compare the digits in the units place. Here, 7 is smaller than 3. Therefore, 787 is smaller than 793.

In general, logical deduction - perhaps like most other cognitive tasks - can't be extrapolated or generalised or inductively derived purely from data, which is what current state-of-the-art AI systems are based on.

For example, no amount of training data can give us a mathematical abstraction like the Pythagorean theorem. It had to be deduced logically using created representations like numbers. And even with logical deduction, there is a fundamental computational resource limitation problem. We know from theory of computation that most logical

deductions are computationally intractable, and that there is an infinite hierarchy of logical deduction problems whose solutions will require ever increasing amounts of time and memory resources. We clearly do not have the right theory of intelligence as yet.

A stone, a watch, a frog

Further, scientific theories are not derived from observations in nature. They are obtained through a process of abduction, by making hypotheses – sometimes with wild guesses – and critiquing and reasoning about them, often with physical experiments, but again not always. Indeed, we have obtained fantastic theories like quantum mechanics and gravitation based on curved spacetime only using such methods. They were only validated post-facto with observations from experiments and telescopes.

And despite its obvious appeal, the Turing test is inadequate for intelligence. It requires a judge to empirically decide whether an AI is indistinguishable from humans. However, judging a genuine AI will invariably require explanations of how it works. A purely behavioural test is bound to be insufficient because it is well known in probability theory that, in general, multiple, possibly infinite, internal configurations and explanations of systems will exist that can result in the same behavioural manifestations over the observables.

It is like a philosopher trying to tell a living object by just looking at a stone, a watch, and a frog. The test also does not reveal who is *responsible* for the AI's behaviour. If it was an external designer, the programme is not an AI.

Can machines think?

Nevertheless, it is the quest for passing the test that has brought AI systems to where they are. They are indeed impressive in their conversational coherence and there can certainly be many engineering applications where they can be used effectively. That will however require us to ensure they adhere to the conventional safety principles of engineering. In that sense, the Turing test has certainly been useful.

Programming intelligence requires us to cross new epistemological barriers. Pure empiricism and inductive reasoning from data, using fake-it-till-you-make-it type optimisation or even logical deductions can't possibly be adequate theories of intelligence. We don't even know how to make wild guesses and hypotheses algorithmically, let alone critique and analyse them. We are also fairly clueless algorithmically about emotions, and feelings like pain and happiness, and of course about sensorimotor perceptions.

The ultimate test of AI will have to be based on explanatory theories of AI. And if we understand them, we should be able to programme them. Ultimately, we have to admit, even reluctantly, that if ever we discover a theory of AI, it is more likely to emerge from the discipline of philosophy than from computer science.

(Subhashis Banerjee is Professor of Computer Science, Ashoka University, and the Centre for Digitalisation, AI, and Society at the university. Views expressed are personal.)



The singularity,

- The popular understanding seems to be that the day is not far off when artificial intelligence (AI) will be able to think like humans and interact, at least through languages, in a way that is indistinguishable from real humans.
- Such a day has been called “the singularity,” a pivotal moment for the human race.
- With the recent success of large language models (LLMs) like ChatGPT, which are capable of interpreting language use and composing sentences, many think this day is imminent

TURING TEST



- The Turing Test measures the intelligence of a test subject to determine whether a machine can demonstrate intelligence.
- According to the test, a computer program can think if its responses can fool a human into believing it, too, is human.
- Not everyone accepts the validity of the Turing Test, but passing it remains a major challenge to developers of artificial intelligence.

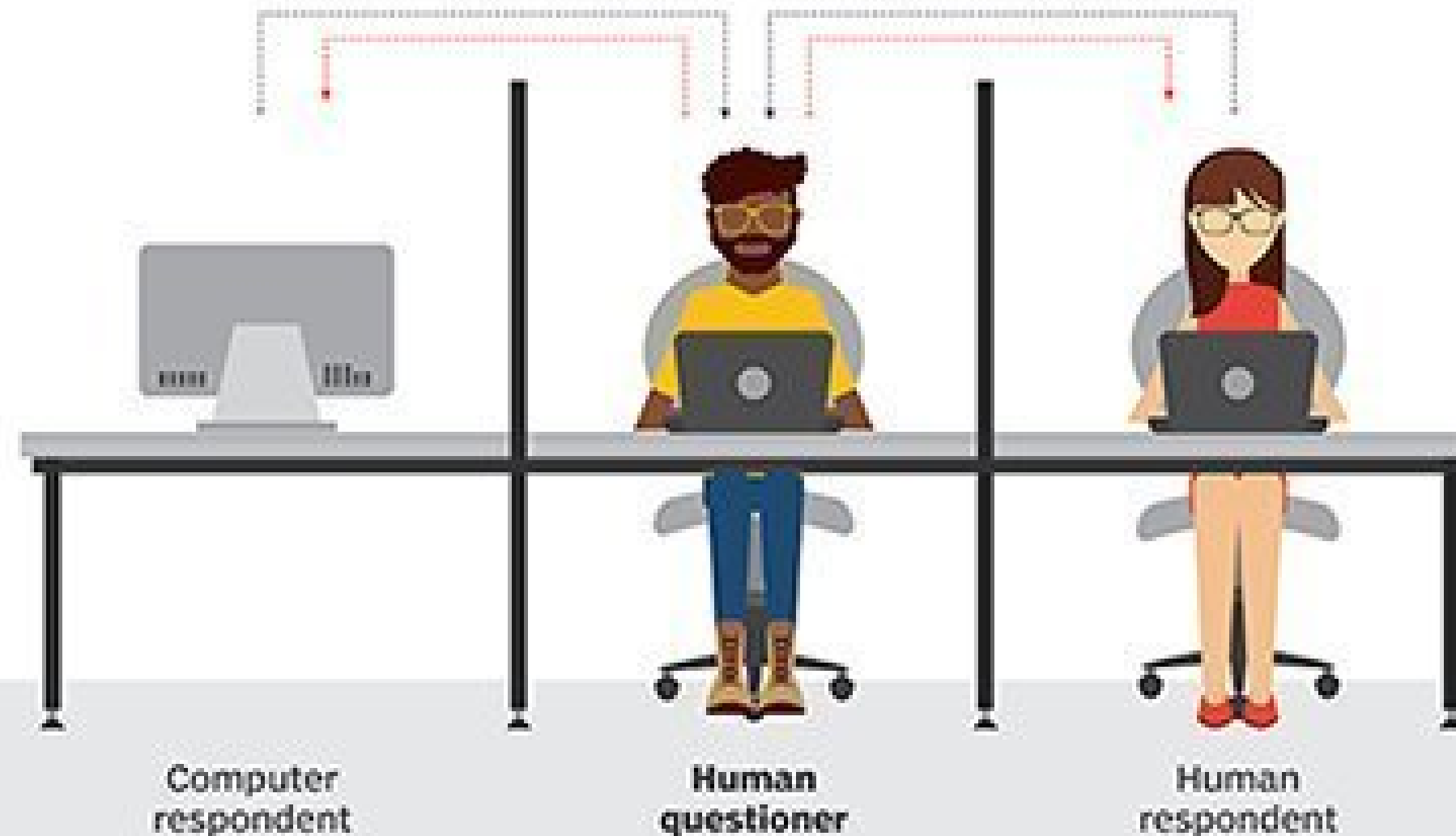
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Turing test

During the Turing test, the human questioner asks a series of questions to both respondents. After the specified time, the questioner tries to decide which terminal is operated by the human respondent and which terminal is operated by the computer.

■ QUESTION TO RESPONDENTS ■ ANSWERS TO QUESTIONER



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- There are variations to the Turing test as well as modifications to the approach of asking questions in different AI tests.
- The Turing test has several limitations including requiring a controlled environment, not having a dedicated definition of intelligence, and needing to adapt to evolving technological advancements.



Since last June, the world has broken heat records each month. AP

Hottest March in history was in 2024: EU climate body

Associated Press

The world experienced the warmest March ever due to a combined effect of El Niño and human-caused climate change, making it the 10th consecutive month since June last year to set a new temperature record, the European Union's climate agency said on April 9. The Copernicus Climate Change Service (C3S) said the average temperature of 14.14 degrees C in March was 1.68 degrees C higher than the month's average for 1850-1900, the designated pre-industrial reference period. It is 0.10 degrees C above the previous high of March 2016.

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

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

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

degrees C above the pre-industrial period.

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

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

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

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

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

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

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

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



Hottest March in history was in 2024:



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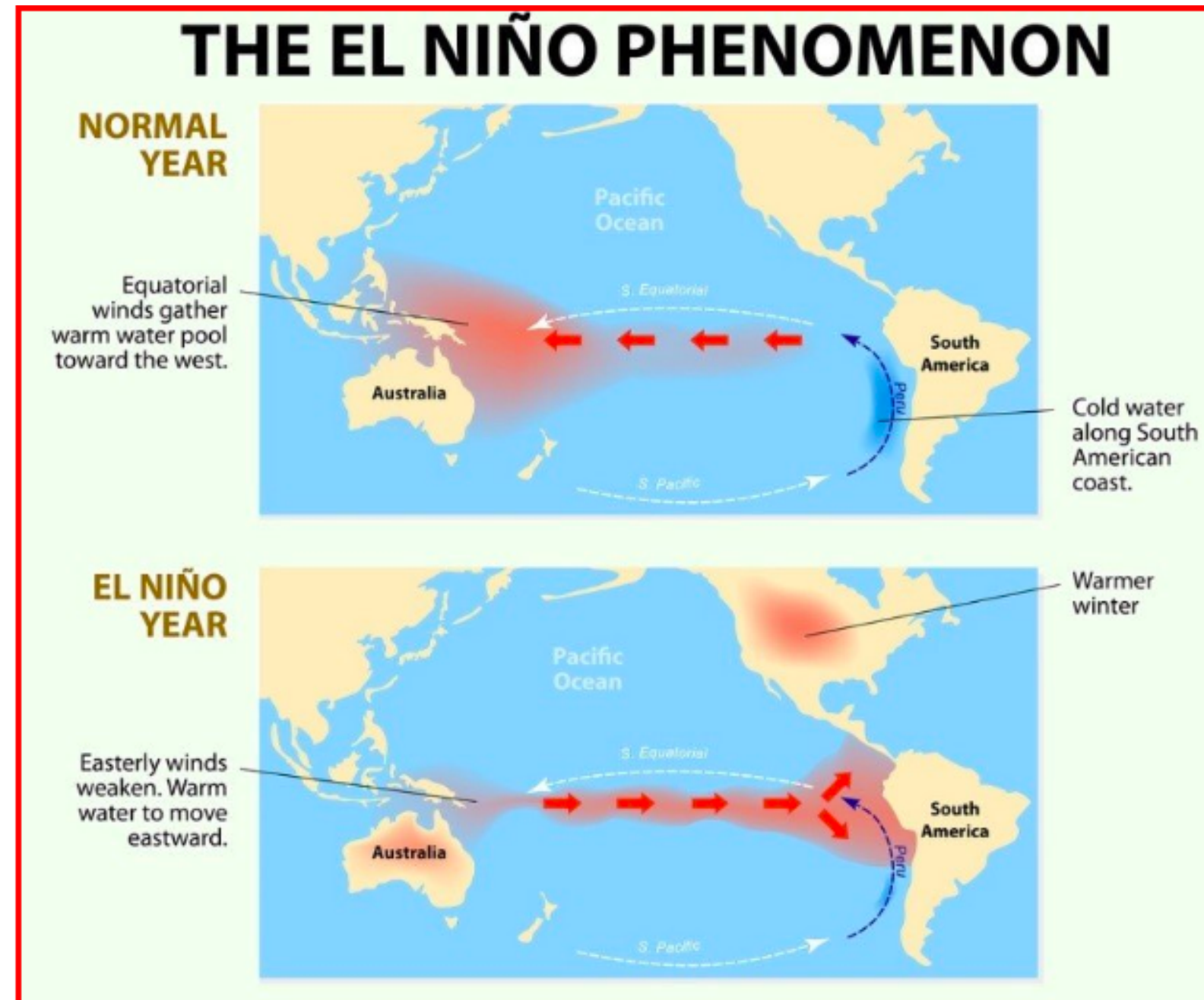


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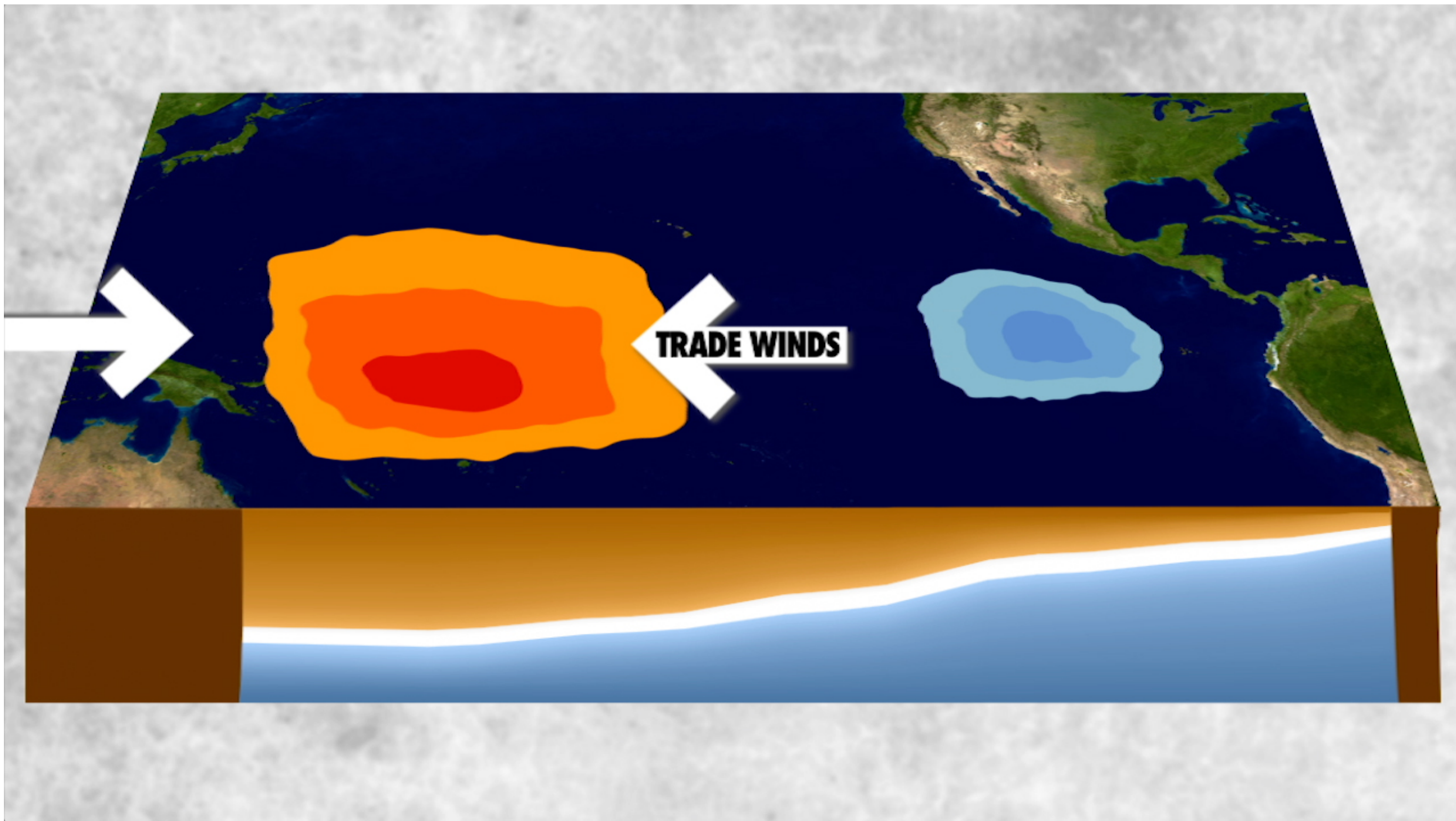
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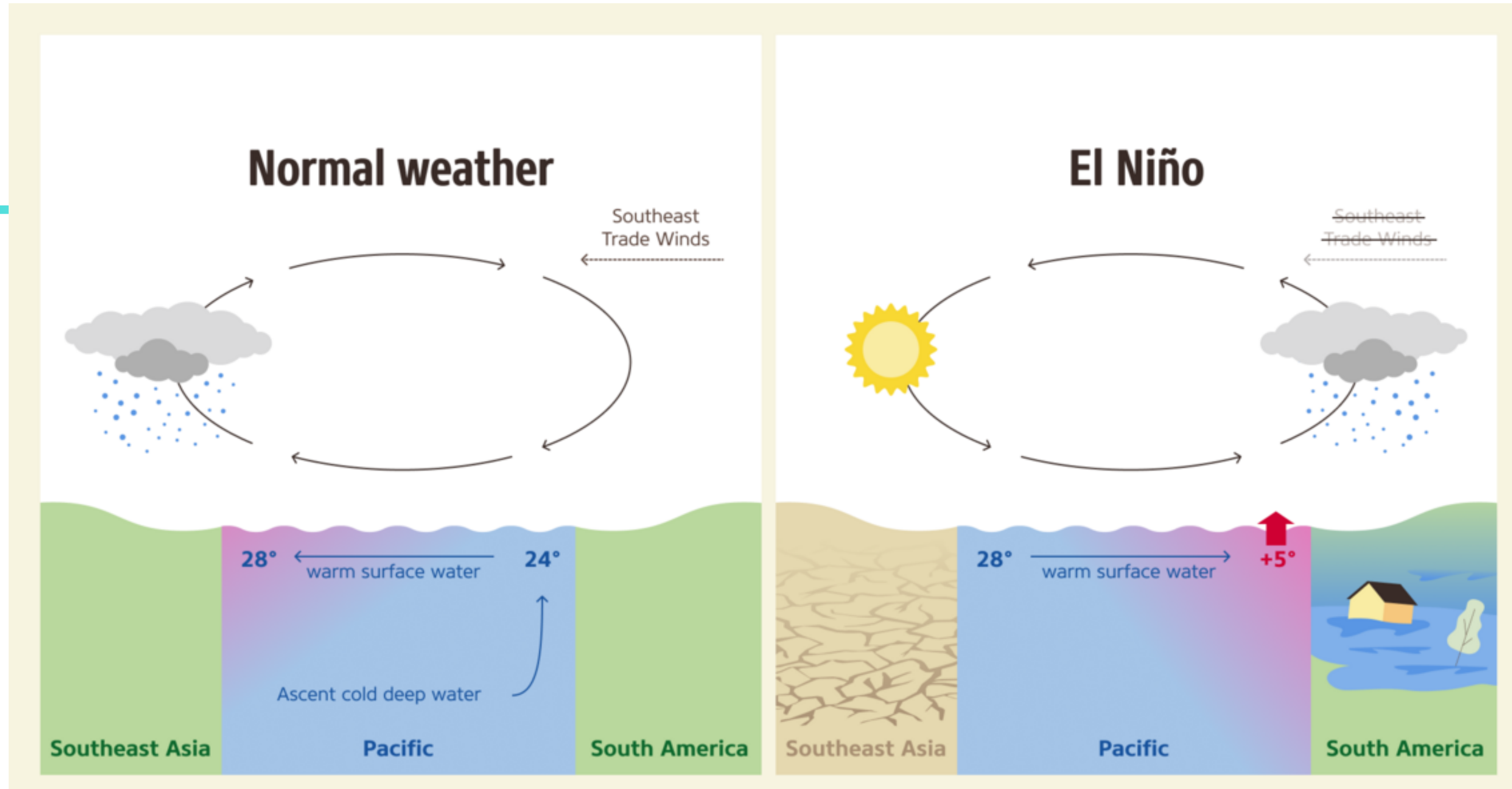


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On unemployment in Indian States

This analysis looks at unemployment in the major States of India – excluding the Union Territories – among individuals aged 15 and above, utilising data from the Periodic Labour Force Survey (PLFS) of 2022-23

ECONOMIC NOTES

Rahul Menon

A recent report released by the International Labour Organization (ILO) and the Institute for Human Development (IHD) revealed that two out of every three unemployed individuals was a young graduate, highlighting the need for urgent policy intervention. Little is understood about the causes of unemployment in India, a knowledge gap that requires urgent redressal.

This analysis looks at unemployment in the major States of India – excluding the Union Territories – among individuals aged 15 and above as measured by the Usual Principal and Subsidiary Status (UPSS), utilising data from the Periodic Labour Force Survey (PLFS) of 2022-23. (Manipur is not included here since field work was not completed owing to the conflict). Since the coverage of smaller States in the overall sample is less compared to larger States, these estimates should not be taken as definitive measurements but as indicators of the important factors driving unemployment.

An analysis of unemployment

Figure 1 outlines the unemployment rates across Indian States in 2022-23 from the highest to the lowest. At almost 10%, Goa's unemployment rate – more than three times the national average (3.17%) – is the highest. Interestingly, 4 of the top 5 States – Goa, Kerala, Haryana and Punjab – are comparatively richer states. The rich States of western India – Maharashtra and Gujarat – experience unemployment rates far less than the national average. All northern States – Jammu and Kashmir, Punjab, Haryana, Uttarakhnad and Himachal Pradesh – have unemployment rates higher than the national average, as do all southern States with the exception of Karnataka.

Out of the 27 States considered, 12 States have unemployment rates less than the national average. Low rates in larger States – 3% in Maharashtra, 2.4% in Uttar Pradesh and 1.6% in Madhya Pradesh – bring down the national average. But this presents a conundrum: barring Maharashtra and Gujarat, much of the States with unemployment rates lower than the national average also have per capita incomes lesser than the national average.

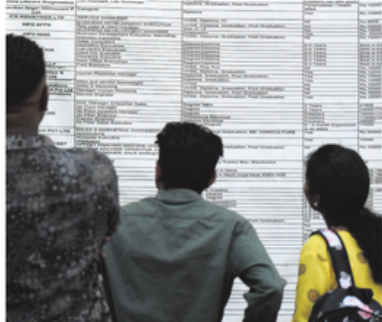
The determinants of unemployment

Figure 2 depicts the relationship between unemployment rates and the share of the labour force in self-employment. The trend line drawn through the data is downward-sloping, indicating that there exists a negative relationship between the two; in States where a large proportion of the labour force is engaged in self-employment, the unemployment rate is low. Since a bulk of the self-employment in India is of the informal variety, States with a large proportion of informal work would find it easy to absorb a large number of job-seekers. Yet it is unclear whether this relationship is cause or effect. Does a lack of self-employment opportunities result in high unemployment? Or is it that in States with high unemployment, individuals do not wish to engage in self-employment?

A large proportion of informal self-employment is accounted for by agriculture and the rural economy. A useful proxy, therefore, is to examine the size of the labour force engaged in the

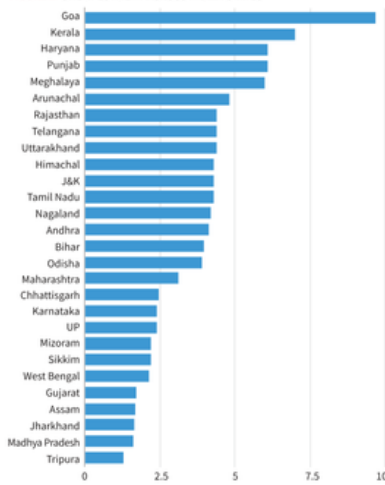
A definite lack of jobs

This analysis looks at unemployment in the major States of India. Since the coverage of smaller States in the overall sample is less compared to larger States, these estimates should not be taken as definitive measurements but as indicators of the factors driving unemployment



In pursuit: Job seekers attend Aspire 2024 organised by District Employment office and Vocational Higher Secondary Department at SRI Government Vocational Higher Secondary School in Kochi, in 2023. THULASI KAKKAT

FIGURE 1: UNEMPLOYMENT ACROSS INDIAN STATES



urban sector. Figure 3 outlines the relationship between the urban share of the labour force and the unemployment rate. There is a clear positive relation, indicating an increase in unemployment rates in highly urbanised States. This explains the high degree of unemployment in States like Goa and Kerala – both highly urbanised – and low unemployment in States like U.P., Jharkhand and Madhya Pradesh. Urbanised States have smaller agrarian and agrarian-dependent sectors and hence have a relatively smaller source of informal jobs available. While informal sectors do exist – and thrive – in urban settings, the scope for the absorption of job-seekers is limited as compared to rural agriculture, which often acts as a 'reserve' absorbing surplus labour.

On education and employment

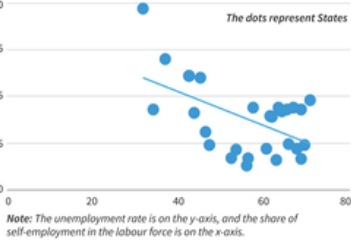
Exceptions, however, do exist. Gujarat and Maharashtra are highly urbanised – the share of the urban labour force is 37% in both States, much higher than States like U.P. (17%) and Madhya Pradesh (20%)

– and yet have lower unemployment.

Much of the discussion in the wake of the release of the ILO-IHD report has centred on the link between education and unemployment. A previous column in this newspaper on December 26, 2023, 'Are graduates facing unemployment', also discussed the high prevalence of unemployment amongst graduates. Figure 4 outlines this link across Indian States. There is a clear positive relationship. Kerala, for instance, has a highly educated labour force – 30% of the labour force are graduates – and faces high unemployment. Gujarat and Maharashtra have a relatively lower share of graduates in their labour force – roughly 14% and 20% respectively – and hence have lower unemployment in spite of being richer and urbanised.

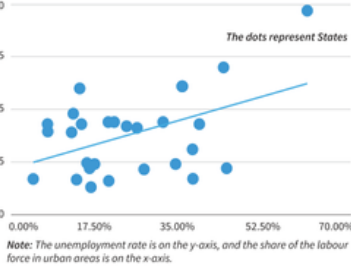
There might be several reasons for this outcome. Perhaps graduates do not possess the requisite skills required for the growing modern sector. This necessitates a focus on teaching infrastructure and standards. But this does not explain why graduates have

FIGURE 2: SELF-EMPLOYMENT AND UNEMPLOYMENT



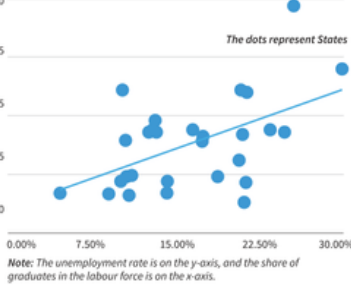
Note: The unemployment rate is on the y-axis, and the share of self-employment in the labour force is on the x-axis.

FIGURE 3: URBANISATION AND UNEMPLOYMENT



Note: The unemployment rate is on the y-axis, and the share of the labour force in urban areas is on the x-axis.

FIGURE 4: SHARE OF GRADUATES AND UNEMPLOYMENT



Note: The unemployment rate is on the y-axis, and the share of graduates in the labour force is on the x-axis.

THE GIST

▼ A recent report released by the International Labour Organization (ILO) and the Institute for Human Development (IHD) revealed that two out of every three unemployed individuals was a young graduate.

▼ Perhaps graduates do not possess the requisite skills required for the growing modern sector. This necessitates a focus on teaching infrastructure and standards.

▼ Out of the 27 States considered, 12 States have unemployment rates less than the national average.



On unemployment in Indian States



- A recent report released by the International Labour Organization (ILO) and the Institute for Human Development (IHD) revealed that two out of every three unemployed individuals was a young graduate, highlighting the need for urgent policy intervention.
- Little is understood about the causes of unemployment in India, a knowledge gap that requires urgent redressal

- There might be several reasons for this outcome. Perhaps graduates do not possess the requisite skills required for the growing modern sector.
- This necessitates a focus on teaching infrastructure and standards. But this does not explain why graduates have always faced unemployment, even when the modern sector was in its infancy.
- Another possible explanation is linked to aspirations. Graduates seek high-wage jobs in line with their skills, and not informal jobs. If the modern sector does not expand sufficiently to absorb new graduates, it would result in unemployment.
- These are not the only factors driving unemployment.
- State policy also plays a key role. But this analysis highlights the links between structural transformation and unemployment.

∴ The Hindu analysis by saurabh.pandey sir

- Growing developing economies experience a reduction in the role of agriculture, and an increase in urbanisation and educational attainment.
- As India develops, these factors would add an upward pressure to the unemployment rate.
- It is imperative that policy concentrates on the question of employment generation to counter these tendencies.
-

The advent of a holistic approach to ‘one health’

The interdependence between humans, animals and environment has been made increasingly evident with the emergence of pandemics such as COVID-19. It is not just humans who are affected by pandemics but also livestock – an example being the outbreak of lumpy skin disease that has spread across countries.

The recent decision on the ‘National One Health Mission’ by the cabinet marks a milestone.

In July 2022, the Prime Minister’s Science, Technology, and Innovation Advisory Council (PM-STIAC) endorsed the setting up of the ‘National One Health Mission’. Since then, 13 Ministries and Departments as well as science funding agencies – this includes the Department Of Science and Technology, the Department of Biotechnology (DBT), the Council of Scientific and Industrial Research (CSIR), the Department of Pharmaceuticals, and AYUSH, or Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy – the Ministries of Health, Animal Husbandry and Environment as well as Defence came together to shape the mission, taking one of the most holistic approaches to one health and pandemic preparedness in the world. There was consensus among the leadership of these Ministries to have a National Institute for One Health. Based in Nagpur, it is to be the anchor in coordinating activities nationally, and the nodal agency to coordinate international activities across the space of one health. The foundation stone of this institute was laid by the Prime Minister Narendra Modi on December 11, 2022.

More a journey

The goals of the ‘National One Health Mission’ are to develop strategies for integrated disease surveillance, joint outbreak response, coordinated research and development (R&D) and ensure seamless information sharing for better control of routine diseases as well as those



Ajay Kumar Sood

is the Principal Scientific Adviser to the Government of India

The ‘National One Health Mission’ is the result of recognition that only a coordinated approach will ensure a better response to disease outbreaks

of a pandemic nature. While diseases that affect humans such as COVID-19 are well known, diseases that affect animals such as foot and mouth disease or lumpy skin disease can hit productivity and trade. Similarly, these and other diseases such as canine distemper affect wild animals and their conservation. Only a coordinated approach will ensure that we are better prepared for such diseases as well as those that can cause the next pandemic such as avian influenza or Nipah.

Pandemic preparedness is incomplete without there being a focus on strong R&D. Focused R&D can ensure that we are better prepared for emerging diseases through the development of tools such as vaccines, therapeutics, and diagnostics, that is critical for India and the world. This is where all the participating departments such as the DBT, CSIR, the Indian Council of Medical Research, the Indian Council of Agricultural Research and the Department of Pharmaceuticals will play a role. It is not just government departments but also our academic centres and the private sector that will be the critical stakeholders in making this a reality. All these efforts can become effective only when there is close coordination between the Centre and States. Therefore, working with States will not only help them in introducing this approach in a much better way at the ground level, but the lessons also learned in the process of implementation will help in evolving an effective strategy – the approach to One Health is more a journey than a destination.

A network of laboratories

Under the mission, a national network of high-risk pathogen (Biosafety level or BSL 3 and BSL 4) laboratories has been created. Bringing such laboratories that are managed by different departments together will serve to address the disease outbreak response better regardless of

human, animal and environmental sectors. There will be better resource utilization of expensive but much-needed infrastructure but also good linking from across sectors better to tackle diseases such as Nipah that involve bats, pigs, and humans, for example.

Further, India has to augment its epidemiology and data analytic capability. Under the mission, efforts are being made to apply artificial intelligence (AI) and machine learning and disease modelling to address these issues and coordinate capacity building in epidemiology across sectors. Emerging approaches such as genomic surveillance from wastewater showed promise during the COVID-19 pandemic. This will be expanded to other sentinels such as places where animals (livestock or wildlife) congregate for a broader set of diseases to be taken up so that we mainstream these approaches to be a part of routine surveillance across human, livestock and environmental sectors.

A global subject

‘One Health’ is a global topic. During India’s presidency of the G-20, this approach was highlighted and widely endorsed by all the members to work together in specific areas such as building better surveillance capacity, analytic capability and setting up an international network of ‘One Health’ institutes.

‘One Health’ is not just limited to diseases. It concerns wider aspects such as antimicrobial resistance, food safety, plant diseases and the impact of climate change on all of these. Intersectoral topics such as ‘One Health’ require close engagement of not just different governmental agencies but also non-governmental organisations, academia, the private sector and also citizens. Such an approach focused on an actionable framework will further the goal of moving closer to the clarion call of ‘One Earth, One Health’ and ‘Health for All’.



ONE HEALTH



- The recent decision on the ‘National One Health Mission’ by the cabinet marks a milestone.
- In July 2022, the Prime Minister’s Science, Technology, and Innovation Advisory Council (PM-STIAC) endorsed the setting up of the ‘National One Health Mission’.
- Since then, 13 Ministries and Departments as well as science funding agencies — this includes the Department Of Science and Technology, the Department of Biotechnology (DBT), the Council of Scientific and Industrial Research (CSIR), the Department of Pharmaceuticals, and AYUSH, or Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy — the Ministries of Health, Animal Husbandry and Environment as well as Defence came together to shape the mission, taking one of the most holistic approaches to one health and pandemic preparedness in the world.

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Topics



- **National Mission for Sustaining the Himalayan Ecosystem**
- **Lachit Borphukan**
- **(CAR) T cell therapy**
- **ISRO's 'zero orbital debris'**
- **Is transparency lacking in candidate disclosure?**
- **Mains**

By saurabh pandey sir



A battle to save Ladakh, and all of humanity

When Ramon Magsaysay award winner (2018) and climate activist Sonam Wangchuk addressed a 30,000-strong crowd at Leh, Ladakh on March 6, 2024 to announce his 21-day climate fast, he was not just speaking to the people of Ladakh but also making an appeal to the world.

Tucked away between India's neighbours, Pakistan and China, at a height of 11,500 feet, Ladakh comprises 97% indigenous tribes, many of whom lead simple pastoral lives and depend on farming and animal rearing for a livelihood. Apart from border disputes, the Himalayan region also faces the damaging effects of climate change through floods, drought, landslides, greenhouse gases, and other pollutants.

There are about 15,000 glaciers in the Himalayan region, often referred to as the Third Pole. In spring and summer, these glaciers form an important part of the hydrological process by releasing meltwater to the Indus, the Ganga, and the Brahmaputra. The Himalayan glaciers, like those in the rest of the world, are at risk of melting due to global warming and climate change. This will affect both residents of the mountain region and those living downstream.

Infrastructure boom

In 2008, the Centre launched eight Missions under the National Action Plan on Climate Change (NAPCC). One of these was under the Ministry of Science and Technology, i.e., the National Mission for Sustaining the Himalayan Ecosystem (NMSHE). As the Department of Science and Technology (DST) website states, the "main objective of NMSHE is to develop a capacity to scientifically assess the vulnerability of the Himalayan region to climate change and continuously assess the health status of the Himalayan ecosystem".

So, why has NMSHE forgotten its role of protecting the Himalayan region?

Almost as soon as Ladakh became a Union



Janaki Murali

is a journalist and author

Territory, several mega infrastructure projects were launched at rapid pace. These included the construction of bridges, widening of roads, tunnels, railway lines, mega solar projects, a state-of-the-art airport terminal and wayside amenities to boost tourism. Among these were the 14.15 kilometre Zojila tunnel, the 230 km Kargil-Zaskar National Highway project, and a 10 gigawatt solar energy project covering 20,000 acres in the Changthang region. The Ladakh (UT) Industrial Land Allotment Policy of 2023 aims "to make UT Ladakh one of the preferred destinations for investment".

The Border Roads Organisation (BRO) has been spearheading many of these projects along with the National Highways & Infrastructure Development Corporation Ltd. (NHIDCL). In its annual report of 2021-22, the NHIDCL states as its vision the following: "To fast-track the construction of National Highways and other Infrastructure in the North Eastern Region, near border and strategic areas like Jammu and Kashmir, Ladakh and also in the state of Uttarakhand and UT of Andaman & Nicobar islands". Incidentally, all these areas are vulnerable to climate change-related disasters.

A region that has seen disasters

What is puzzling is why the various government bodies, sanctioning and executing the projects at such a feverish pace, are not paying heed to the warnings from past disasters in the mountains and learning from them.

Since 2010, there have been several disasters in the Himalayan region, with a loss of lives and livelihoods. In 2013, a cloudburst in the upper reaches of the Himalayas led to flash floods at Kedarnath, claiming 6,000 lives and sweeping away several settlements. In January 2023, disaster struck Joshimath, when water gushed down a lower slope of the mountain, submerging parts of the town. In November 2023, the rescue of 41 trapped workers in the collapsed Silkyara

tunnel project in the Himalayas garnered international attention.

Uttarakhand, where all these tragedies occurred, too has seen a slew of infrastructure projects from its formation in 2000. This has continued despite dire warnings from geologists and ecologists. A Supreme Court of India constituted expert committee even suggested that authorities limit the number of pilgrims visiting the Char Dam Himalayan shrines, at Kedarnath, Badrinath, Yamunotri, and Gangotri to carrying capacity. Carrying capacity is the maximum number of people that an ecosystem can support, without eroding it. But, instead, pilgrim numbers have only swelled every year. Some expert committees have even suggested that no hydroelectric projects are set up in the para-glacial zone.

When tragedy strikes, the human cost of environmental destruction is sadly borne by poor migrant workers in ongoing projects and by residents, tourists and pilgrims. Government bodies sanctioning the projects or the developers executing them escape the wrath of the mountains.

Scant review

What has been frustrating climate change activists is their recommendations gathering dust despite approaching the courts and the formation of expert committees. Hardly any due diligence which includes risk assessment, safety measures and geological and seismic analysis, goes into any of the multi-crore mega projects in the mountains.

In the name of development, we cannot afford to upset the fragile balance in the Himalayan ecosystem and its biodiversity. The onus is on all of us to ensure that the Himalayas and the people living under its shadow are protected.

For, Wangchuk's battle is not just about Ladakh and its people. It is a battle for all of humanity and its future generations.

Sonam Wangchuk's climate fast has highlighted the larger issue of the fragility of the Himalayan ecosystem



National Mission for Sustaining the Himalayan Ecosystem



- The National Action Plan on Climate Change (NAPCC) has enunciated the launch of a National Mission for Sustaining the Himalayan Ecosystem.
- The mission attempts to address some important issues concerning a) Himalayan Glaciers and the associated hydrological consequences, b) Biodiversity conservation and protection, c) Wild life conservation and protection, d) Traditional knowledge societies and their livelihood and e) Planning for sustaining of the Himalayan Ecosystem.

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- **Sustaining the Himalayan eco system as a national mission, will focus on the rapid generation of four types of national capacities, They deal with a) Human and knowledge capacities, b) Institutional capacities, c) Capacities for evidence based policy building and governance and d) Continuous self learning for balancing between forces of Nature and actions of mankind.**

Jorhat’s Statue of Valour watches over battle for Ahom pride

Rahul Karmakar
JORHAT

Pranab Barpatragohain plans to start a restaurant on his plot opposite the entrance gate of an under-construction park sporting Meleng-Hollongapar’s newest landmark – the Statue of Valour.

The 125-foot statue depicts Lachit Borphukan, the iconic Ahom general revered for leading the Battle of Saraighat in 1671 to prevent the Mughal army from occupying Assam. The park encompasses the *maidam*, or earthen pyramid, where he was buried after the battle.

“The park and the statue are expected to attract visitors and boost business in the neighbourhood,” said Mr. Barpatragohain.

“This statue may change the face of our area, but it should have been inaugurated after completion,” said one of his neighbours.

Divided opinion

Opinions about the Statue of Valour, inaugurated by Prime Minister Narendra Modi on March 9, are perhaps as divided as the support for the two top candidates – BJP’s Topon Kumar Gogoi, who is eyeing a second successive term; and challenger Gaurav Gogoi of the Congress. The latter had won the 2019 Lok Sabha election from the adjoining Kaliabor seat, which metamorphosed into Kaziranga after the 2023 delimitation exercise.

The nerve centre of the constituency is the elite Jorhat town, said to be As-



The statue of Lachit Borphukan was inaugurated by the Prime Minister on March 9.

sam’s tea capital because of the surrounding plantations, about 300 km east of Guwahati. The park is almost as far from the eastern edge of the town along NH-715 as the Sukhapha Samannay Kshetra is from its western edge.

Dedicated to Swargadeo (or emperor) Sukapha, who came from China’s Yunnan to establish the Ahom dynasty that ruled Assam for 600 years until the British takeover in the 1800s, this represents Ahom pride as much as the Lachit statue park. But while the park is perceived to have a BJP stamp, the Kshetra is associated with the Congress. Former CM and Mr. Gaurav’s father, the late Tarun Gogoi, laid its foundation in December 2015. The Ahom community, to which the Gogois belong, make up the majority of voters in the Jorhat constituency, and are believed to have a soft corner for Mr. Gaurav.



Lachit Borphukan



- **.Lachit Borphukan, the general of the Ahom Kingdom, is best known for fighting off the Mughals, defeating them in the Battle of Saraighat in 1671 on the banks of the Brahmaputra near Guwahati.**
- **Born on November 24, 1622, Lachit Borphukon is a 17th-century commander of the Ahom forces.**

The Hindu analysis by saurabh pandey sir



AHOM KINGDOM



The Hindu analysis by saurabh pandey sir



- The Ahom kingdom had been repeatedly attacked by the Turkic and Afghan rulers of the Delhi Sultanate and later by the Mughals.
- The Mughal-Ahom wars had been going on since 1615-16, with the first Mughal attack on Assam with a view to capturing the region.
- The Ahoms had ruled major parts of Assam for nearly 600 years, between 1228 and 1826

Crafted at home, NexCAR19 takes India to next level in cancer care

Chimeric Antigen Receptor T cell therapy involves genetically modifying a patient's T cells to fight against malignant tumor cells. T cells are a type of white blood cell developed from the stem cells in the bone marrow and are a vital part of the immune system, defending the body against infections

Soujanya Padikkal

It is 2015. Alka Dwivedi, is striving to develop patient-focused therapy for cancer. This leads her to join Rahul Purwar, a Professor at the Indian Institute of Technology Bombay (IIT-B), who is working on developing affordable CAR-T cell therapy in India.

Chimeric Antigen Receptor (CAR) T cell therapy involves genetically modifying a patient's T cells to fight malignant tumor cells. T cells are a type of white blood cell developed from the stem cells in the bone marrow and are a vital part of the immune system, defending the body against infections.

Dr. Purwar returned to India in 2013 after completing his post-doctoral programme at Harvard Medical School and realised that India lagged behind the West in CAR-T research. The U.S. was already working on it by then, and in 2017, it had approved the first commercial CAR-T cell therapy, which cost anywhere between ₹3 and 4 crore, excluding hospitalisation to treat side effects, rendering it unaffordable to middle and low-income countries, including India.

He was driven by a vision to provide accessible treatment to Indians. It took 10 years to flesh out his vision in research that included his students Alka Dwivedi and Atharva Karulkar. "When I saw what he was doing, I decided to give it my 100% to make it successful," says Dr. Dwivedi, the former doctoral student who now works at the National Cancer Institute (NCI) in Bethesda, Maryland. He would soon be joined by Gaurav Narula and Hasmukh Jain, haemato-oncologists from Tata Memorial Hospital (TMH), Mumbai, who spearheaded the clinical trial phases of NexCAR19. "We were just getting to know that [CAR-T therapy] is something that is going to potentially change the treatment paradigm," said Dr. Jain.

How are CAR-T cells made?

T-cells (a type of white blood cell) are collected from the patient through a process called leukapheresis. They are then modified in the lab to express proteins called chimeric antigen receptors (CARs) on their surface. The gene responsible for encoding CAR is developed synthetically in the lab, and a vector acts as a vehicle to deliver CAR into the patient's T-cell. Commonly, viral vectors, such as lentiviral vectors, are used, as seen in NexCAR19. The re-engineered T cells are then multiplied by millions in the lab and sent back to the hospital, where they are infused into the patient. The patient usually undergoes chemotherapy before receiving the CAR-T cells.

The CAR comprises several components that enable it to identify cancer cell antigens and stimulate an



The National Cancer Institute at the National Institutes of Health in Bethesda, Maryland. AFP

immune response. Each CAR spans across the cell membrane, with a portion extending outside the cell and a portion inside. The exterior segment is made of fragments of laboratory-generated antibodies selected for their affinity to bind to the targeted antigen. The internal segment of CAR consists of two components responsible for transmitting signalling once the receptor interacts with an antigen.

The FDA has approved six CAR-T cell therapies till now, and four of them target CD19, a protein produced on the surface of leukemia and lymphoma cells. NexCAR19 is similar in this aspect. A key difference between the CAR-T cell therapies developed in the U.S. and NexCAR19 lies in the composition of antibody fragments. While those developed in the US originate from murine (mice) sources, NexCAR19 has human proteins added to the mouse antibody, resulting in a 'humanised' CAR. This modification might have contributed to its reduced toxicity.

Collaboration with NCI

The researchers were trying to develop a therapy unexplored in India, and it was not an easy path. "We tried multiple times and had multiple failures and successes," says Dr. Dwivedi. "The process is very lengthy and requires skill. When I was trying, the process was not working." Recognising the need for expertise, the team decided to seek help from the NCI and brought on board Nirali Shah, M.D., who collaborated with Dr. Jain and Dr. Narula on the clinical trial phase of the treatment. "They knew what they wanted to do and how to develop it in India for India," says Dr. Shah.

They visited NCI during a conference at the American Association for Cancer Research (AACR). The team met researchers at NCI who helped them troubleshoot and provided insights on protocol and the challenges they were



In October 2023 CDSCO approved the first CAR-T cell therapy to treat relapsed or refractory B-lymphomas and B-Acute Lymphoblastic Leukemia (B-ALL), where all other lines of treatment had failed

facing. Upon returning to India, they implemented the suggestions provided, and it worked well. "NCI had a great impact on our development," says Dr. Dwivedi. The visit helped the team design an effective therapy. A smile spreads across her face as she reminisces about the day the CAR construct worked not only in vitro but also in mice.

Clinical trial

After successfully developing CAR-T cell therapy, the team had to approach the Central Drugs Standard Control Organization (CDSCO) for clinical trial approval. "I think getting approval to conduct the study was a second critical milestone," says Dr. Shah.

On June 4, 2021, the first patient was treated at Tata Memorial Hospital, and the CAR-T therapy worked. "We were super happy that whatever we saw in the laboratory was working on the patient. It was a huge thing," says Dr. Dwivedi. In October 2023, based on the data emerging from the clinical trial, CDSCO approved the first CAR-T cell therapy to treat relapsed or refractory B-lymphomas and B-Acute Lymphoblastic Leukemia (B-ALL), where all other lines of treatment had failed. Thus emerged a Made-in-India product, built by a team that persevered despite numerous challenges.

Risks of CAR-T therapy

While CAR-T therapy has shown remarkable progress in cases that looked

hopeless, its efficacy varies from person to person, and it remains too early to declare it a complete cure. Moreover, it entails several side effects, the cytokine release syndrome (CRS) being the most common – an inflammatory response triggering immune system hyperactivity. Neurotoxicity is another common side effect but it wasn't observed in any early-stage clinical trial patients, potentially because of the 'humanised' antibody fragments used. Additionally, infections and low blood cell counts are other side effects doctors anticipate.

"We had to keep in mind that complications, which we may not be aware of now, might appear as you go along. That is something we have to be careful about," says Dr. Jain.

Despite the promise of CAR-T therapy, access to primary healthcare remains a challenge in many parts of India, with cancer treatment primarily concentrated in metropolitan areas. Given the therapy's side effects, proximity to a hospital is paramount.

As a clinician and scientist, Dr. Shah points out that her biggest worry with CAR-T cell implementation is managing its side effect profile linked to inflammation, particularly in cases requiring intensive care support, and the possibility of patients being heavily immunocompromised.

"You have to be really mindful when you try to adopt a therapy from one country to the next. You have to also think about the clinical parameters where this therapy is going to be implemented," says Dr. Shah

Relatively costly therapy

The project started with Dr. Purwar's dream of developing an affordable treatment. While NexCAR19 is priced at a fraction of its U.S. counterpart, it remains relatively high for many Indians, ranging from ₹40 to 45 lakh. "It's still one of the most expensive therapies that we have in the entire field of cancer therapy," says Dr. Jain. The manufacture of NexCAR19 involves multiple steps that affect its cost. Labour, logistics, materials, and facility expenses as well as marketing, distribution, and intellectual property development all play a role in pricing according to Shirish Arya, Co-founder and Director-Corporate Strategy and Business Development at ImmunoACT, a startup founded by Dr. Purwar and backed by Laurus Labs.

The good news, though, is the price can be further reduced. "We are working hard to increase access further", says Mr. Arya. "As purchasing power improves, scale up of manufacturing will help reduce cost of production". Also, the low toxicity means a patient doesn't have to bear the cost of hospitalisation.

(The author is a freelance content provider based in Hyderabad. souji_padikkal@yahoo.com)



Chimeric Antigen Receptor (CAR) T cell therapy



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The Hindu analysis by saurabh.pandey sir

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Side Effect

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- Additionally, infections and low blood cell counts are other side effects doctors anticipate

ISRO's 'zero orbital debris' milestone

How did ISRO ensure practically zero debris left in earth orbit after the PSLV-C58/XPoSat mission? What is the purpose and function of the PSLV Orbital Experimental Module-3 (POEM-3)? How does it contribute to space debris mitigation efforts? What are the risks space debris poses to space assets?

EXPLAINER

Suchitra Karthikeyan

The story so far:

The Indian Space Research Organisation (ISRO) has said its PSLV-C58/XPoSat mission has practically left zero debris in earth orbit. The space agency explained that the last stage of the Polar Satellite Launch vehicle (PSLV) used in the mission was transformed into a kind of orbital station – called the PSLV Orbital Experimental Module-3 (POEM-3) – before it was left to re-enter the earth's atmosphere instead of floating in orbit once its mission was completed. ISRO said that after it completed the primary mission of injecting all satellites into their target orbits, the fourth stage of the PSLV was transformed into the POEM-3. It was subsequently de-orbited from 650 km to 350 km, rendering it more susceptible to being pulled towards the earth and burning up in the atmosphere. ISRO also said it "passivated the stage," meaning dumped its fuel, to avoid an explosion that could have flung small pieces of debris into orbit.

What is POEM?

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

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



Orbital threat: With the rise in the number of satellites in orbit around the earth, space debris has become a pressing issue. AFP

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

What has POEM-3 achieved?

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

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

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

It completed 400 orbits around the

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

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

Why is this significant?

With the rise in the number of satellites in orbit around the earth, space debris has become a pressing issue. Space debris in the low earth orbit (LEO) mainly comprises pieces of spacecraft, rockets, and defunct satellites, and the fragments of objects that have deteriorated

explosively as a result of anti-satellite missile tests. This debris often flies around at high speeds of up to 27,000 km/hr. Due to their sheer volume and momentum, they pose a risk to several space assets.

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

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

How are agencies dealing with debris?

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

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

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

THE GIST

ISRO successfully conducted the PSLV-C58/XPoSat mission, deploying the XPoSat satellite into orbit and subsequently transforming the last stage of the PSLV into the PSLV Orbital Experimental Module-3 (POEM-3).

Developed by the Vikram Sarabhai Space Centre (VSSC), POEM utilises the spent fourth stage of a PSLV rocket as an orbital platform for scientific experiments.

POEM-3 completed 400 orbits around the earth, operationalising nine payloads to conduct various experiments before re-entering the earth's atmosphere.

With the increasing number of satellites in orbit, space debris poses a significant risk to space assets.



ISRO's 'zero orbital debris'



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

- **WHAT IS POEM?**

- **Dubbed PSLV Orbital Experimental Module, Poem is the spent fourth stage of the launch vehicle that would be used as an orbital platform to carry out scientific experiments through non-separating payloads.**
- **PSLV is a four-stage rocket, and while the first three stages are jettisoned into the ocean after they push the mission to desired orbit, the four-stage remains in orbit and becomes space junk.**
- **Isro is now repurposing this fourth stage to use an experimental platform**
-

HOW DOES POEM WORK?

- The fourth stage or the orbital experimental platform, Poem, is powered by solar panels and is fitted with its own Navigation Guidance and Control (NGC) system, which helps in attitude stabilization.
- The payloads will be switched on, once the primary and the secondary satellites from Singapore are deployed in their orbits. Isro said that the solar panels mounted around the PS4 tank will be deployed after confirmation of the stage achieving stabilization.

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- "The platform will ensure that the deployed solar panel points towards the Sun optimally using appropriate sun pointing mode, which will increase the power generation capability of the platform.

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Is transparency lacking in candidate disclosure?

How has the Supreme Court addressed concerns about candidates with serious criminal charges contesting elections? What reforms have been proposed by the Law Commission and EC to address these issues?

Rangarajan. R

The story so far:

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

What does the law specify?

Section 33 of the Representation of the People Act, 1951 (RP Act) read with rule 4A of election rules, requires every contesting candidate to file their nomination paper for elections along with an affidavit in a prescribed format. In *Association of Democratic Reforms (ADR) Vs Union of India* (2002), the Supreme

Court held that voters have the right to know about the criminal antecedents, income and asset details of the candidate and his/her dependants and educational qualification of contesting candidates. This resulted in Section 33A being added to the RP Act that requires details of criminal antecedents to be part of the election affidavit.

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

What are the issues?

In a recent case, an independent candidate from Arunachal Pradesh failed to declare three vehicles as assets in his election affidavit while contesting the Assembly election in 2019. His election was set aside by the Gauhati High Court. However, the Supreme Court reversed the

decision and held that non-disclosure of information that is not material or substantial cannot be treated as an attempt to unduly influence the voters. In the case of Mr. Chandrashekar, the complaint is about alleged concealment of his income and substantial assets in his election affidavit that can have a potential impact on the decision of the voters.

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

The Law Commission in its 244th report on 'Electoral Disqualifications' (2014) and EC in its memorandum on

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

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

What can be the way forward?

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

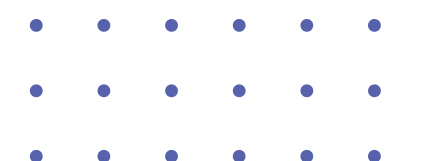
Rangarajan R is a former IAS officer and author of 'Polity Simplified'. Views expressed are personal

THE GIST

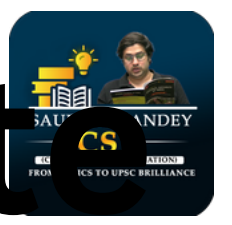
▼ The Supreme Court ruled that candidates are not obligated to disclose every detail in their election affidavits unless the information is substantial in nature.

▼ Instances of candidates failing to disclose assets and income have raised questions about the transparency and completeness of affidavits.

▼ While debarring candidates based on chargesheets could be misused, implementing stricter punishment for false affidavits and increasing transparency in disclosing criminal records are crucial steps. Ensuring voter awareness and informed choices through better disclosure mechanisms is essential for electoral integrity.



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Topics



- ASER 2023
- TONGA
- PACIFIC ISLAND FORUM
- Songkran
- National Investigation Agency
- Essay topic



By saurabh pandey sir.



Data for better education, a brighter future for students

As it has almost been a tradition since 2005, except during the COVID-19 years, the Annual Status of Education Report (ASER) 2023 was released in mid-January this year. And, as it has also become customary, the report has got much attention. Amidst a surfeit of insights that the report has offered, what has grabbed the headlines is the foundational skills of 14-18 year olds. As much as the learning outcomes data is concerning, practitioners and policymakers must dig deeper into the data to glean actionable insights for improving education and overall outcomes for India's adolescents and youth.

On foundational learning trajectories
First, the ASER 2023 Beyond Basics survey was carried out in 28 rural districts across 26 States of the country. While the sample is not nationally representative, it is still representative of the district level and indicative of broader trends of the activities, abilities (including digital abilities), and aspirations of 14-18 year olds. The report shows that, overall, 26% of 14-18 year olds cannot read a standard two level text in their regional language.

This is concerning but the die was cast years ago. An 18-year-old in 2023 would have been a 13-year-old in 2018, and most probably a standard seven or eight student. In 2018, around 32% of standard seven and 27% of standard eight children could not read a standard two level text. Foundational learning trajectories are typically flat and become flatter in the upper grades, which means that unless children acquire foundational skills in the primary grades, they are extremely unlikely to acquire them in later grades, in the absence of focused interventions. Should we really be surprised then that one in four 14-18-year olds cannot read fluently?

But how do we correct the collective failures of the past when it comes to these millions of children? ASER provides data on the distribution of 14-18 year olds as well as the percentage of children with basic reading skills, by where they are enrolled. Basic calculations using these numbers suggest that 57% of the 14-18 year olds surveyed who do not possess basic reading skills are enrolled in standard 10 or below, while another 28% of these children are not enrolled in school, college or a vocational institution.

Though ASER does not capture school attendance in secondary grades, the National Sample Survey Office (NSSO) 75th round did so in 2017-18, recording that in the secondary grades (standards nine and 10) attendance in rural India was as low as 60%. Thus, among the 14-18 year olds who are unable to read fluently, even those who are enrolled in school may not be attending school. Focusing on school-based reading



Neeraj Trivedi

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Shweta Bhutada

co-leads the Survey Unit at Annual Status of Education Report (ASER) Centre

improvement programmes without investing in encouraging and empowering these children to return to school and to reading may not yield transformative results.

ASER 2022 provides further insights into where these children are on the ladder in terms of acquiring abilities to read with fluency and comprehension. Of the children in standard eight who could not read standard two level text fluently in 2022, almost half could read a standard one level text (i.e., a simple paragraph). Recognising letters or decoding simple words is not the major challenge most face. They need guidance, practice, and lots of encouragement and motivation to read. Unfortunately, exposed to ridicule and embarrassment, many of these children may have given up and begun to hate reading now.

The availability of reading materials and books is a crucial factor in developing reading habits and abilities. ASER 2022, and later the State of Elementary Education in Rural India Report, brought out by Sambodhi and the Development Intelligence Unit, clearly indicate that only a small fraction of rural households has reading materials, other than school textbooks. Community libraries can create rich, vibrant spaces that foster reading, creativity and critical thinking. But just setting up libraries is not the solution. They need to be managed right, led by committed and enterprising individuals who can rekindle an interest in reading, drawing children, youth and adults to these libraries and nurturing an environment in homes and neighbourhoods that guides, supports and motivates readers of all ages, genders and abilities.

Children and careers

ASER 2023 provides a peek into the aspirations and thought processes of the 14-18 year olds regarding their future. In addition to quantitative questions around educational and work aspirations and role models, the ASER team conducted focus group discussions with children of the target age group in three districts. More than 60% of the surveyed children want to obtain at least a college education, with a higher percentage of girls aspiring for a college education (65%) when compared to boys (59%). When asked about their work aspirations, one in five said they had really not thought about it. Among those who had, joining the police or the defence forces was the most prominent among career options for boys, while becoming a teacher or doctor emerged as the most prominent career option for girls. Developing aspirations is important but youth need the support, mentorship and inspiration to evaluate these aspirations, identifying alternative better-suited prospects if available, and

undertaking preparations and measures needed to fulfil the aspirations. ASER points out that almost half of the surveyed 14-18 year olds who have work aspirations do not know anyone else working in that profession, whether at home, community, school or even a public figure.

Further, focus group discussions conducted in three districts, as part of the ASER 2023 survey, discussed perceptions of 14-18 year olds around vocational education. In Sitapur and Dhamtari (in Uttar Pradesh and Chhattisgarh, respectively) vocational education was marred by negative perceptions of being the route that people choose when they are unable to bag white collar jobs. However, discussions in Solan (Himachal Pradesh) offered a refreshing perspective. Here, context-driven vocational courses such as tourism and hotel management were introduced in schools as early as standard nine and the result was seen in the perspectives of students towards these trades, which gained aspirational value. On-the-job training, certification at the end of the course and readily available information on career prospects encouraged students to aspire for related professions.

Technology use

In this backdrop, the increasing ubiquity and access of youth to smartphones, as highlighted by ASER 2023, and, earlier, the State of Elementary Education in Rural India Report, must be leveraged. Both surveys also confirm what we all know from our personal experiences – that teens use smartphones primarily for entertainment and social media and less for educational purposes. Youth will use smartphones for what they find interesting and what aligns with their motivations. Tapping into the incentives that youth may have to prepare and learn more about what they want to become, digital technology can equip youth with the foundations of their aspired professions and also bridge connections with relevant professionals. For example, while in school or college, youth who wish to become nurses can undertake online foundational courses on nursing and related subjects, or even relevant short modules such as administering first aid. All this requires committed collaborations among ed-tech agencies, industries and professional groups. But schools and colleges must take the lead and do more to understand and cultivate youth's aspirations and guide them to the right platforms and avenues.

Data, and not just ASER data, when designed and collected with rigour and the right intent, highlight problems but also have crucial pointers for action. What is needed is to move beyond the immediate instinct to lament over the problem and dig deeper to discern where to act, how to act and who must act.



.About the ASER 2023 Survey

- The survey focuses on four key aspects: educational and career pathways, the application of foundational skills in daily life, digital access, and future skills and aspirations.
- The ‘Beyond Basics’ survey for the year 2023 by ASER was carried out in 28 districts across 26 states.
-

ASER 2023 'Beyond Basics' explored four key domains

ABILITY

Proficiency in comprehending simple text and performing basic arithmetic tasks. Capable of executing basic calculations needed for everyday situations, such as calculating interest for repayment and applying discounts. Further, it focuses on youth's ability to read and comprehend simple instructions, such as those found on a medicine packet.

AWARENESS AND DIGITAL APTITUDE

Do they have smartphones? Are they financially aware? Do they have knowledge of digital technologies and platforms? How do they utilize smartphones, and can they execute fundamental digital tasks on these devices?

ACTIVITY

What activities currently occupy the youth of India? Are they attending school or college, seeking additional tuition, undergoing vocational training, preparing for exams, or engaged in employment?

ASPIRATIONS

What are their ambitions for the future? How extensive is their desire for further education? Who do they look up to as their role models?

The Hindu analysis by saurabh pandey sir

- **Enrollment:** 86.8% of individuals aged 14 to 18 are currently enrolled in an educational institution.
- **Enrolled Streams:** The majority of youth within this age range are enrolled in the Arts/Humanities stream
- **Vocational Training:** Just 5.6% of the surveyed young individuals are engaged in vocational training or related courses.
- **Employment:** A greater proportion of males (40.3%) engage in non-household work for at least 15 days in the previous month compared to females (28%)

- **Foundational reading Ability:** Approximately 25% of individuals in this age bracket 14-18 are still unable to ~~fluently~~ read a text at the Standard II level in their regional language.
- **Foundational Arithmetic Ability:** In general, nearly half of the youth population demonstrates proficiency in common calculations, such as time measurement, weight addition, and application of the unitary method.

- **Access to digital devices: Nearly 90% of young individuals have a smartphone in their households and are proficient in its usage.**
- **Among smartphone users, males (43.7%) are more than twice as likely to own a smartphone compared to females (19.8%).**
- **In contrast, the presence of a computer or laptop in households is significantly lower, with only 9% having one at home.**

- **Key Takeaways**
- **Smartphone ownership in rural households has increased from 36% in 2018 to 74% in 2022**
- **Two decades ago it was believed that computers and the internet would revolutionize education. A decade later mobile technology led to the belief that education anytime anywhere is possible. From one laptop per child we started thinking mobile devices will replace books. Now we are about to reach a situation of having a mobile phone in every home.**
- **89% of youth have stated that they have a smart phone at home, 92% stated they know how to use a smartphone.**

The Hindu analysis by saurabh pandey sir



- According to self-declared information in ASER 2023, almost half the population has used mobile phones for their studies, significant but much less than those who use Youtube on smartphones.
- Agriculture employs over 50% of India's workforce, only 0.7% of the surveyed youth are enrolled in agriculture courses beyond Std X
- Half of the students start working part-time after completing Std X

●

NUKU'ALOFA

China defends security offer to Tonga for Pacific islands summit



GETTY IMAGES/ISTOCKPHOTO

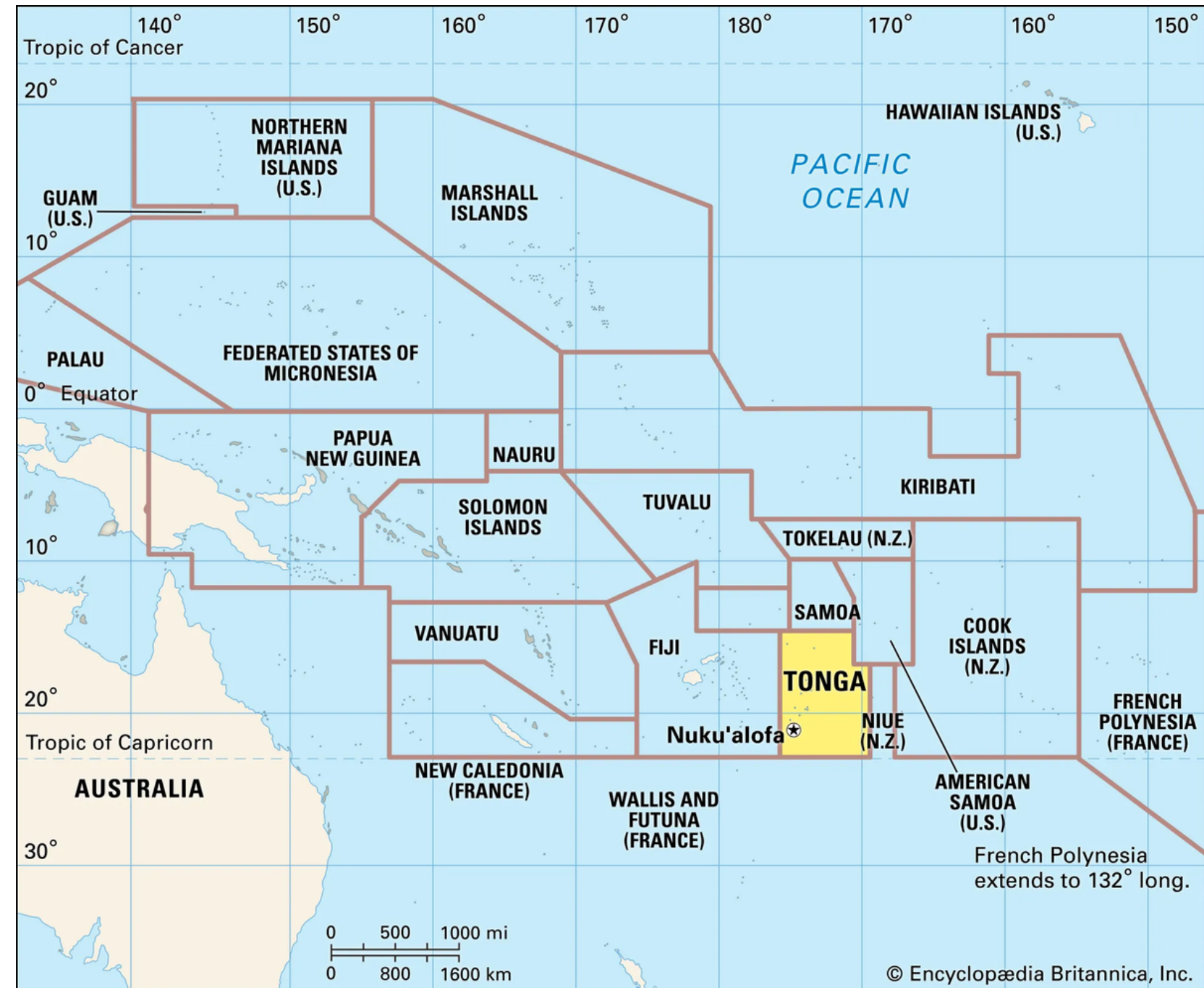
China said on Friday it is offering security assistance to Tonga for a Pacific islands summit, but swatted away concerns about its ambitions in the hotly contested region. Tonga, a Pacific kingdom of fewer than 1,10,000 people, says it needs help to host the August 26 annual meeting of the 26-member Pacific Island Forum. AFP



TONGA



- China said on it is offering security assistance to Tonga for a Pacific islands summit.



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The Pacific Islands Forum

- The Pacific Islands Forum brings the region together to address pressing issues and challenges, and foster collaboration and cooperation in the pursuit of shared goals.
- Founded in 1971, it comprises 18 members: Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Kiribati, Nauru, New Caledonia, New Zealand, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.
- Our vision is for a resilient Pacific region of peace, harmony, security, social inclusion and prosperity, that ensures all Pacific peoples can lead free, healthy and productive lives

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New beginnings



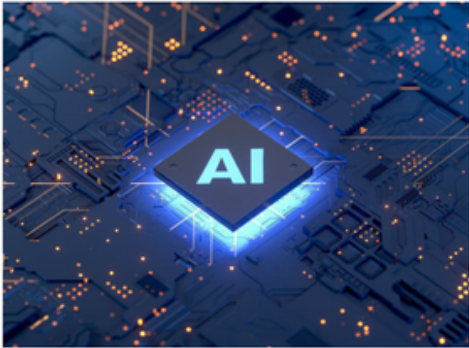
Making merry: Revellers take part in a mass water fight on the eve of Songkran, or Thai New Year, on Khao San Road in Bangkok. AFP



Songkran

- In Thailand, Songkran refers to the sun's annual passing into the Aries constellation, the first sign of the Zodiac, which marks the traditional start of the new year.
- Occurring in mid-April after the rice harvest, it is a time when people reunite with their families and pay their respects to older adults, ancestors and sacred Buddha images. Pouring water is a significant act during Songkran, symbolizing cleansing, reverence and good fortune.
- Other activities include bathing important Buddha images, splashing water on family and friends, folk plays, games, music and feasting





New wave: For two decades, Taiwan's top export market has been China. ISTOCKPHOTO

U.S. becomes Taiwan's largest export market amid chips, AI surge

Agence France-Presse
TAIPEI

The United States has topped long-time leader China as Taiwan's main export market for four consecutive months due to a surge in demand for microchip products and AI technology, Taipei's Finance Ministry said Friday.

Self-ruled Taiwan is a microchip-manufacturing powerhouse, churning out the world's most advanced silicon wafers necessary to power everything from e-vehicles and satellites to fighter jets and increasingly to power AI technology.

For two decades, its top export market has been China – which claims Taiwan as part of its territory – but December data from the Finance Ministry shows the United States topping the list for the first time since August 2003.

In December, Taiwan exported \$8.49 billion in products to the United States, compared with \$8.28 billion to mainland China. The trend continued through March, when the U.S. exports increased by 65% to \$9.11 billion, a six per cent jump, while mainland China received \$7.99 billion. Those figures exclude Hong Kong, which holds its own status as a customs territory. When combined with mainland tallies, China remains the top destination for Taiwanese goods.

A Finance Ministry official in the trade division attributed the recent U.S. tilt to the global “reorganisation of electronics and ICT (information and communication technology) supply chains, and the popularity of the AI industry”.



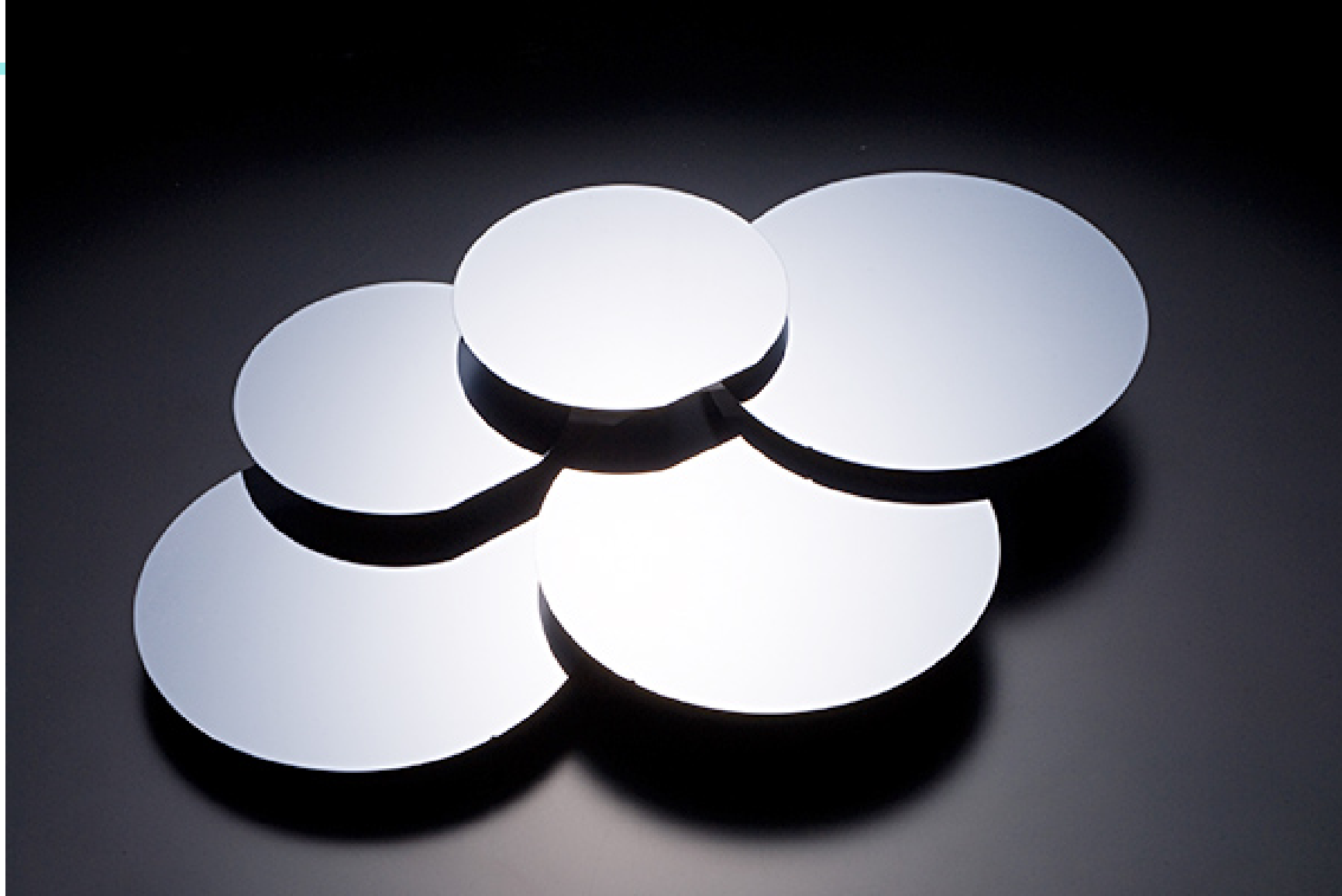
U.S. becomes Taiwan's largest export market



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Silicon WAFER



The Hindu analysis by saurabh.pandey sir

- Silicon wafer is a material used for producing semiconductors, which can be found in all types of electronic devices that improve the lives of people.
- Silicon comes second as the most common element in the universe; it is mostly used as a semiconductor in the technology and electronic sector.
- There are various methods used in silicon fabrication counting the horizontal Bridgeman method, horizontal gradient freeze method, vertical gradient freeze, vertical Bridgeman method and the Czochralski pulling method.

- All through the growth process dopants can be included to modify the purity of the silicon wafer depending on its manufacturing purpose.
- Some of the silicon dopants that can be added throughout the growth process include aluminum, boron, nitrogen, indium and gallium.

NIA arrests Bengaluru cafe bomber and chief conspirator in Bengal

K.V. Aditya Bharadwaj
BENGALURU

In a significant breakthrough, the National Investigation Agency (NIA) arrested the alleged bomber and chief conspirator in Bengaluru's Rameshwaram Cafe blast case from a hotel near Kolkata, West Bengal, early on Friday.

The arrested persons were identified as Abdul Matheen Ahmed Taahaa, 30, the alleged chief conspirator in the case, and Mussavir Hussain Shazib, 30, the alleged bomber.

The blast at the restaurant in Brookfield on March 1 had left nine injured. The NIA had announced a reward of ₹10 lakh for information leading to their arrest.

The duo came under the radar of security agencies in 2020, when they were accused in the Islamic State (IS)-inspired Al Hind module case busted in Bengaluru. The module wanted to allegedly start an IS-style insurgency from the jungles of south India and had spread its tentacles in Karnataka and Tamil Nadu. While others in the case were arrested, the duo slipped away and had been on the run.

The two, both hailing



In the net: An accused in the Bengaluru cafe blast case being brought to a court by NIA officials, in Kolkata. PTI

Trinamool, BJP spar over arrests

KOLKATA
The arrest of two accused in the Bengaluru cafe blast case from West Bengal on Friday triggered a war of words between the Trinamool Congress and the BJP in the State ahead of the Lok Sabha polls. » **PAGE 7**

from Thirthahalli in Shivamogga, in southern Karnataka, allegedly put together a module of youth they radicalised in their hometown.

The “Thirthahalli module” was also allegedly involved in a pro-terror graffiti case in Mangaluru in 2020, an IED trial blast in Shivamogga and cooker

blast in Mangaluru in 2022.

“The kingpins of this module that had been active for four years now have now been arrested,” a senior official said.

The NIA said they were traced to their hideout to a lodge near Kolkata, where they were staying under false identities. After the NIA sought their help, the West Bengal police apprehended the accused. The NIA said the month-long manhunt for the duo that ended on Friday morning was a coordinated effort of several Central agencies along with police forces of Karnataka, Tamil Nadu, Telangana, West Bengal among other States.

With these arrests, the total number of arrests in the case has gone up to four.



National Investigation Agency



- **The Government after due consideration and examination of the issues involved, proposed to enact a legislation to make provisions for establishment of a National Investigation Agency in a concurrent jurisdiction framework, with provisions for taking up specific cases under specific Acts for investigation.**
- **Accordingly the NIA Act was enacted on 31-12-08 and the National Investigation Agency (NIA) was born. At present NIA is functioning as the Central Counter Terrorism Law Enforcement Agency in India.**

•

- **The National Investigation Agency aims to be a thoroughly professional investigative agency matching the best international standards.**
- **The NIA aims to set the standards of excellence in counter terrorism and other national security related investigations at the national level by developing into a highly trained, partnership oriented workforce.**
- **NIA aims at creating deterrence for existing and potential terrorist groups/individuals. It aims to develop as a storehouse of all terrorist related information**



Topics



- What is hepatitis?
- **LAW OF DISCLOSURE**
- Sea Level Rise
- Gerozyme'
- sc on climate change jurisprudence
- Essay topic



By saurabh pandey sir.



Why is there a WHO alert on viral hepatitis?

What are the findings in the Global Hepatitis Report 2024? Why does India have such a high disease load of hepatitis B and C? Is the increasing prevalence of non-viral forms of the disease, like alcoholic liver disease and non-alcoholic fatty liver disease, adding to the burden?

Bindu Shajan Perappadan

The story so far:

India accounted for 11.6% of the total viral hepatitis disease burden globally in 2022, making it the country with the second highest disease load after China, according to the World Health Organization's (WHO) Global Hepatitis Report 2024 released recently. Bangladesh, China, Ethiopia, India, Indonesia, Nigeria, Pakistan, the Philippines, the Russian Federation and Vietnam, collectively shoulder nearly two-thirds of the global burden of hepatitis B and C.

What does the report highlight?

As per the report, the disease is the second leading infectious cause of death globally – with 1.3 million deaths per year, the same as tuberculosis, a top infectious killer. New data from 187 countries show that the estimated number of deaths from viral hepatitis increased from 1.1 million in 2019 to 1.3 million in 2022. Of these, 83% were caused by hepatitis B, and 17% by hepatitis C. Every day, there are 3,500 people dying globally due to hepatitis B and C infections. Half the burden of chronic hepatitis B and C infections is among people aged 30-54 years old, with 12% among children under 18 years of age. Men account for 58% of all cases.

What is hepatitis?

“Hepatitis is an inflammation of the liver that is caused by a variety of infectious viruses and non-infectious agents leading to a range of health problems, some of which can be fatal,” says Sharad Malhotra, HOD, Gastroenterology Hepatology and Therapeutic Endoscopy, Aakash Healthcare, Delhi. There are five main strains of

Hepatitis B can be prevented through vaccination, and the report highlights the need to ensure coverage; hepatitis C is curable with medicines

the hepatitis virus, referred to as types A, B, C, D and E. While they all cause liver disease, they differ in important ways including modes of transmission, severity of the illness and geographical distribution. In particular, types B and C lead to chronic disease and together are the most common cause of liver cirrhosis, liver cancer and viral hepatitis-related deaths. An estimated 354 million people worldwide live with hepatitis B or C, and for most, treatment remains beyond reach, according to the WHO.

Why is India vulnerable?

Doctors attribute the large number of cases to several reasons including high population density, lack of awareness to symptoms, screening and treatment and not adhering to or having access to good hygiene practices.

Dr. Sudeep Khanna, senior consultant, gastroenterologist, Indraprastha Apollo Hospitals, explained that one of the major reasons for the increasing burden of hepatitis in India is the high prevalence of chronic viral hepatitis B and C infections. “These chronic infections often remain asymptomatic for decades; furthermore, the lack of widespread screening programmes and limited awareness about the importance of hepatitis testing contribute to a significant proportion of cases going undiagnosed. Undiagnosed cases continue to transmit the infection, perpetuating the cycle of transmission and leading to a rise in the overall burden of the disease,” he said. The physician added that another important factor contributing to the rising number of hepatitis cases is the increasing prevalence of non-viral forms of the disease, such as alcoholic liver disease (ALD) and non-alcoholic fatty liver disease (NAFLD). Doctors note that the high consumption of alcohol, particularly in urban areas, has led to a significant increase in ALD cases. Additionally, the rapid rise in obesity and metabolic disorders, coupled with sedentary lifestyles and dietary changes, has fuelled an epidemic of NAFLD in both urban and rural populations. These conditions can progress to more severe forms of liver disease further compounding the burden of hepatitis in India.

Men report larger number of cases. Manoj Gupta, HOD, Liver Transplant and GI Surgery, PSRI Hospital, Delhi, states that this is due to high-risk behaviour like use of IV drugs, sharing injections while using IV drugs and sexual behaviour. “Multiple sex partners, or male to male sex is a very high-risk factor for these hepatitis B and C infections,” he said.

How can it be prevented?

Hepatitis B can be prevented through

vaccination and the report highlights the need to ensure coverage, while hepatitis C is curable with medicines. In India, the numbers of deaths due to viral hepatitis aren't comparable to tuberculosis, say experts, adding that cost of treatment is also among the lowest as India makes the generic version of the drugs. Also, the government's viral hepatitis control programme offers the vaccine to high-risk adults such as healthcare workers. Treatment for both hepatitis B and C is available under the programme. With an initial rollout of the hepatitis B vaccine in certain cities and districts of India in 2002-2003, the Indian Government included Chronic Hepatitis B infection (HBV) vaccine in the childhood immunisation programme in 2011-12.

Why is the report significant?

This is the first consolidated WHO report on the viral hepatitis epidemiology, service coverage and product access, with data for action. This report presents the latest estimates on the disease burden and the coverage of essential viral hepatitis services from 187 countries across the world. It also found that across all regions, only 13% of people living with chronic hepatitis B infection had been diagnosed, and approximately 3% (7 million) had received antiviral therapy at the end of 2022. Regarding hepatitis C, 36% of people had been diagnosed and 20% (12.5 million) had received curative treatment. These results fall well below the global targets to treat 80% of people living with chronic hepatitis B and hepatitis C by 2030. However, it does indicate slight but consistent improvement in diagnosis and treatment coverage since the reported estimates in 2019.

What is the way forward?

Mother to child transmission is responsible for most new infections, and in India, elimination of hepatitis B requires extensive treatment coverage, immunising and protecting every newborn and ending any discrimination against patients, said Dr. S.K. Sarin, Vice-Chancellor, Institute of Liver and Biliary Sciences, Delhi. The report cautions that despite the availability of affordable generic viral hepatitis medicines, many countries fail to procure them at lower prices. Pricing disparities persist both across and within WHO regions, with many countries paying above global benchmarks.

The report adds that service delivery remains centralised and vertical, and many affected populations still face out-of-pocket expenses for viral hepatitis services. It has outlined a series of actions to advance a public health approach to viral hepatitis, designed to accelerate progress towards ending the epidemic by 2030. This must look at expanding access to testing and diagnostics, shifting to policies for equitable treatment, strengthening prevention efforts and improved funding both at a global level or within countries' health budgets, said WHO.



Need for awareness: Pregnant women waiting for the Hepatitis B surface antigen screening test in Chennai in 2021. FILE PHOTO



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The Hindu analysis by saurabh pandey sir





Disease	Pathogen	Symptoms	Incubation period	Method of transmission	Diagnostic test
Hepatitis A	HAV, Picornaviridae	Fever, headache, malaise, jaundice	2-6 weeks	Ingestion	IgM antibodies
Hepatitis B	HBV, Hepadnaviridae	Severe liver damage, chronic disease occurs	3-26 weeks	Parenteral, sexual contact	IgM antibodies
Hepatitis C	HCV, Flaviviridae	Same as HBV, more chronic	2-33 weeks	Parenteral	PCR of viral RNA
Hepatitis D	HDV, Deltaviridae	Severe liver damage, high mortality rate	6-26 weeks	Parenteral, when co-infected with HBV	IgM antibodies
Hepatitis E	HEV, Caliciviridae	Pregnant women may be at high risk and show high mortality, not chronic disease	2-6 weeks	Ingestion	IgM antibodies, PCR of viral RNA

The Hindu analysis by saurabh pandey sir



How did the law on disclosure of assets evolve?

What is the Supreme Court ruling?
What principle emerges from it? What is the penalty for omission of assets?

K. Venkataramanan

The story so far:
Two recent developments have brought under focus the disclosure norms that candidates are expected to comply with in election law. One relates to reports that the BJP candidate in the Thiruvananthapuram Lok Sabha constituency, Rajeev Chandrasekhar, had allegedly failed to report all the assets he owns in the mandatory affidavit accompanying his nomination papers. Another report was about the Supreme Court noting that not every little detail needs to be disclosed, as candidates also have their right to privacy.

What is the law related to disclosure?
The requirement that prospective candidates will have to disclose their criminal antecedents, if any, their educational qualifications and their assets and liabilities, including those of their spouses and dependants, arose from a landmark Supreme Court judgment on May 2, 2002. The court ruled that the voters’ right to information in a democracy is part of the citizens’ right to express their opinion through their vote.

In June 2002, the ECI issued the rules to give effect to the judgment. However, the Central government of the day sought to curtail the scope of these disclosures by an ordinance amending the Representation of the People Act, 1951, in August 2002. Later, it was replaced by an

Rejecting the contention that the voter’s right to know all particulars is absolute, the Supreme Court said there was no need for a candidate to lay bare his entire life for the electorate to examine

Act. The amendments introduced Sections 33A (concerning disclosure of pending criminal cases), Section 33B (which effectively nullified the ECI’s notification by saying no disclosure other

than those prescribed in the Act is required) and Section 125A (penalty for failure to disclose or false disclosure). The Ordinance and, thereafter, the amending Act were challenged in court. The Supreme Court on March 13, 2003, struck down Section 33B and restored the disclosure requirements regarding assets and liabilities and educational qualifications. The ECI issued revised instructions and the format for disclosure based on the judgment.

What are the consequences of any omission?
Section 125A of the RPA, 1951, prescribes a six-month prison term, or a fine, or both, for any candidate’s failure to disclose the required information, or giving false information or concealing such information.

Besides this provision for prosecution, any omission or false information could be a ground to challenge a candidate’s election in the High Court. Among the grounds available to a court to invalidate an election, two are relevant here.

Under Section 100, an election can be declared void if there is “improper acceptance of any nomination” or “any non-compliance with the provisions of the Constitution or of this Act or of any rules or orders made under this Act.” It is possible for an unsuccessful candidate to question the acceptance of the nomination of the ultimate winner on the ground of concealment or furnishing of false information, as well as raise the possible violation of any of the statutory disclosure requirements.

What is the latest court ruling?

This case concerned the election of Karikho Kri, an independent candidate who won a seat in the Arunachal Pradesh Assembly in 2019. His election was challenged by the Congress candidate Nuney Tayang on the ground that Mr. Kri had not disclosed some moveable assets in the names of his wife and children. The Itanagar Bench of the High Court of Assam, Nagaland, Mizoram and Arunachal Pradesh accepted the allegations and declared Mr. Kri’s election void. It found that his nomination had been improperly accepted as he had failed to disclose three vehicles sold some years before, but not yet registered in the name of the buyers) and had not submitted a ‘No Dues’ certificate for government accommodation he had enjoyed during an earlier stint as MLA (2009-14).

The Supreme Court set aside the High Court’s judgment on the ground that the non-disclosure was not of a substantial nature warranting rejection of his nomination; nor did it amount to non-compliance with the law as it did not materially affect the outcome of the election.

What is the takeaway from the verdict?

Rejecting the contention that the voter’s right to know all particulars is absolute, the Supreme Court said there was no need for a candidate to lay bare his entire life to the electorate. It is not necessary to declare every item of moveable property, unless it is of such value as to be sizeable in itself, or will reflect upon his lifestyle and thus be of interest to the voter. However, the court cautioned that there cannot be a straitjacket rule on this, and what omission is of a substantial character or will affect the outcome will depend on the facts of each case.



LAW OF DISCLOSURE



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Concurrent heatwaves, sea level rises pose a threat to coastlines

The Hindu Bureau

Concurrent occurrences of heatwaves and extreme short-term sea level rise at the same coastal locations significantly increased between 1998 and 2017 when compared to the preceding twenty years, as per a study published in the journal *Communications Earth & Environment*.

The study also suggests that these events may be five times more likely to occur between 2025 and

2049 under a modelled high emissions scenario.

A so-called 'concurrent heatwave and extreme sea level' (CHWESL) event is when a heatwave and an extreme short-term sea level rise occur at the same coastal location over the same time period.

This can pose a serious threat to coastal communities. Yet, there has so far been little research into the characteristics and occurrences of these events.

Shuo Wang and Mo

Zhou from the Hong Kong Polytechnic University, Hong Kong, investigated CHWESL events worldwide between 1979 and 2017 and projected future events between 2025 and 2049 under a high emissions climate scenario (the IPCC's SSP5-8.5 scenario). The authors only included events occurring in the extended summer season, spanning May to September in the Northern Hemisphere, and November to March in the Southern

Hemisphere. The authors found that approximately 88% of the world's coastlines experienced a CHWESL event during the period 1979-2017. Approximately 39% of coastlines recorded a significant increase in the total duration of CHWESL conditions experienced over a year during the period 1998-2017 compared to during 1979-1998, with tropical regions more likely to experience a greater increase.

The authors also found

a significant association between heatwave intensity and the probability of a CHWESL event occurring, with a 1% increase in heatwave intensity associated with an approximately 2% increase in the probability of a CHWESL event occurring. From their projections, the authors suggest that global coastal areas could experience on average 38 days of CHWESL conditions each year between 2025 and 2049, an increase of 31 days compared

to the historical period of 1989-2013.

The authors conclude that CHWESL events could pose a significant threat to coastal communities, particularly from the risks of excess heat to human health.

They note that countries in tropical areas are likely to be the most severely affected, and that many of these countries are low or middle-income countries which may struggle to cope with the effects.



Sea Level Rise

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The Hindu analysis by saurabh pandey sir



Geroscience: the science related to aging



**SPEAKING OF
SCIENCE**

D. Balasubramanian

Dr. Daniel Belsky, an epidemiologist at Columbia University, New York (my Alma Mater), has coined the term 'geroscience', meaning geriatric, or related to age. Here, he has devised a novel blood test which determines the pace at which a person is aging. His group has devised a method which studies the formation of methyl groups through an enzyme in the DNA of senior citizens and finds that this methylation is sensitive to aging. This is often referred to as 'gerozyme'.

Tool to target aging

Several groups are working on drugs and other related methods to modulate the

gerozyme, and how these efforts affect his/her aging. One group has suggested the drug called metformin is a tool to target aging (*Cell Metabolism*, vol.23, June 14, 2016). Another group has shown that if we inhibit the enzyme TORC1, it will enhance immunity and reduce infection in the elderly. More recently, Mannick et al, in a paper in *Nature Aging* (2023) have reviewed the effects of the drug rapamycin on the longevity and survival of animal models of human diseases, and how we may make the drug's inhibitors a part of the standard of care for diseases of aging.

Dr. Belsky's group had also studied the levels of DNA methylation in people across the socio-economic backgrounds (poor-rich, rural-urban) and found that the socio-economic disadvantage has a role to play.

The Columbia Aging



Various benefits: Senior citizens will benefit from exercise and thus inhibit the aging-associated enzyme (gerozyme). GETTY IMAGES

Centre has found that a balanced diet supports brain health by reducing inflammation, and promotes proper blood flow by supplying essential nutrients which aid cognitive function.

The website healthline.com elaborates on this and states that healthy

sources of proteins, healthy fats, and foods rich in antioxidants, such as healthy fats, vegetables, foods rich in oils, and plenty of fruits help in supporting healthy aging. This is of particular value to us in India, since the number of people above the age of 60 years is about 10 crores

(out of a total population of 143 crores). Healthline.com suggests that proteins (animal and vegetable), nutritive grains (wheat, rice, ragi, bajra), oils, fruits and soft drinks help in healthy aging. These are easily available, both for meat eaters and vegetarians.

Researchers at Stanford University have found that a drug which can boost strength in injured or aging mice restores connections between nerves and muscle fibres. This drug blocks the activity of an aging-associated gerozyme called 15-PGDH which naturally increases in muscles with age and in neuromuscular disease. But with this drug, aging mice become physically active again.

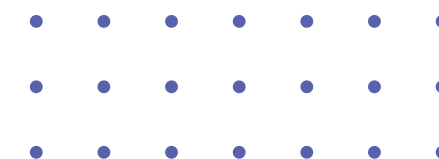
Mayo Clinic in Minnesota offers seven benefits of regular physical activity. These are: controls weight; combats health conditions and diseases like stroke, high blood pressure, type

2, diabetes, and cancer; improves your mood; boosts energy; enables better sleep; better sex life; and finally, it can be fun and social such as meeting, walking, or playing with others.

All of us, particularly senior citizens, will greatly benefit by exercise, and thus inhibit the gerozyme.

Music may even modulate gerozyme and be a cure for dementia!

In 2020, a group from Toledo, Spain published a paper which concluded that music can be a powerful treatment strategy for dementia. And more recently, another group, again from Spain, has a paper titled: Music compensates for altered gene expression in age-related cognitive disorders. In effect, the paper suggests that music can modulate our gerozyme. So, friends! Sing a song or turn the music on!



Gerozyme'

- Dr. Daniel Belsky, an epidemiologist at Columbia University, New York (my Alma Mater), has coined the term 'geroscience', meaning geriatric, or related to age.
- Here, he has devised a novel blood test which determines the pace at which a person is aging.
- His group has devised a method which studies the formation of methyl groups through an enzyme in the DNA of senior citizens and finds that this methylation is sensitive to aging. This is often referred to as 'gerozyme'.

The trend in climate change jurisprudence

What is the backdrop to the Supreme Court ruling that citizens have a right against the adverse effects of climate change? Why has a link been drawn between climate change and human rights? Is this happening in litigation in other countries too?

Jacob Koshy

The story so far:

In a recent judgment, the Supreme Court ruled that citizens have a “right against the adverse effects of climate change.” The Court was giving its verdict in a case that raised concerns over multiple deaths of the Great Indian Bustard due to solar power transmission lines against India’s obligation to meet its emission reduction and increase its energy capacity through non-fossil fuel sources.

What is the context?

In recent years, one of the factors linked to the decline in the population of the Great Indian Bustard, an endangered species, are power lines in Rajasthan and Gujarat, which host several, large solar parks. The concern was that the birds collided against the overhead transmission lines. Environmentalists petitioned the Supreme Court in 2019, pleading that all overhead lines, existing and prospective, be shifted underground. Private and public power companies, supported by the Centre’s Ministry of New and Renewable Energy (MNRE), contended that shifting all overhead lines underground would be expensive and impractical, and would significantly hike the cost of solar power, undermining India’s

Supreme Court judgments on environmental matters have often significantly altered public discourse and governmental action

commitment to green growth. The Court had constituted a committee of experts in April 2021 to determine which transmission lines ought to go underground and which ones could remain overground. In its latest judgment, the Court has continued to task an expert committee with overseeing the electrification but quite emphatically stressed that underground electrification – as the government and power-developers have argued – would hinder India’s road to solar electrification.

What does the judgment say on human rights and climate change?

The Court notes that the Indian government has taken multiple steps through legislation as well mission-led programmes to address climate change. The Wild Life (Protection) Act 1972, the Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act 1986, the National Green Tribunal Act 2010, were among those referenced in the judgment; the National Solar Mission, the National Mission for Enhanced Energy Efficiency and, the National Mission for a Green India were also mentioned. “Despite governmental policy and rules and regulations recognising the adverse effects of climate change and seeking to combat it, there is no single or umbrella legislation in India which relates to climate change and the attendant concerns. However, this does not mean that the people of India do not have a right against the adverse effects of climate change,” the Court noted.

Despite constitutional guarantees that give citizens equality before the law and right to life and personal liberty, it was now necessary, in the Court’s view, to explicitly link the impact of climate change as something which impedes these rights of liberty, life and equality. “This is perhaps because this right (against climate change) and the right to a clean environment are two sides of the same coin. As the havoc caused by climate change increases year by year, it becomes necessary to articulate this as a distinct right. It is recognised by Articles 14 and 21,” the judgment notes. The Court also said that if vulnerable communities were affected, say by

coastal erosion, land degradation, or if people were made additionally vulnerable to disease, agricultural losses, storms and flooding – all indirectly linked to climate change – then rights under these Articles (14 and 21) would be violated, further necessitating an explicit link between climate change and rights.

Are their international precedents?

The link between climate change and human rights has grown stronger since the Paris Agreement of 2015. The preamble of the Agreement had references to “human rights.”

In a 2023 research paper, Doreen Lustig and Ilil Gabison of Tel Aviv University highlighted that there was a growing convergence between the fields of international human rights law (IHRL) and climate change. Several reports of UN human rights bodies and Human Rights Council resolutions are now drawing a link between rights and climate change. In 2005, Sheila Watt-Cloutier, a Canadian-Inuk activist, in her capacity as chair of the Inuit Circumpolar Conference (now known as the Inuit Circumpolar Council), petitioned the Inter-American Commission on Human Rights (IACHR) to get relief for human rights violations resulting from the impacts of climate change. This was among the first explicit links translating the impact of the climate crisis into human rights language. Scholars also argue that the framing of climate change as affecting future generations and endangering their right to a liveable planet follows from the link to human rights. That is how the climate activism, for instance, of Greta Thunberg and her ‘school strikes for climate’, must be understood.

What are the implications of such a ruling?

Supreme Court judgments on environmental matters have often significantly altered public discourse and governmental action. For instance, decisions in the *M.C. Mehta versus Union of India*, the *Godavarma Thirumulpad* cases have been the foundation of subsequent environmental action. In the current case of the Great Indian Bustard too, the ruling has come with the Court underlining the necessity for expanding electricity production for solar energy sources. While this is state-backed, India has also underlined its right at international fora to continue to rely on coal plants and fossil fuels. Whether this will be seen by Indians as the government failing to protect them against the effects of climate change remains to be seen.



For the future: Greta Thunberg with a sign that reads, “School Strike for climate”, outside the Swedish Parliament in Sweden on June 9, 2023. REUTERS



Supreme Court ruling that citizens have a right against the adverse effects of climate change

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The Hindu analysis by saurabh.pandey sir

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Topics



- How fast is the universe expanding?
- Cryogenics
- The Ashaninka
- SC ON ECOTOURISM
- doxxing
- Mains



By saurabh pandey sir.



How fast is the universe expanding?

New data keeps the mystery open

Two equally valid ways to measure how fast the universe is expanding have yielded two different estimates, and no amount of double-checking has eliminated this tension. In a paper published recently, researchers have disproved a suspected flaw in one of the two ways, meaning the tension is real and not a flaw in the data

Qudsia Gani

A big open problem in cosmology is the Hubble tension. There are two equally valid ways to measure how fast the universe is expanding, but they have yielded two very different estimates. No amount of rechecking and refining calculations has made this tension go away.

In a study published recently in *Monthly Notices of The Royal Astronomical Society* (MNRAS), scientists from Germany and the U.K. led with a radical explanation for the tension: our model used to understand the universe is wrong.

This model is called λ cold dark matter, or “lambda CDM”. It’s currently the simplest model that explains various features of the universe, including radiation leftover from the Big Bang, the arrangement of galaxies in the universe, and the fact that the universe is expanding.

But cosmologists are also looking for a new, better model that can explain some things the λ CDM model can’t, such as the Hubble tension. Repeated measurements and computations have ascertained the Hubble tension exists and that it’s not some aberration in the data.

In a paper published after the MNRAS one in *The Astrophysical Journal Letters*, a different group disproved a flaw some scientists had suspected in one of the two ways to measure the universe’s expansion - meaning the tension is real.

For now, the model does seem to be the problem.

Open, closed or flat?

Our universe started to expand after the Big Bang event around 14 billion years ago. It may continue to expand unabated forever. If it does, it will be an *open* universe. But if at some point the expansion stops, because of the gravitational forces exerted by the galaxies, say, the universe could collapse and become closed.

A closed universe is said to have a positive curvature of space – like a sphere. Such a universe will be finite even if it has no bounds. That is, in this universe, we can travel forever without falling off an ‘edge’.

In an open universe, space will warp in the opposite direction. That is, it will have a negative curvature, resembling a saddle.

There is another possibility between these assumptions: that the universe will continue to expand forever, but the rate of expansion, which is currently increasing, will eventually start decreasing thanks to the gravitational forces. The rate will take an infinite



The Cepheid variable star RS Puppis as imaged by the Hubble space telescope in 2010. NASA

amount of time to drop to zero, so the universe will keep expanding, just slower and slower.

This special approximation leads to a flat universe. And according to many cosmologists, this is the state of our universe at this time.

That the universe is flat doesn’t mean it’s like a 2D sheet of paper. Instead, flatness means if you start to draw two parallel lines in space and you keep drawing them, they will remain parallel no matter how far you go. (In a spherical or a saddle-like space, the lines will intersect somewhere.)

The Big Bang’s afterglow

Cosmologists deduced this based on studying the cosmic microwave background (CMB). This is a sea of photons, the particles of light, present throughout the universe. They are leftover from the Big Bang, its afterglow. Scientists have measured temperature changes in the CMB and studied its large-scale properties using complicated trigonometry. And they found that it has nearly zero curvature.

The Wilkinson Microwave Anisotropy Probe (WMAP), BOOMERanG, and ‘Planck’ are three telescopes in space. They study the CMB and their data is clear: the observable universe is flat with a 0.4% margin of error. In 2021, researchers with the Atacama Cosmology Telescope reported based on astronomical data that they could find no



Our universe started to expand after the Big Bang event around 14 billion years ago. It may continue to expand unabated forever

evidence that the space of our universe is non-flat.

Based on these studies, cosmologists have estimated space to be expanding at around 68 kilometres per second per megaparsec ((km/s)/Mpc). That is, an object one megaparsec (3.26 million lightyears) away is moving away at 68 km/s.

The cosmic distance ladder

The CMB is one way to study the universe’s expansion.

The other is called the cosmic distance ladder – a set of techniques used to measure the distance to objects that are close, further away, and very far away from the earth. One object in particular is the Cepheid variable star.

The Cepheid variables have a unique feature: their brightness varies in a predictable way over time. Based on how bright a Cepheid variable is, scientists can estimate how far away it is.

Using this, cosmologists have estimated based on various Cepheid variables the expansion of the universe is (and other such objects) 73 (km/s)/Mpc.

Hubble versus JWST

The best way to follow these stars is using the near-infrared radiation they emit. Unlike visible light, such radiation can pass through intervening dust clouds and reach us. Cepheid variable stars may also be crowded in some places.

Fortunately, NASA’s James Webb Space Telescope (JWST) can track both near-infrared radiation and has instruments good enough to distinguish between radiation from two Cepheid variable stars close to each other in the sky. In the study published in *The Astrophysical Journal Letters*, researchers checked a concern that the data collected by NASA’s previously best space telescope, the Hubble, had some flaws in its readings that gave rise to the Hubble tension. They analysed more than a thousand sharp observations of Cepheid variables recorded by JWST. “The superior resolution of JWST negates crowding noise, the largest source of variance in the near-infrared [brightness] relations measured with the Hubble space telescope,” they wrote.

In the end, they found “no significant difference” in estimates of the stars’ distance based on Hubble telescope and JWST data, even after correcting for “local crowding” and “choice of filters”.

In sum, the Hubble tension is real and its origins remain a mystery.

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

THE GIST

A closed universe is said to have a positive curvature of space – like a sphere. Such a universe will be finite even if it has no bounds. That is, in this universe, we can travel forever without falling off an ‘edge’

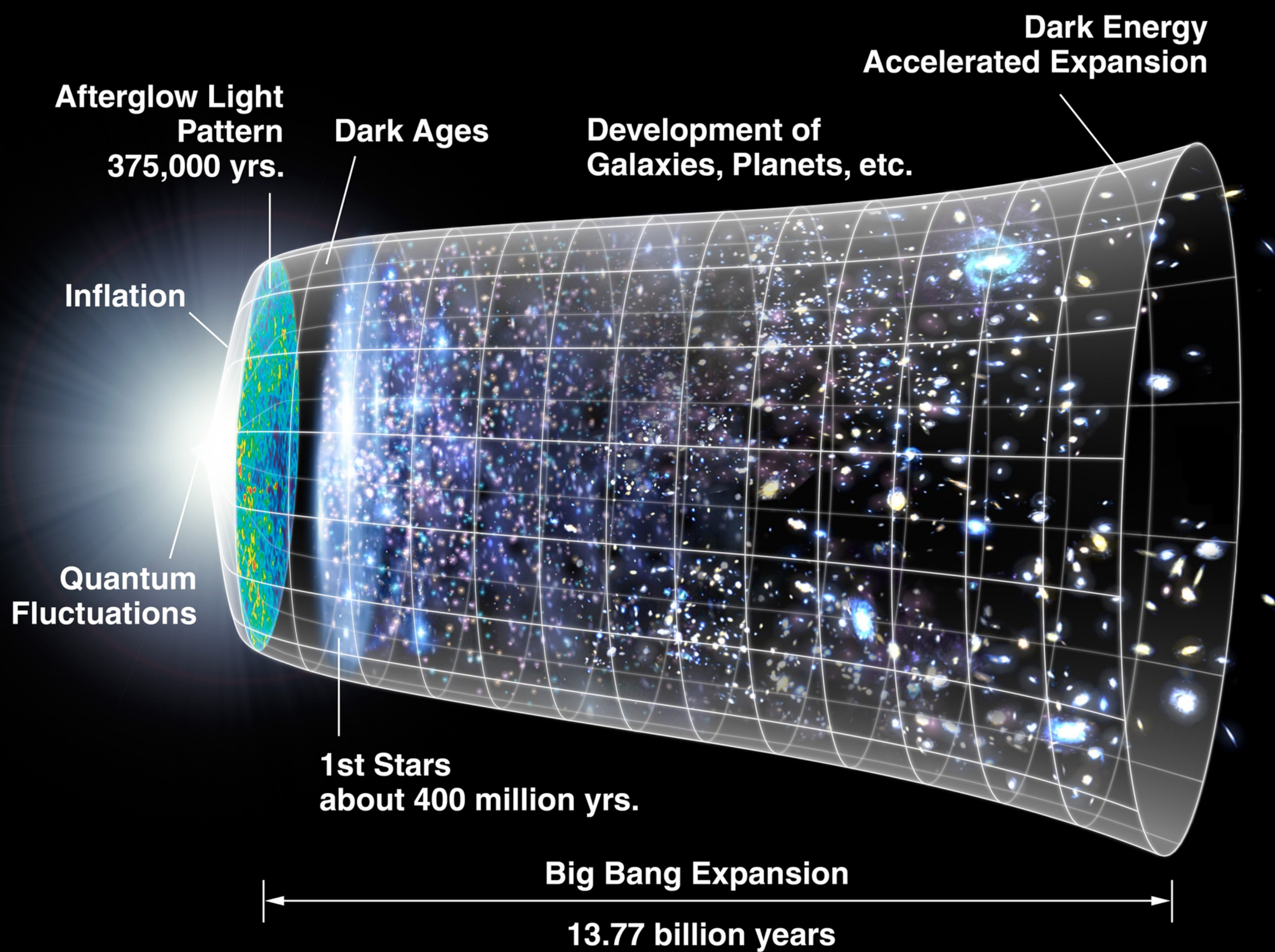
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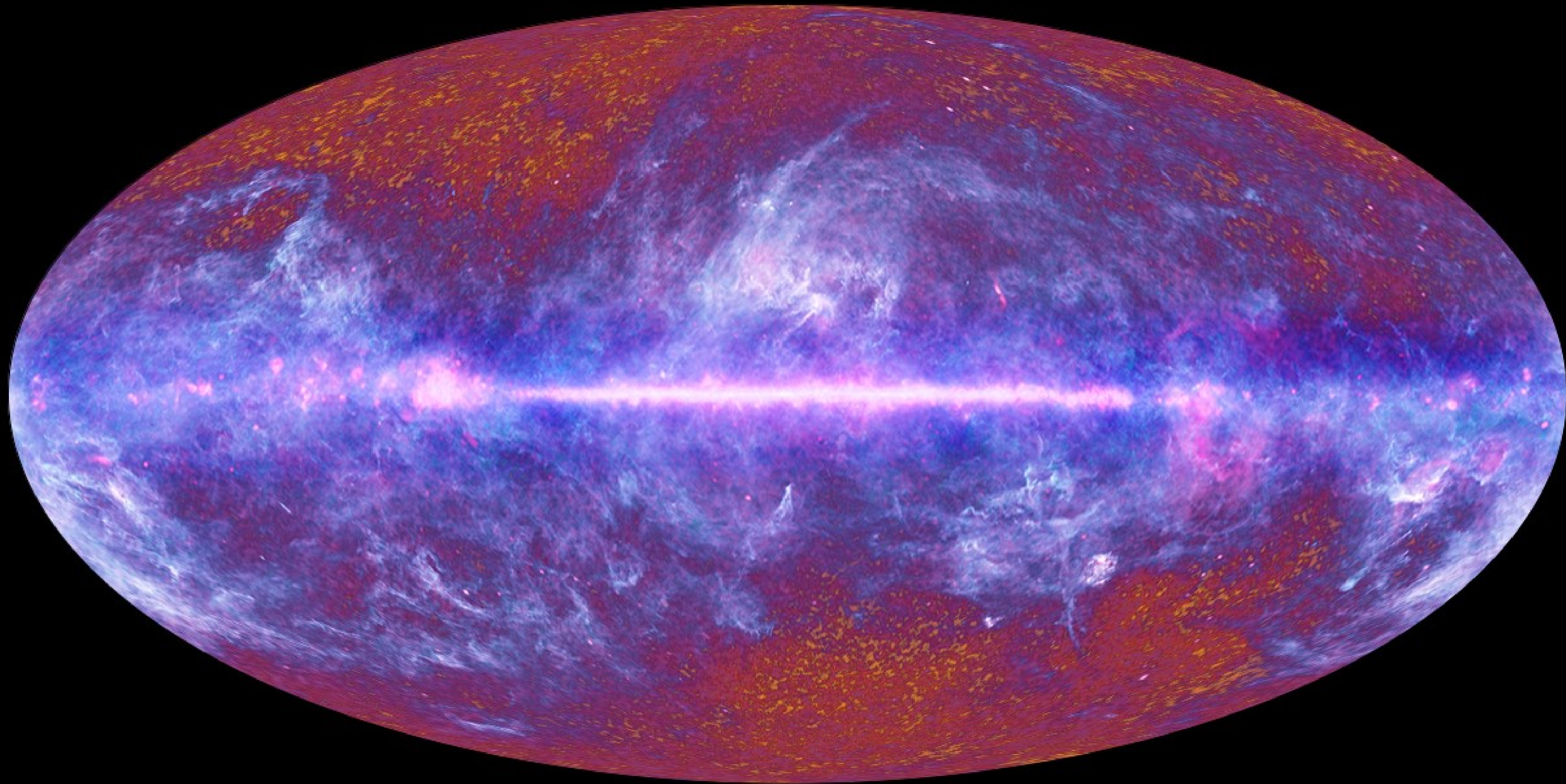
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How fast is the universe expanding?

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WHAT IS IT?

Cryogenics: keep it chill

Vasudevan Mukunth

Cryogenics is the science of materials at temperatures below negative 153 degrees C. The technologies by which materials are cooled up to this temperature are collected under the term refrigeration. Instead, cryogenics deals with thermal conditions in which even the substances that we encounter in our daily lives as gases — such as hydrogen, nitrogen and, of course, the air in our atmosphere — are liquid.

This field typically uses helium and nitrogen as the cryogenic fluid, the thing that cools a substance. Nitrogen has a boiling point of negative 196 degrees C, and helium, negative 269 degrees C. So below these temperatures, they are liquid. Such fluids need to be stored in vacuum flasks or they could leak and damage their surroundings.

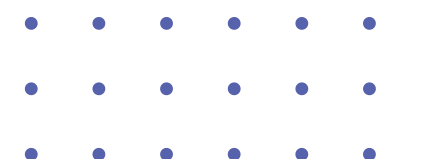
Many cryogenic materials have desirable properties. For example, hydrogen is one of the best rocket fuels but it can only be used as a liquid, so it needs to be cryogenically cooled. (Cryogenic hydrogen and cryogenic oxygen power the third stage of ISRO's LVM-3 rocket.) In the process of cryogenic hardening, a material — steel in particular — can be made harder and stronger. This is because as it is cooled to around



Models of the Cryogenic engine, and other components used by ISRO in its GSLV mission at the ISRO Museum at Satish Dhawan Space Centre (SDSC) at Sriharikota. VELANKANNI RAJ

negative 185 degrees C, more of the steel's crystal structure acquires the martensite configuration. Magnetic resonance imaging (MRI) devices used in medical diagnostics use cryogenic fluids to cool their magnets.

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Cryogenics



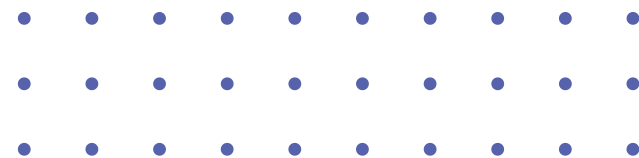
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BIG SHOT



Justice at last: An Indigenous man celebrates the sentences of five men who were being retried for the murders of four Indigenous Amazon land defenders, of the Ashaninka people, who had crossed swords with illegal loggers, outside the high court of justice in the district of Calleria, Peru, on Thursday. A court imposed near three-decade sentences on the five men for the 2014 murders. AFP



The Ashaninka

- The Ashaninka are one of South America's largest tribes.
- Their homeland covers a vast region, from the Upper Juruá river in Brazil to the watersheds of the Peruvian Andes.
- For over a century, colonists, rubber tappers, loggers, oil companies and Maoist guerillas have invaded their lands



Decoding the judgment on Jim Corbett

In its ruling in March, the Supreme Court brought to light the unholy nexus of politicians, forest officials, and local contractors responsible for the felling of 6,000 trees in the Jim Corbett National Park in Uttarakhand. This state of affairs underlines one fact clearly: despite conservation goals receiving priority through policies and laws including the Wildlife Protection Act, 1972, Project Tiger, and the Forest (Conservation) Act, 1980, the state's main interest remains increasing revenue. The illegal destruction of trees in Jim Corbett can be seen in contravention of the 1983 Supreme Court judgment in *Rural Litigation and Entitlement Kendra vs. State of Uttar Pradesh*, which said that “economic growth cannot be achieved at the cost of environmental destruction and people's right to healthy environment.”

The judgment

National and State forest authorities have leaned on ecotourism to simultaneously attain conservation goals, enhance revenue, and improve the livelihoods of local people. In its recent judgment, instead of treating eco-tourism as a panacea for conservation and revenue generation, the Supreme Court said that the approach must be of eco-centrism and not anthropocentrism. The court directed the banning of tiger safaris in core areas and the constitution of a committee to explore the feasibility of permitting tiger safaris in peripheral areas in not just Jim Corbett, but across India. It also disagreed with the 2019 guidelines of the National Tiger Conservation Authority permitting a tiger safari on the lines of a zoo in a national park. The court stressed that tigers should be sourced from the same landscape as where the safari is being conducted and not outside the tiger reserve.

According to British environmentalist Norman Myers,



Anwar Sadat

teaches international law, with a specialisation in environmental law, at the Indian Society of International Law. Email: sadatshazia@gmail.com

The Court's decision to assess the damage done to the green cover of Jim Corbett so as to identify the cost of restoration and recover the same appears to be a mirage in the absence of a well-defined methodology

the precautionary principle is becoming an established principle for policymakers tackling environmental problems. The principle says “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent such environmental degradation.” On banning safaris in core areas, the Court invoked this principle to ensure that there is least damage to the environment. Myers had said, “In salient respects, the principle applies to biodiversity more than any other environmental problem. This is because the mass extinction gathering force will, if it proceeds unchecked, not only eliminate half or more species but will leave the biosphere impoverished for at least 5 million years.” The International Union for Conservation of Nature's Red List of Threatened Species monitors 1,212 animal species in India. In 2021, it found that 12% of them are endangered. According to a report of the Centre for Science and Environment in 2021, India has lost 90% of the area under its four biodiversity hotspots. The precautionary principle therefore applies not only in the case of tigers, but also other species, especially endangered ones.

What the court missed

However, the Court's decision to assess the damage done to the green cover of Jim Corbett so as to identify the cost of restoration and recover the same from the errant individuals and officers appears to be a mirage in the absence of a well-defined methodology. Recovering the cost of restoration does not amount to necessarily recovering the loss of the ability of the environment to provide goods and services. As per the European Liability Directive 2004, conservation status of natural habitat means the “sum of influences acting on a natural habitat and its typical species that may affect its long-term natural

distribution, structure, and functions as well as the long-term survival of its typical species.” In India, the framework of valuation which predated the *T.N. Godavarman* case (1996) was aimed at replacing lost natural forest with compensatory plantations. The two choices which are supported legally and institutionally and serve as the background for the valuation of forest land in India are now compensatory afforestation levy and net present value (NPV). The levy is essentially a form of replacement cost, designed to replace the forest land which was lost as a result of diversion of forest towards non-forestry use. Since the levy is found to be insufficient in terms of making good the loss, the Court introduced the NPV in 2002 as an additional payment obligation. But both these methodologies do not rightly account for the correlation between the removal of trees and the harm caused to other environmental goods and services.

In the context of the growing degradation of biodiversity hotspots and the support to revenue-generating eco-tourism, a valuation method which is based on ecosystem services (food, water, and services regulating the climate and floods, etc.) is a must. The system refers to the benefits people obtain from natural ecosystems in contrast with man-made structures. The Court could have set a precedent by saying that ecosystem services are more important and generate more revenue than eco-tourism or raised the need of putting in place a precise law and policy relating to ecosystem services. The reasoning provided by the International Court of Justice (ICJ) in *Costa Rica v. Nicaragua* (2018) could have been used to understand the methodologies in evaluating damage to the environment. The ICJ asserted that damage to the environment, and the consequent loss of the ability of the environment to provide goods and services, is compensable.



SC ON ECOTOURISM



- National and State forest authorities have leaned on ecotourism to simultaneously attain conservation goals, enhance revenue, and improve the livelihoods of local people.
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The Hindu analysis by saurabh pandey sir





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The act of digitally publicising a person's private details is called doxing. It allows abusers and criminals who are thousands of miles away to target victims by putting their private details online for others to exploit

A 3x7 grid of blue dots. There are 3 rows and 7 columns of dots, totaling 21 dots.



doxxing

- The act of digitally publicising a person's private details is called doxxing, or doxing.
- Doxxers generally publicise highly personal data such as other people's home addresses, phone numbers, private email IDs, medical conditions, government documents, social security numbers, live locations, insurance information, private employment details, etc. Such information is usually obtained through illegal methods such as hacking or theft.



Topics



- **Parkinson's disease**
- **Coral Cages**
- **India In Arctic**
- **Siachen**
- **Mains**



By saurabh pandey sir.



Gene variant tied to Parkinson's may also show a way to beat it

What makes each person genetically susceptible to nonfamilial Parkinson's disease is different. Using genetic data it is possible to test for types of dysfunction in the cell that are hallmarks of the disease. This will help identify environmental factors that influence the risk of developing it

Matthew Farrer

Parkinson's disease is a neurodegenerative movement disorder that progresses relentlessly. It gradually impairs a person's ability to function until they ultimately become immobile and often develop dementia. In the U.S. alone, over a million people are afflicted with Parkinson's, and new cases and overall numbers are steadily increasing.

There is currently no treatment to slow or halt Parkinson's disease. Available drugs don't slow disease progression and can treat only certain symptoms. Medications that work early in the disease, however, such as Levodopa, generally become ineffective over the years, necessitating increased doses that can lead to disabling side effects. Without understanding the fundamental molecular cause of Parkinson's, it's improbable that researchers will be able to develop a medication to stop the disease from steadily worsening in patients.

Many factors may contribute to the development of Parkinson's, both environmental and genetic. Until recently, underlying genetic causes of the disease were unknown. Most cases of Parkinson's aren't inherited but sporadic, and early studies suggested a genetic basis was improbable.

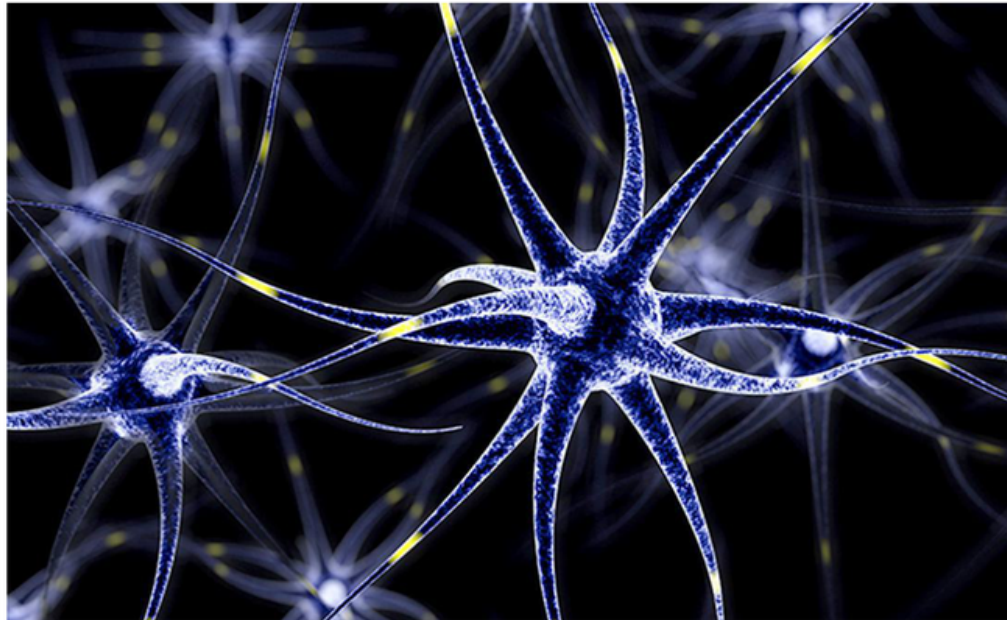
Nevertheless, everything in biology has a genetic foundation. As a geneticist and molecular neuroscientist, I have devoted my career to predicting and preventing Parkinson's disease. In our newly published research, my team and I discovered a new genetic variant linked to Parkinson's that sheds light on the evolutionary origin of multiple forms of familial parkinsonism, opening doors to better understand and treat the disease.

Genetic linkages and associations

In the mid-1990s, researchers started looking into whether genetic differences between people with or without Parkinson's might identify specific genes or genetic variants that cause the disease. In general, I and other geneticists use two approaches to map the genetic blueprint of Parkinson's: linkage analysis and association studies.

Linkage analysis focuses on rare families where parkinsonism, or neurological conditions with similar symptoms to Parkinson's, is passed down. This technique looks for cases where a disease-causing version of the gene and Parkinson's appear to be passed down in the same person. It requires information on your family tree, clinical data and DNA samples. Relatively few families, such as those with more than two living, affected relatives willing to participate, are needed to expedite new genetic discoveries.

"Linkage" between a pathogenic genetic variant and disease development is so significant that it can inform a diagnosis. It has also become the basis of many lab models used to study the consequences of gene dysfunction and how to fix it. Linkage studies, like the one my team and I published, have identified pathogenic mutations in over 20 genes. Notably, many patients in families with parkinsonism have symptoms that are indistinguishable from typical, late-onset Parkinson's. Nevertheless, what causes inherited



In the U.S. alone, over a million people are afflicted with Parkinson's, and new cases and overall numbers are steadily increasing. GETTY IMAGES/ISTOCKPHOTO

Parkinsonism, which typically affects people with earlier-onset disease, may not be the cause of Parkinson's in the general population.

Conversely, genome-wide association studies, or GWAS, compare genetic data from patients with Parkinson's with unrelated people of the same age, gender and ethnicity who don't have the disease. Typically, this involves assessing how frequently in both groups over 2 million common gene variants appear. Because these studies require analysing so many gene variants, researchers need to gather clinical data and DNA samples from over 100,000 people.

Although costly and time-consuming, the findings of genome-wide association studies are widely applicable. Combining the data of these studies has identified many locations in the genome that contribute to the risk of developing Parkinson's. Currently, there are over 92 locations in the genome that contain about 350 genes potentially involved in the disease. However, GWAS locations can be considered only in aggregate; individual results are not helpful in diagnosis nor in disease modeling, as the contribution of these individual genes to disease risk is so minimal.

Together, "linked" and "associated" discoveries imply a number of molecular pathways are involved in Parkinson's. Each identified gene and the proteins they encode typically can have more than one effect. The functions of each gene and protein may also vary by cell type. The question is which gene variants, functions and pathways are most relevant to Parkinson's? How do researchers meaningfully connect this data?

Parkinson's disease genes

Using linkage analysis, my team and I identified a new genetic mutation for Parkinson's disease called RAB32 Ser71Arg. This mutation was linked to Parkinsonism in three families and found in 13 other people in several countries, including Canada, France, Germany, Italy,



Linkage between a pathogenic variant and disease development is so significant that it can inform diagnosis. It has also become the basis of many lab models used to study the consequences of gene dysfunction

Poland, Turkey, Tunisia, the U.S. and the U.K.

Although the affected individuals and families originate from many parts of the world, they share an identical fragment of chromosome 6 that contains RAB32 Ser71Arg. This suggests these patients are all related to the same person; ancestrally, they are distant cousins. It also suggests there are many more cousins to identify.

With further analysis, we found RAB32 Ser71Arg interacts with several proteins previously linked to early- and late-onset Parkinsonism as well as nonfamilial Parkinson's disease. The RAB32 Ser71Arg variant also causes similar dysfunction within cells.

Together, the proteins encoded by these linked genes optimize levels of the neurotransmitter dopamine. Dopamine is lost in Parkinson's as the cells that produce it progressively die. Together, these linked genes and the proteins they encode and regulate specialised autophagy processes. In addition, these encoded proteins enable immunity within cells.

Such linked genes support the idea that these causes of inherited parkinsonism evolved to improve survival in early life because they enhance immune response to pathogens. RAB32 Ser71Arg suggest how and why many mutations have originated, despite creating a susceptible genetic background for Parkinson's in later life.

RAB32 Ser71Arg is the first linked gene researchers have identified that directly connects the dots between prior linked

discoveries. The proteins encoded bring together three important functions of the cell: autophagy, immunity and mitochondrial function. While autophagy releases energy stored in the cell's trash, this needs to be coordinated with another specialized component within the cell, mitochondria, that are the major supplier of energy. Mitochondria also help to control cell immunity because they evolved from bacteria the cell's immune system recognizes as "self" rather than as an invading pathogen to destroy.

Identifying subtle genetic differences

Finding the molecular blueprint for familial Parkinson's is the first step to fixing the faulty mechanisms behind the disease. Like the owner's manual to your car's engine, it provides a practical guide of what to check when the motor fails.

Just as each make of motor is subtly different, what makes each person genetically susceptible to nonfamilial Parkinson's disease is also subtly different. However, analyzing genetic data can now test for types of dysfunction in the cell that are hallmarks of Parkinson's disease. This will help researchers identify environmental factors that influence the risk of developing Parkinson's, as well as medications that may help protect against the disease.

More patients and families participating in genetic research are needed to find additional components of the engine behind Parkinson's. Each person's genome has about 27 million variants of the 6 billion building blocks that make up their genes. There are many more genetic components for Parkinson's that have yet to be found.

As our discovery illustrates, each new gene that researchers identify can profoundly improve our ability to predict and prevent Parkinson's.

(Matthew Farrer is a professor of neurology, University of Florida. This article is republished from The Conversation.)



Parkinson's disease

- □ Parkinson's disease is a neurodegenerative movement disorder that progresses relentlessly.
- It gradually impairs a person's ability to function until they ultimately become immobile and often develop dementia.
- Many factors may contribute to the development of Parkinson's, both environmental and genetic.
- Until recently, underlying genetic causes of the disease were unknown.
- New genetic mutation for Parkinson's disease called RAB32 Ser71Arg.

- **RAB32 Ser71Arg interacts with several proteins previously linked to early- and late-onset Parkinsonism as well as nonfamilial Parkinson's disease.**
- **, the proteins encoded by these linked genes optimize levels of the neurotransmitter dopamine.**
- **Dopamine is lost in Parkinson's as the cells that produce it progressively die.**
- **Together, these linked genes and the proteins they encode and regulate specialised autophagy processes**

- **Linked genes** are genes located close together on the same chromosome. They are usually (but not always) inherited together.
- **Autophagy** is the natural, conserved degradation of the cell that removes unnecessary or dysfunctional components through a lysosome-dependent regulated mechanism. It allows the orderly degradation and recycling of cellular components.



A 'Coral Fort' that researchers are using to protect laboratory-grown coral off the coast of Fort Lauderdale, Florida. AP

Scientists grasp at straws to save corals from fish

Associated Press

Researchers trying to prevent predatory fish from devouring laboratory-grown coral are grasping at biodegradable straws in an effort to restore what some call the rainforest of the sea.

Scientists around the world have been working for years to address the decline of coral reef populations. Just last summer, reef rescue groups in South Florida and the Florida Keys were trying to save coral from rising ocean temperatures. Besides working to keep existing coral alive, researchers have also been growing new coral in labs and then placing them in the ocean.

But protecting the underwater ecosystem that maintains upwards of 25% of all marine species is not easy. Even more challenging is making sure coral grown in a laboratory and placed into the ocean doesn't become fish food.

Marine researcher Kyle Pisano said one problem is predators like parrot fish attempt to bite and destroy the newly transplanted coral in areas like South Florida, leaving them with less than a 40% survival rate. With projects calling for tens of thousands of coral to be planted over the next decade, the losses add up when coral pieces can cost more

The cage consists of a limestone disc surrounded by eight vertical straws. The device doesn't have a top, because the juvenile coral needs sunlight and the fish don't face downward to eat

than \$100 (Rs 8,300) each.

Mr. Pisano and his partner, Kirk Dotson, have developed 'Coral Fort', claiming the small biodegradable cage made in part with drinking straws boosts the survival rate of transplanted coral to over 90%.

The fish eventually lose interest in the coral as it matures, but scientists need to protect the coral in the meantime. Stainless steel and PVC pipe barriers have been set up around transplanted coral in the past, but those barriers needed to be cleaned of algae growth and eventually removed.

Mr. Pisano had the idea of creating a protective barrier that would eventually dissolve, eliminating the need to maintain or remove it. He began conducting offshore experiments with biodegradable coral cages as part of a master's degree program at Nova Southeastern University. He used a substance called polyhydroxyalkanoate, a biopolymer derived from the fermentation of canola oil. PHA biodegrades in the ocean, leaving only water and carbon dioxide. His findings were published last year.

The coral cage consists of a limestone disc surrounded by eight vertical phade brand drinking straws. The device doesn't have a top, Mr. Pisano said, because the juvenile coral needs sunlight and the parrot fish don't generally want to position themselves facing downward to eat.

Mr. Dotson, a retired aerospace engineer, and Mr. Pisano formed Reef Fortify Inc. to further develop the patent-pending Coral Fort. The first batch of cages were priced at \$12 (Rs 1,000) each, but the two believe that could change as production scales up.



Coral Cages

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India's Arctic imperative

In December 2023, when four Indian climate scientists arrived in Oslo to begin acclimatisation for India's maiden winter expedition at the Arctic, they had little idea of what lay ahead. Himadri, India's research station in the International Arctic Research Base at Svalbard in Norway, had until then hosted missions only in the summer. A winter expedition entails living in the intense cold (as low as -15 degrees Celsius) after a period of rigorous acclimatisation. More concerning for Indian researchers was the daunting prospect of polar nights.

Growing interest in the Arctic

In March 2024, India's first winter experience at the Arctic came to a successful end. While the scientists will doubtless be proud of their feat, India's long reluctance to embark on an all-year Arctic mission calls for introspection. For over a decade, India's National Centre for Polar and Ocean Research saw no reason for a winter mission to the Arctic. What changed Indian policy, ostensibly, was scientific data showing that the Arctic was warming faster than previously thought. When facts tying catastrophic climatic occurrences in India to the melting of Arctic Sea ice emerged, decision-makers felt compelled to act.

Second, New Delhi is seized of the opening up of Arctic Sea routes, primarily the Northern Sea Route, and would like to route Indian trade through the region. This might help India reduce costs for shipping companies along with time, fuel, and security costs for transmitting goods.

The third reason is geopolitics. China's growing investments in the Arctic have raised concern in India. Russia's decision to grant China expanded access to the Northern Sea Route has deepened this anxiety. India's increasing focus on the Arctic comes at a time of heightened tensions in the region, fuelled by the Russia-Ukraine conflict and



Abhijit Singh

is head of the Maritime Policy Initiative at Observer Research Foundation, New Delhi



Andreas Østhagen

is a Senior Research Fellow at the Fridtjof Nansen Institute in Oslo

exacerbated by the suspension of various regional cooperative forums. There are concerns about the potential repercussions of these tensions, especially given Russia's growing reliance on its nuclear deterrent on the Kola Peninsula. For India, which aims to maintain constructive relations with both western nations and Russia, these developments carry significant strategic implications.

To be sure, India is no newcomer to the Arctic. Its involvement in the region goes back to 1920, with the signing of the Svalbard Treaty in Paris. In 2007, India undertook its first research mission to investigate Arctic microbiology, atmospheric sciences, and geology. A year later, India became the only developing country, aside from China, to establish an Arctic research base. After being granted 'observer' status by the Arctic Council in 2013, India commissioned a multi-sensor moored observatory in Svalbard in 2014 and an atmospheric laboratory in 2016. The work at these stations focuses on examining Arctic ice systems and glaciers and the consequences of Arctic melt on the Himalayas and the Indian monsoon.

Even so, the issue of Indian engagement in the Arctic divides the country's academic and policy communities. Opinions are split over the potential impacts of the changing climate in the Arctic on India's economy. The concern primarily stems from mining in the region for fossil fuels, an area where India has yet to articulate a clear economic strategy. The proponents of economic exploitation in the Arctic advocate a pragmatic approach in the region, especially around oil and gas exploration, and mining. The sceptics warn about the potential environmental consequences and underscore the need for a more balanced policy framework that recognises the negative aspects of maritime resource exploitation.

Potential for collaboration

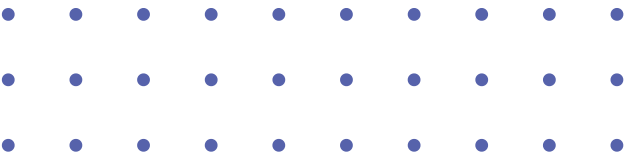
Norway, the present chair of the

Arctic Council, has close ties with India. Since the late 1980s, the two countries have collaborated to investigate changing conditions in the Arctic and Antarctic, as well as their impact on South Asia. As climate change ends up more deeply affecting the Arctic and the South Asian monsoon, these efforts have accelerated over time.

India's present policy is to cooperate with Arctic countries in green energy, and green and clean industries, as a way of bolstering its 'responsible stakeholder' credentials. With Denmark and Finland, for instance, Indian collaboration has come in areas such as waste management, pollution control, renewable energy, and green technology. Many believe a partnership with Norway could be transformational for India as it would enable greater Indian participation in the Arctic Council's working groups, tackling issues such as the blue economy, connectivity, maritime transportation, investment and infrastructure, and responsible resource development. While the Indian government seems keen to benefit from seabed mining and resource exploitation in the Arctic, it ought to unequivocally back a sustainable mode of extraction.

Understandably, a partnership with Norway is likely to be focused on scientific research and climate and environmental protection. These are two of the six pillars that comprise India's Arctic Policy (the other four being economic and human development; transportation and connectivity; governance and international cooperation; and national capacity building). India would perhaps still look to explore economic opportunities in the Arctic. Norway could, then, help India design a sustainable policy that accommodates the needs of both the scientific community and industry. As global geopolitical tensions are also mounting in the Arctic, finding constructive and non-sensitive ways to alleviate pressure will be in the interest of both India and Norway.

While the Indian government seems keen to benefit from seabed mining and resource exploitation in the Arctic, it ought to unequivocally back a sustainable mode of extraction



India In Arctic

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India's Arctic Policy

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- **India's Arctic Policy (the other four being economic and human development; transportation and connectivity; governance and international cooperation; and national capacity building)**

In January 2020, then Army Chief Gen. Manoj Mukund Narvane termed Siachen as the place from where a collusive threat from China and Pakistan was maximum while stressing on the importance of keeping that particular area always in India's possession.

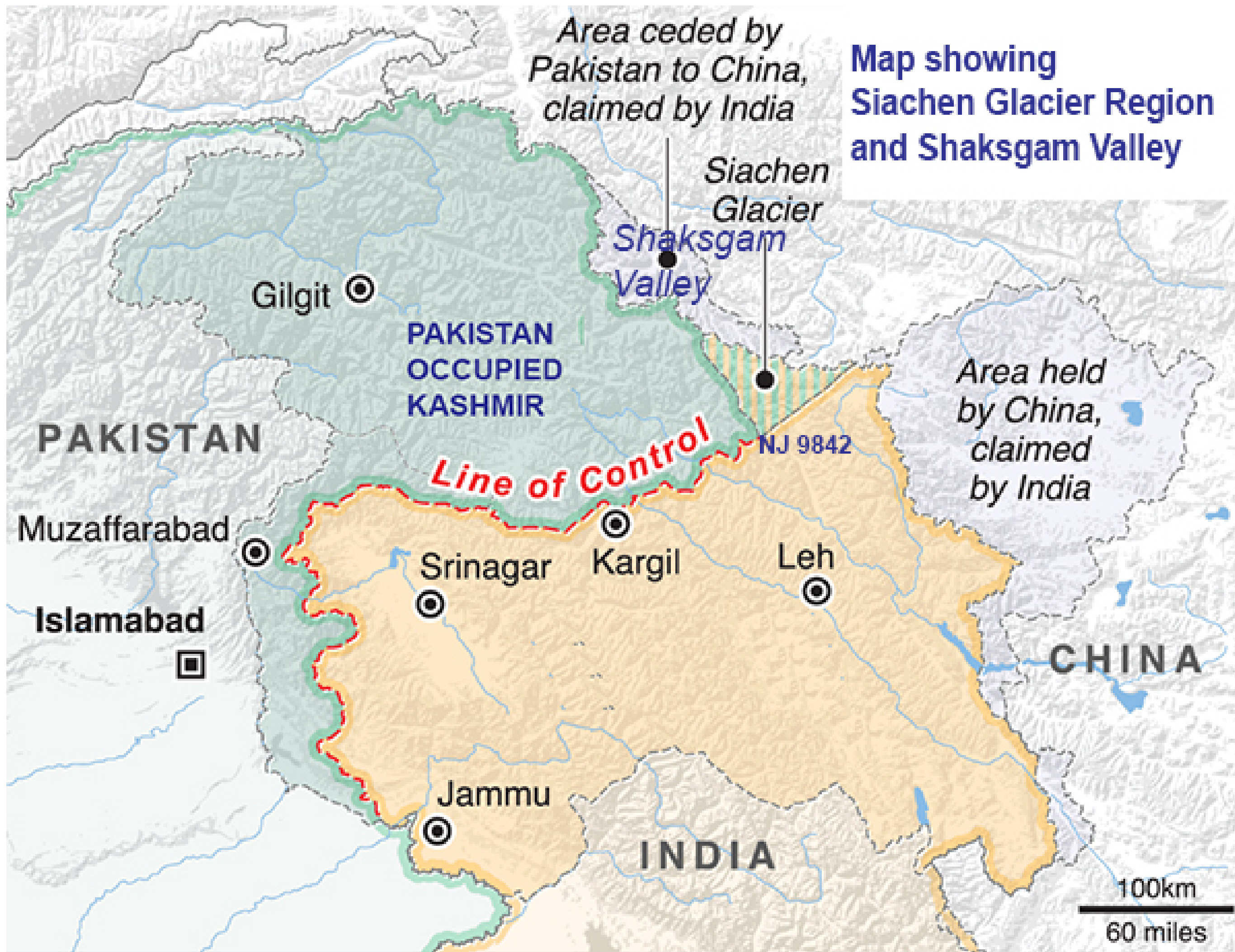
Siachen is probably not so 'low hanging' any more.

Siachen

- **Conflicting claims Siachen, in Balti language means “land of roses” — ‘Sia’ is a kind of rose species that grows in the region and ‘Chen’ means “in abundance”.**
- **However, it is known for being the world’s highest and coldest battle field. It sits at a very strategic location with Pakistan on the left and China on the right.**
- **Siachen is a legacy of the Partition between India and Pakistan.**
- **While the Line of Control (LoC) was delineated and accepted by both sides upto NJ-9842 as part of the 1972 Simla agreement, the glacier itself was left unmarked.**

The Hindu analysis by saurabh pandey sir





- India claims the area based on the Jammu and Kashmir Accession Agreement of 1947 and the Karachi Agreement of 1949, which define the ceasefire line beyond NJ-9842 as running “Northwards to the glaciers”. On the other hand, Pakistan interprets it as ‘North-Eastwards’ to claim the area beyond the Saltoro Ridge and beyond Siachen as its own.
- This would give Pakistan direct connectivity to China as well as strategic oversight over the Ladakh region and the crucial Leh-Srinagar highway, posing a serious threat to India



OPERATION MEGHDOOT

On April 13, 1984, first platoon of 4 KUMAON led by then Captain Sanjay Kulkarni (now a Lieutenant General (Retd)) planted the **first Indian flag on the Siachen glacier**, which began **"Operation Meghdoot"**.

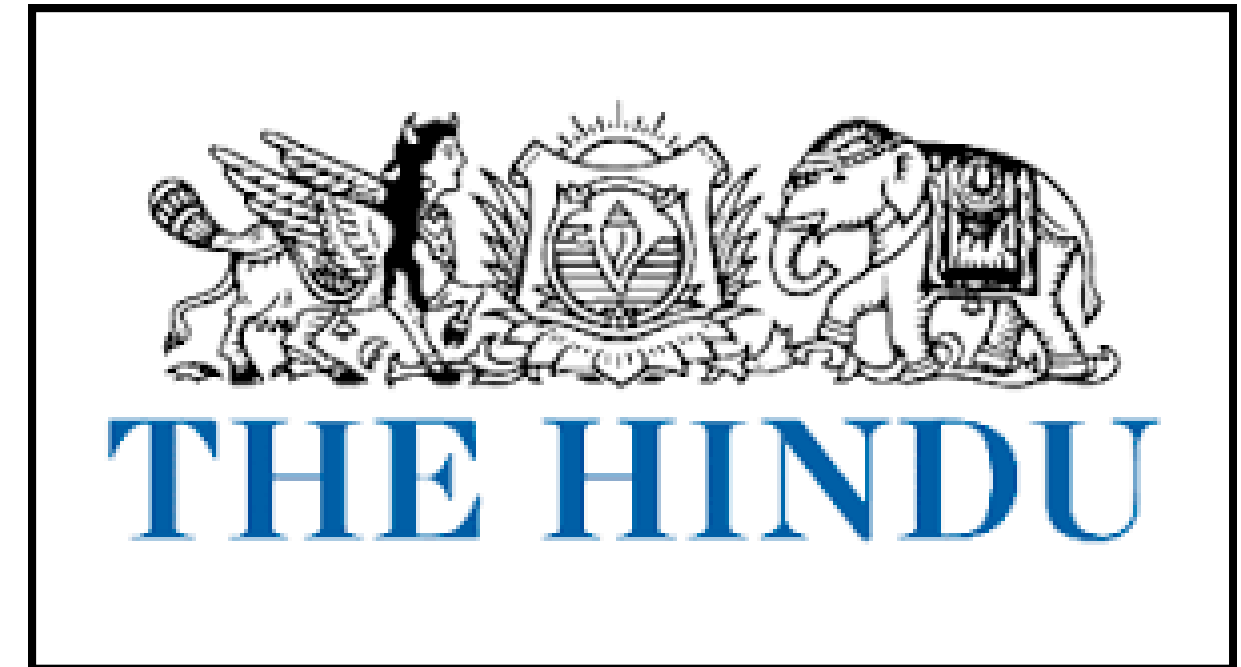
India gained the control of the world's highest battlefield under the joint operation by the **Indian Army & Indian Air Force**.



Topics



- **Fishes using Tools ,Sea urchins**
- **Hard vs soft corals**
- **coral bleaching**
- **History of voting**
- **FI In green bonds**
- **Mains**



By saurabh pandey sir



A promotional graphic for Saurabh Pandey's CSE preparation material. It features a dark blue background with a white border. In the center, a man (Saurabh Pandey) is shown reading a book. To his left is a yellow lightbulb icon above a stack of books. Below the image, the text 'SAURABH PANDEY' is written in white, followed by 'CSE' in large yellow letters, and '(CIVIL SERVICES EXAMINATION)' in white. At the bottom, it says 'FROM BASICS TO UPSC BRILLIANCE' in white.

Siddhi Jaishankar
Rohan Arthur

“

A 3x7 grid of blue dots. There are 3 rows and 7 columns of dots, totaling 21 dots.

As naturalists spend more time in the water, they are observing more tool-use in fish. Documenting them is critical so we can ask larger questions about habitat use by fish, the development of animal intelligence, and predator-prey interactions



Fishes using Tools

- Three Fish species that live in the Laccadive Sea, of the southwest corner of the Indian coast, are capable of using tools.
- All three species used live or dead coral structures as anvils to break the hard shells of sea urchins so they could get to the edible bits inside.
- The Jansen's wrasse (*Thalassoma janseni*) and the checkerboard wrasse (*Halichoeres hortulanus*) have never been reported using tools before, and this is the first documented instance of the moon wrasse (*Thalassoma lunare*) using tools in the wild

- Unlike primates, birds, otters, octopuses, and many other animals that **scientists know** are capable of wielding tools, fish have no hands, claws, or tentacles.
- This presents an obvious challenge for tool use, since being able to grasp and manipulate objects are key requirements for using tools. Some fish have found innovative ways of using water itself as a tool.
- The archer fish, for example, spouts jets of water through its specialised mouth to shoot down prey above the surface

- urchin, a wrasse would skilfully approach it from the side and use its snout to gingerly turn the urchin over with a series of pushes and jabs.
- The underside of the urchin has fewer and softer spines, allowing the wrasse to safely pick it up in its jaws.
- With the prize in its mouth, the wrasse would swim to a nearby hard coral and strike the urchin against it, dusting of the prickly spines. Even more strikes would break open the test as well

Sea urchins

- Sea urchins are spiny, globular echinoderms in the class Echinoidea.
- About 950 species of sea urchin are distributed on the seabeds of every ocean and inhabit every depth zone from the intertidal seashore down to 5,000 meters.
- The spherical, hard shells of sea urchins are round and covered in spines.



The Hindu analysis by saurabh pandey sir

Hard corals vs soft corals

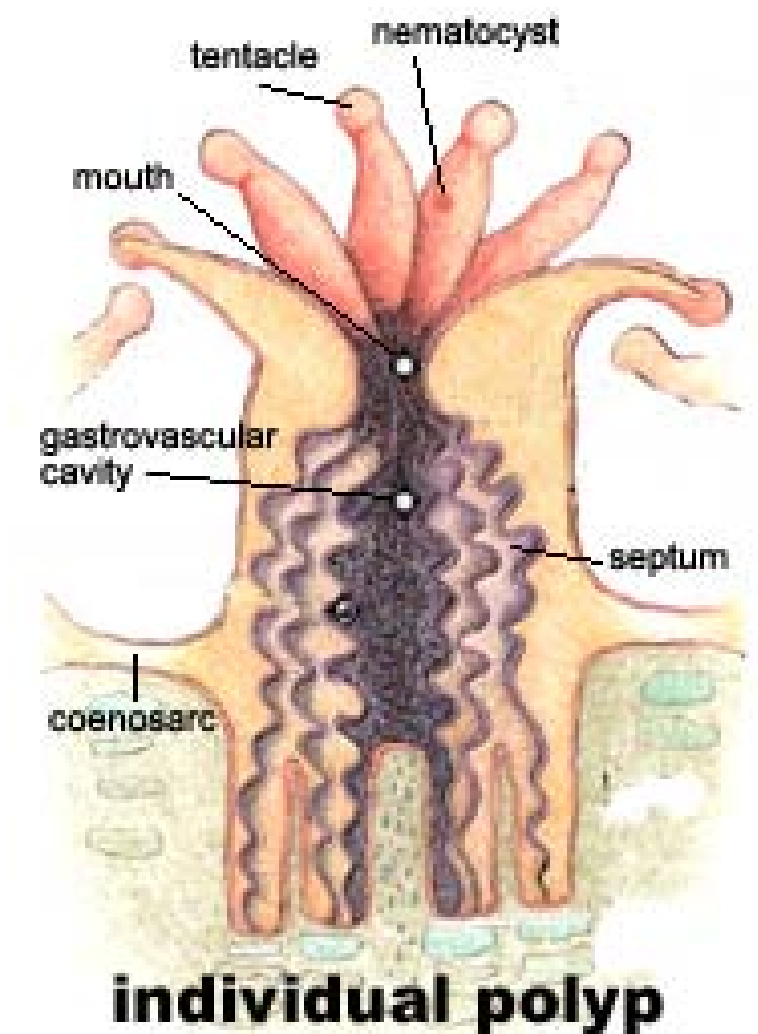
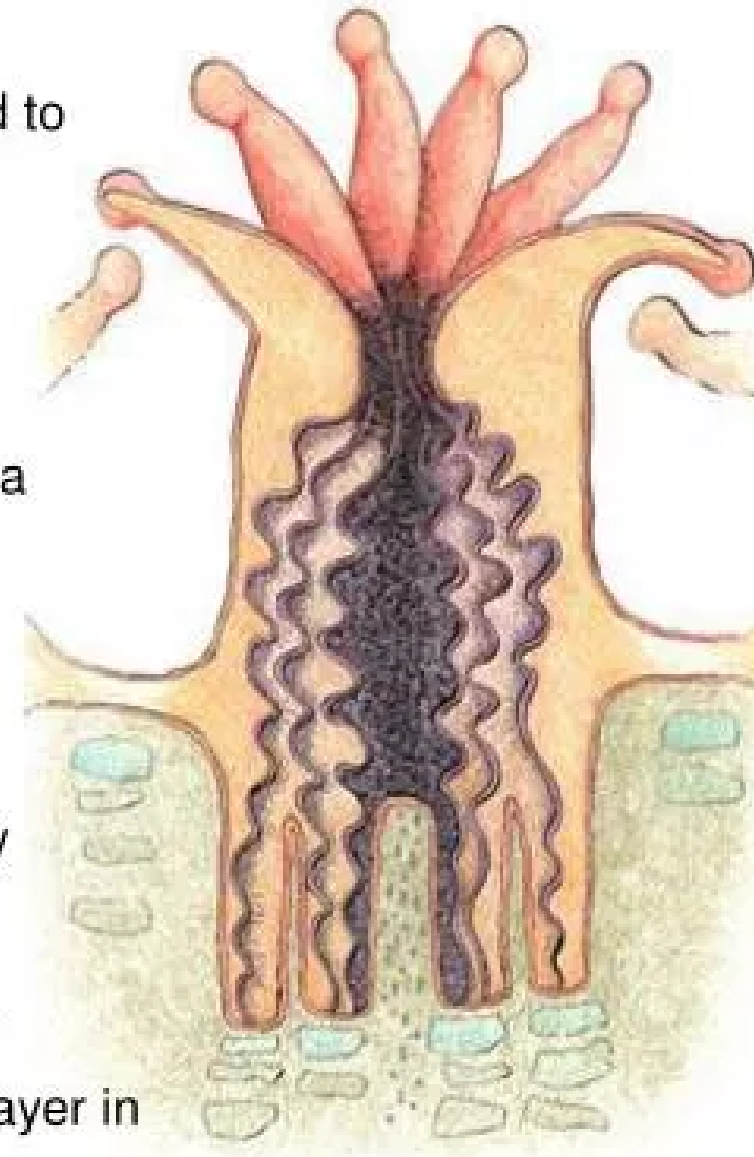


Coral Reefs

- Are produced by the organisms that live on them
- Are produced by a soft bodied polyp similar to and related to an anemone
- Very diverse ecosystem

Coral Anatomy & Growth

- Reef forming corals secrete CaCO_3
- Are members of the Phylum Coelenterata, Class Anthozoa
- Are radially symmetrical
 - Subclasses:
 - Soft Corals- sea fans, sea pens, sea whips
 - Hard Corals- stony corals (make the reefs)
- Are carnivores, tentacles have nematocysts to capture prey and bring it into the digestive cavity
- Most corals live in colonies
- Each polyp sits in a hard limestone cup called a corallite
- Which is made by their epidermis
- The polyp grows by drawing itself up and secreting a new layer in the bottom of the cup
- All the polyps are connected over the top of the calcium cup by a thin tissue layer called a coenosarc, so touching and tearing this tissue can injure the coral and let infections in.



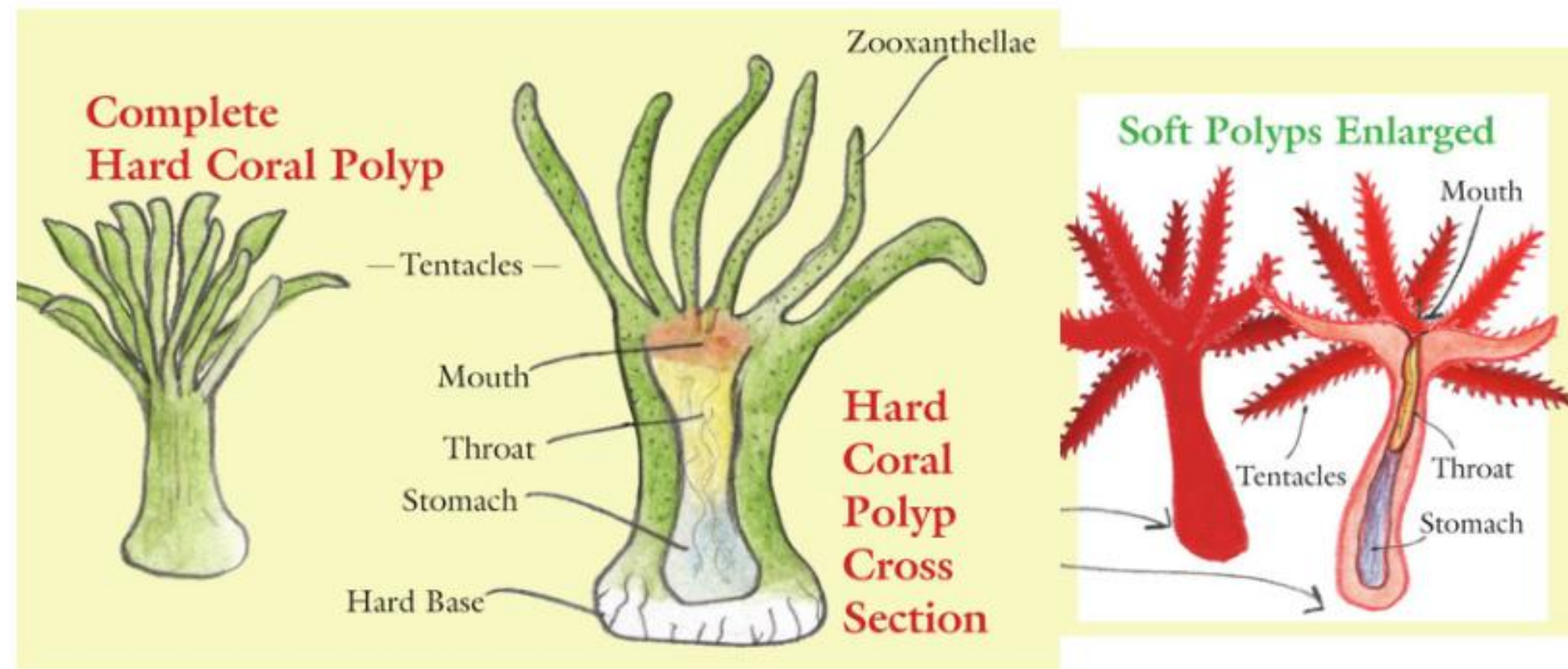
Hard corals vs. Soft corals

Hard corals

- Reef builders.
- Rigid skeleton made of calcium carbonate (CaCO_3)
- Secrete calcium carbonate

Soft corals

- No skeleton
- No calcium carbonate secretions



The Hindu analysis by saurabh pandey sir

- **Appearance:** Hard corals have tentacles in multiples of 6, while soft coral tentacles form in multiples of 8. Hard corals closely represent rocks, while soft corals look like underwater plants.
- **Growth characteristics:** Hard corals deposit calcium carbonate skeletons that remain behind after they die, forming the base of coral reefs. Soft corals have internal structural support known as spiracles.
- **Defense Mechanisms:** Polyps of hard coral can retreat into their skeletons for protection, while soft corals rely more on chemical defense

BIG SHOT



Bleached and dead coral around Lizard Island on the Great Barrier Reef, located 270 km north of the city of Cairns. Australia’s famed Great Barrier Reef is teetering on the brink, suffering one of the most severe coral bleaching events on record – and the fifth in eight years – leaving scientists unsure of its survival. AFP



SAURABH PANDEY

CSE

(CIVIL SERVICES EXAMINATION)

FROM BASICS TO UPSC BRILLIANCE



Coral bleaching

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BIG SHOT



The Hindu analysis by saurabh pandey sir







CORAL BLEACHING

Have you ever wondered how a coral becomes bleached?

HEALTHY CORAL

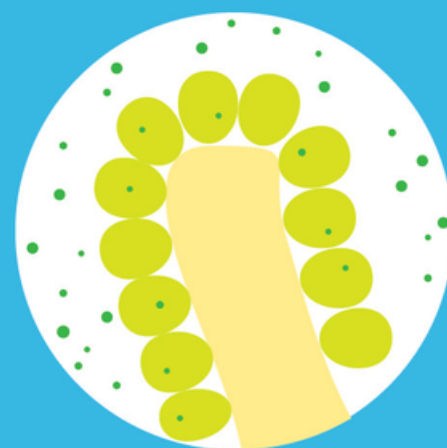
1 Coral and algae depend on each other to survive.



Corals have a symbiotic relationship with microscopic algae called zooxanthellae that live in their tissues. These algae are the coral's primary food source and give them their color.

STRESSED CORAL

2 If stressed, algae leaves the coral.



When the symbiotic relationship becomes stressed due to increased ocean temperature or pollution, the algae leave the coral's tissue.

BLEACHED CORAL

3 Coral is left bleached and vulnerable.



Without the algae, the coral loses its major source of food, turns white or very pale, and is more susceptible to disease.

WHAT CAUSES CORAL BLEACHING?



Change in ocean temperature

Increased ocean temperature caused by climate change is the leading cause of coral bleaching.



Runoff and pollution

Storm generated precipitation can rapidly dilute ocean water and runoff can carry pollutants — these can bleach near-shore corals.



Overexposure to sunlight

When temperatures are high, high solar irradiance contributes to bleaching in shallow-water corals.



Extreme low tides

Exposure to the air during extreme low tides can cause bleaching in shallow corals.



NOAA's Coral Reef Conservation Program
<http://coralreef.noaa.gov/>

Reforms needed in the voting process

When were Electronic Voting Machines (EVMs) first introduced? What have been the concerns raised by activists about EVMs? What are the voting practices in other countries? How can the process of voting be made more robust?

EXPLAINER

Rangarajan. R

The story so far:

The Supreme Court has decided to hear petitions seeking 100% cross-verification of the Voter Verifiable Paper Audit Trail (VVPAT) slips with the vote count as per Electronic Voting Machines (EVMs).

What is the history of voting process?

In the first two general elections of 1952 and 1957, a separate box was placed for each candidate with their election symbol. Voters had to drop a blank ballot paper into the box of the candidate whom they wanted to vote for. Thereafter from the third election, the ballot paper with names of candidate and their symbols was introduced with voters putting a stamp on the candidate of their choice.

The EVM was introduced on a trial basis in 1982 in the Assembly constituency of Paravur in Kerala. They were deployed in all booths during the Assembly elections of Tamil Nadu, Kerala, Puducherry and West Bengal in 2001. The Supreme Court in various judgments has upheld the validity of using EVMs in elections. In the 2004 general elections to the Lok Sabha, EVMs were used in all 543 constituencies. In *Subramanian Swamy versus Election Commission of India* (2013), the Supreme Court ruled that a paper trail is an indispensable requirement for free and fair elections. The 2019 elections had EVMs backed with 100% VVPAT in all constituencies.

What are international practices?

Many western democracies continue to have paper ballots for their elections. Countries like England, France, The Netherlands and the U.S. have discontinued the use of EVMs, for national or federal elections, after trials in the last two decades. In Germany, the Supreme Court of the country declared the use of EVMs in elections as



Ensuring transparency: An official marks an EVM at a distribution centre in Coimbatore on April 11. AFP

unconstitutional in 2009. Some countries like Brazil, however, use EVMs for their elections. Among our neighbours, Pakistan does not use EVMs. Bangladesh experimented in a few constituencies in 2018 but reverted to paper ballots for the general elections in 2024.

What are the features of EVMs?

EVMs bring significant benefits to the electoral process. First, the EVM is virtually eradicated booth capturing by limiting the rate of vote casting to four votes a minute and thus significantly increasing the time required for stuffing false votes. Second, invalid votes that were a bane of paper ballots and also a bone of contention during counting process have been eliminated through

EVMS. Third, considering the size of our electorate which is close to one billion, the use of EVMS is eco-friendly as it reduces the consumption of paper. Finally, it provides administrative convenience for the polling officers on the day of the poll and has made the counting process faster and error-free. There are mechanisms to uphold the integrity of EVM and VVPAT process. These include random allocation of EVMS to booths before polls; conduct of a mock poll to display the correctness of EVMS and VVPAT before commencement of the actual poll; and the serial number of EVMS along with total votes polled shared with agents of candidates to verify the same at the time of counting of votes.

Despite its advantages, there have been

doubts raised about the functioning of EVMs by various political parties and civil society activists from time to time. The most repeated allegation is that EVMs are susceptible to hacking as it is an electronic device. The ECI has time and again clarified that it is a standalone device like a calculator with no connectivity to any external device and hence free from any kind of external hack. The sample size for matching of the EVM count with VVPAT slips at present is five per assembly constituency/segment. This is not based on any scientific criteria and may fail to detect defective EVMs during counting. The present process also allows for booth-wise polling behaviour to be identified by various parties that can result in profiling and intimidation.

What can be the way forward?

In a transparent democracy, each citizen must be able to comprehend and verify the steps in the election process without any special technical knowledge. The 100% use of VVPAT has enabled the voters to verify that their votes are 'recorded as cast'. However, few additional steps need to be adopted to make the entire process more robust and ensure that the votes are 'counted as recorded'. 100% match of EVM count with VVPAT slips would be unscientific and cumbersome. The sample for matching of EVM count and VVPAT slips should be decided in a scientific manner by dividing each State into large regions as suggested by experts. In case of even a single error, the VVPAT slips should be counted fully for the concerned region and form the basis for results. This would instil a statistically significant confidence in the counting process. Further, in order to provide a degree of cover for voters at the booth level, 'totaliser' machines can be introduced that would aggregate votes in 15-20 EVMs before revealing the candidate-wise count.

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



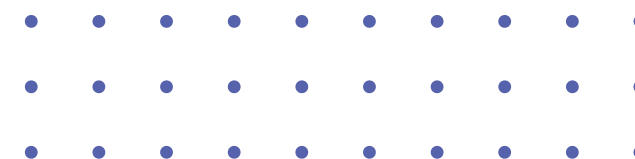
The EVM was introduced on a trial basis in 1982 in the Assembly constituency of Paravur in Kerala.



Despite its advantages, there have been doubts raised about the functioning of EVMs by various political parties and civil society activists from time to time. The most repeated allegation is that EVMs are susceptible to hacking as it is an electronic device.



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- They were deployed in all booths during the Assembly elections of Tamil Nadu, Kerala, Puducherry and West Bengal in 2001.
- The Supreme Court in various judgments has upheld the validity of using EVMs in elections.
- In the 2004 general elections to the Lok Sabha, EVMs were used in all 543 constituencies. In Subramanian Swamy versus Election Commission of India (2013), the Supreme Court ruled that a paper trail is an indispensable requirement for free and fair elections.
- The 2019 elections had EVMs backed with 100% VVPAT

Why has India allowed FIIs to invest in its green bonds?

What are Sovereign Green Bonds? How will investments by Foreign Institutional Investors in green government securities accelerate India's transition to a green economy?

Kunal Shankar

The story so far:

On April 5 the Reserve Bank of India (RBI) green lighted investments in the country's Sovereign Green Bonds (SGrBs) by Foreign Institutional Investors (FIIS) – investors such as insurance companies, pension funds and nation-states' sovereign wealth funds. SGrBs are a kind of government debt that specifically funds projects attempting to accelerate India's transition to a low carbon economy.

How does it help in green transition?

Allowing FIIs to invest in India's green projects widens the pool of capital available to fund the country's ambitious 2070 net zero goals, ensuring 50% of India's energy comes from non-fossil fuel based sources and to reduce the carbon intensity of the nation's economy by 45%, as pledged by Prime Minister Narendra

Modi at COP26 in Glasgow 2021.

The RBI had issued SGrBs worth ₹16,000 crore in two tranches in January and February last year with maturities in 2028 and 2033. While in both instances the bonds were oversubscribed, the main participants were domestic financial institutions and banks, narrowing the avenues from where the government could borrow. Moreover, these green Government-Securities (G-Secs) were classified under the Statutory Liquidity Ratio (SLR), a liquidity rate fixed by the RBI that financial institutions must maintain with themselves before they lend to their customers.

SGrBs yield lower interest than conventional G-Secs, and the amount foregone by a bank by investing in them is called a greenium. But central banks and governments the world over are encouraging financial institutions to embrace greeniums to hasten the transition to a greener future. Climate finance experts believe India would gain

from allowing FIIs in green G-Secs. They say FIIs are also looking to diversify their pool of green investments, as there is considerable regulatory support particularly in developed countries. And so this is an opportunity for them to invest in India's green g-secs. Ashim Roy, Energy Finance lead at World Resources Institute, India said FIIs might also be looking to gain green credentials when such investments may not be available in their home markets, and because India has successfully addressed greenwashing fears with the Sovereign Green Bonds Framework in late 2022.

What is the green taxonomy gap?

In the 2022-23 Union Budget, Finance Minister Nirmala Sitharaman announced the government's decision to issue SGrBs to accelerate funding government projects such as harnessing offshore wind, grid-scale solar power production, or encouraging the transition to battery operated Electric Vehicles (EVs). But the

RBI had not created a green taxonomy, or a way to assess an investment's environmental, or emissions credentials to ensure the project is not an attempt at greenwashing, that is, faking green credentials to secure funding.

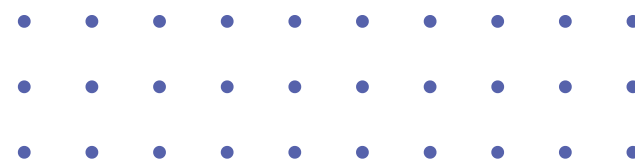
To address this gap, the Finance Ministry released India's first SGrB Framework on November 9, 2022 detailing the kind of projects that would receive funding through this class of G-Secs. These included "investments in solar/wind/biomass/hydropower energy projects (under 25 MW) that integrate energy generation and storage; supporting public lighting improvements (e.g. replacement with LEDs); supporting construction of new low-carbon buildings as well as energy-efficiency retrofits to existing buildings; projects to reduce electricity grid losses." The list goes on to include promoting public transport, subsidies to adopt EVs and building charging infrastructure. The government also sought Norway-based validator Cicero's opinion comparing India's SGrB Framework with International Capital Market Association's (ICMA's) green principles. Cicero rated India's framework as "green medium" with a score of "good governance". WRI's Ashim Roy said, "it would be crucial to identify new green projects with credible audit trails and high impact to optimally deploy the proceeds, especially ones that has received limited private capital like Distributed Renewable Energy and clean energy transition finance for MSMEs."

THE GIST

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Imported inflation: how import costs can increase the prices of goods and services

The Asian Development Bank recently warned that India could face imported inflation as the rupee could depreciate amid the rise in interest rates in the West. A rise in interest rates in the West tends to cause the currencies of developing countries to depreciate

Prashanth Perumal

Imported inflation refers to the rise in the prices of goods and services in a country that is caused by an increase in the price or the cost of imports into the country. It is believed that a rise in input costs pushes producers to raise the price they charge from their local customers, thus boosting inflation.

A fall in the rupee

A depreciation in the value of a country's currency is generally seen as the most important reason behind imported inflation in an economy. This is because when a country's currency depreciates, people in the country will have to shell out more of their local currency to purchase the necessary foreign currency required to buy any foreign goods or services, which in turn means that they will effectively be paying more for anything that they import. The Asian Development Bank recently warned that India could face imported inflation as the rupee could depreciate amid the rise in interest rates in the West. A rise in interest rates in the West tends to cause the

currencies of developing countries to depreciate against western currencies, which in turns can lead to higher import costs for these countries.

A rise in import costs even without depreciation in the value of a country's currency is also believed to lead to import inflation. So a rise in international crude oil prices due to fall in oil output, for instance, is expected to cause prices to rise across an economy which imports oil to produce goods and services. The idea of imported inflation, it should be noted, is simply a variant of cost-push inflation which states that a rise in the cost of inputs can lead to an inflation in the prices of final goods and services.

Consumers decide prices

Critics of the proposition that rising import costs can lead to a rise in inflation believe that it is a fallacious economic idea. They state that it might seem commonsensical to believe that input costs determine price, and hence that higher costs should lead to higher prices for goods and services. After all, it is common to see a lot of businesses in the real world raise the price of their

products when their input costs rise. It may thus seem true, from an individual business' point of view, that costs determine prices.

However, the critics state, it is simply not true that costs determine price when seen from an economic point of view. Instead, they state that it is the prices that customers are willing to pay for the final goods and services that ultimately determine the cost of all inputs that go into making products.

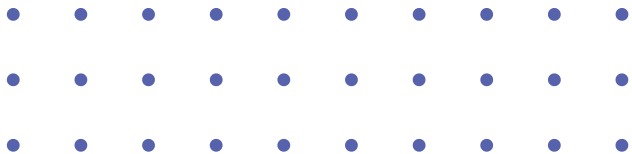
It should be carefully noted that producers are willing to pay for various inputs based on what price they believe they can sell their final output for to their customers. So, if the cost of inputs were set at a price that is higher than what producers are willing to pay (based on final consumer demand), this would cause the available supply of inputs to go unsold as producers are unwilling to purchase the inputs. This, in turn, would cause the price of inputs to drop in accordance with final consumer demand.

Stated simply, value is imputed backwards from final consumer goods and services to inputs that go into making these final goods and services. The idea of

imputation of value from final consumer goods and services to the various factors of production was elaborated famously by Austrian economist Carl Menger in his 1871 book *Principles of Economics*.

It can be further argued that even when import costs rise due to a depreciating currency, the rise in costs is still ultimately driven by the demand for the final output among consumers. To understand this, it should be noted that the value of a currency depreciates against a foreign currency when its supply becomes relatively more abundant than the foreign currency in the forex market. In other words, the exchange rate of a currency depreciates to reflect the greater demand for the foreign currency in terms of the local currency. So, the resulting rise in import costs due to depreciation itself can be seen simply as a reflection of a change in the nominal demand for inputs.

Stated simply, it is not currency depreciation that is causing input costs and the prices of final goods to rise; rather, the currency depreciation is simply a reflection of higher nominal demand for imported goods from final consumers.



Imported Inflation

- **Imported Inflation is inflation that occurs when there is an increase in the prices of goods and services imported into a country.**
- **The surge in prices may be due to several reasons like increased taxes on imports, a weaker domestic currency, or inflation in the exporting country**



Topics



- **Agroforestry**
- **Frogs**
- **Heat waves**
- **Taiwan strait**
- **Great indian buster**
- **Green credit**
- **Mains**



By saurabh pandey sir.



Deepthi R. Shastry
Milind Bunyan
Ravikanth G.



Teak and turmeric grown together in an agroforestry farm in Coimbatore. THE HINDU

“



Agroforestry

Agroforestry is a method of planting diverse fruit trees and other trees in blighted lands in the Amazon based on the mechanism of the forest.



[Agroforestry]

Building Forests through Agriculture

"Agroforestry" is a term coined in the mid 1970s by combining agriculture and forestry.

In Japanese, it is also called "農林複合経営," "混農林業" and "森林農業."

By cultivating crops in a condition similar to nature, it is possible to bring diversity back to fields and achieve sustainable production of crops that were previously monocultural.

The forest is regenerated while farming. This truly is "Building Forests through Agriculture". Many such examples can be found worldwide in regions such as Southeast Asia, Latin America and Africa, but the Agroforestry in Brazil's Tomé-açu is gaining particular attention as sustainable agriculture.

The Hindu analysis by saurabh pandey sir



Agroforestry and its attributes



It is a combination of practicing agriculture and forestry together on same land

What are the components of agroforestry?

There are three main components of agroforestry — crops, trees and livestock.

What are the major agroforestry systems based on the type of component?

Agroforestry systems are classified into three categories based on the types of components: Agrisilviculture (crops + trees), silvopastoral (pasture/livestock + trees); and Agrosilvopastoral (crops + pasture + trees).

What are the major attributes that agroforestry systems should possess?

There are three attributes of agroforestry systems:

Productivity: Production of preferred goods and increasing productivity of land

Sustainability: Conserving the production potential

Adoptability: Acceptance of the prescribed practice

What are the trees suitable for rainfed areas?

Neem, Pongamia, Sandalwood and Anjan tree among others

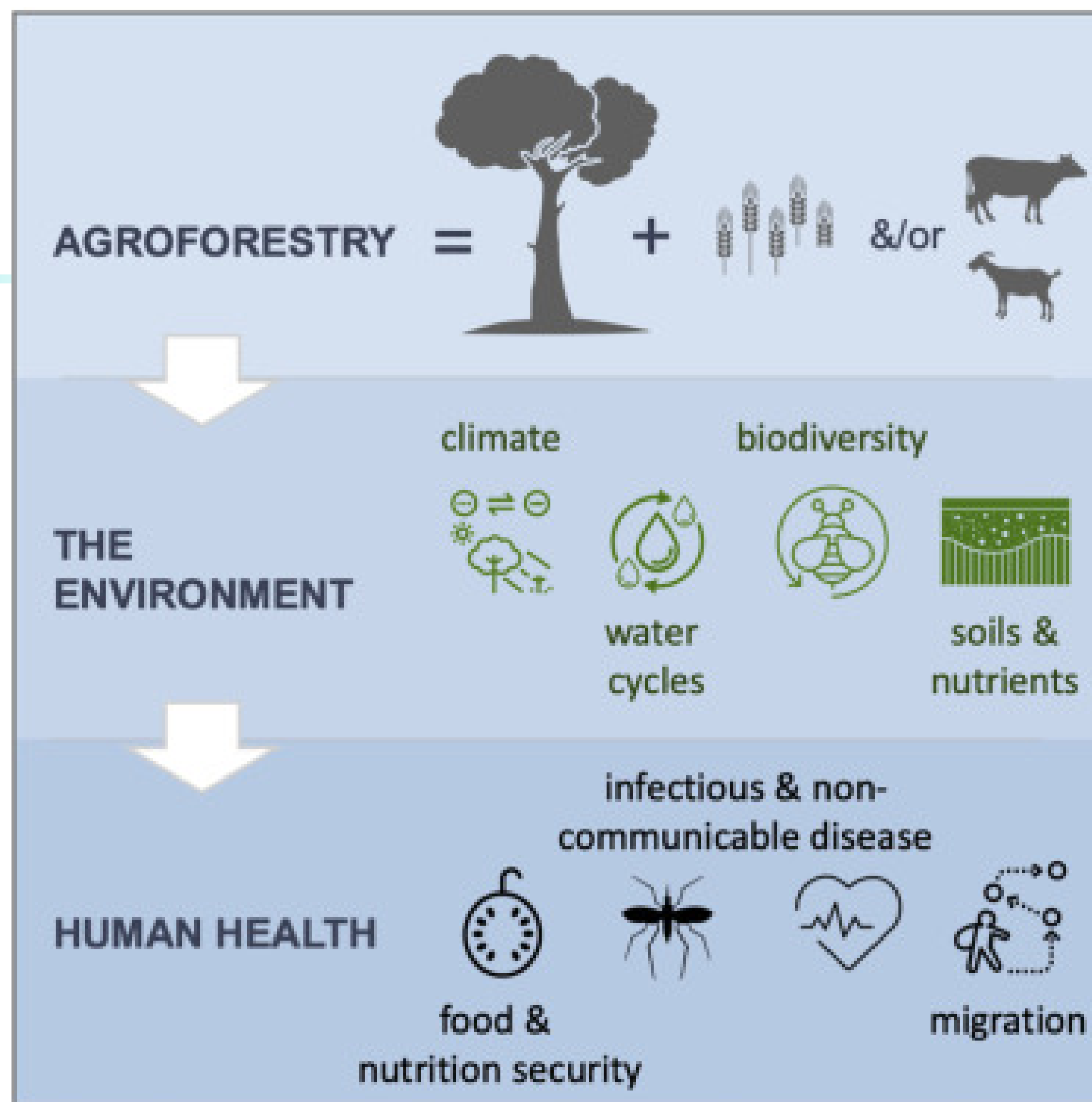
What are the tree crops suited for saline / sodic lands?

Eucalyptus, Casuarina, Pongamia, Neem and Flame of Forest among others



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BENEFITS OF AGROFORESTRY



Soil Health



Biodiversity



**Increase in
productivity**



**Farmer
Revenues**

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Agroforestry related issues

- The Gaja cyclone nearly razed all coconut trees and made the soils saline; we did not know what to plant after.
- The five-year 'Trees Outside of Forests India' (TOFI) initiative is one such attempt to assess comprehensive ways to stimulate a change in the status quo.
- It's a joint initiative of the U.S. Agency for International Development (USAID) and India's Ministry of Environment, Forest and Climate Change.
- In particular, we discovered that water availability and transition finance have been recurrent concerns for smallholders across these states.

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- **problem remains relevant and is especially acute for smallholders who need additional funding to secure water and/or who incur additional debt in doing so.**
- **Moreover, water availability is critical during the sapling stage but remains a constant concern if the trees compete with crops for water in water-constrained environments (e.g. hard rock aquifers and low-rainfall regions).**
- **One way to overcome this constraint is to grow trees that don't compete with the crops for water.**

- choosing the right species for the right place and the right reason is elemental for agroforestry to enhance the sustainability of livelihoods.
- Finding native species that fit multiple criteria is admittedly challenging but necessary to arrest or reverse land degradation while diversifying livelihood opportunities.
- the Indian Forest and Wood Certification Scheme 2023, which certifies agroforestry and wood-based products as sustainable, has an exhaustive list of eligibility criteria for farmers and industries.

- The emerging concept of ecosystem credits or existing ~~approaches~~ such as ‘payment for ecosystem services’ (PES) are potential incentive mechanisms. (In PES, an ecosystem service user, e.g. a food processing company, volunteers to pay a service provider, such as a small farmer, for trees promoting a service like pollination).
- These instruments strengthen the ideology of nature-centred economics.

Agroforestry Policy, 2014

INDIA@COP22

DAC&FW formulated National Agroforestry Policy-approved by Cabinet in 2014- Policy laid on floor of the both Houses of Parliament in 2014 , which aims:

- National coordination, convergence, synergy and facilitation of agroforestry scaling up
- Relaxations in on-farm grown tree felling and transit regulations
- Mainstreaming agroforestry in all agricultural policies and strategies
- Standards for production, certification and supply of planting material
- Land tenure, loans and insurance for agroforestry
- Investments in agroforestry research, extension and capacity building
- Inclusion of agroforestry among qualified items for CSR support
- Profiling agroforestry for carbon sequestration, environmental services, INDCs, etc.
- Policy envisages setting up a National Agroforestry Mission or an Agroforestry Board

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A leaf litter frog emits ultrasonic sounds that are inaudible to humans but can scare off predators.
REUTERS

When this tiny frog in Brazil screams, you won't hear it

Arkatapa Basu

Frogs use a myriad ways to defend themselves against predators. Some are poisonous. Some are brightly coloured. Some even inflate their bodies with air to appear bigger.

Another way frogs have been known to defend themselves, or alert others nearby, about a predator is to make loud sounds.

Recently, scientists have found that one tiny species of frog endemic to the Brazilian Atlantic rainforest emits ultrasonic sounds that are inaudible to humans but can scare off predators.

In their work, published in the journal *Acta Ethologica* earlier this year, Brazilian scientists from the Institute of Biology, São Paulo, and the Project Darnis preserve recorded the ultrasonic 'screams' of the tiny leaf litter frog (*Haddadus binotatus*) while in the rainforest of Brazil.

The researchers found that the frog – which is smaller than an inch – while emitting the scream would raise the upper portion of its body, open its mouth wide, and throw its head back. This behaviour was, they said, was a typical defensive movement against predators.

The frog would then close its mouth just a little and appear to emit a call.

However, the researchers did not hear any sounds.

They subsequently used specialised

The frequency of the frog's call spanned the 7 kHz to 20 kHz range, which is within humans' hearing range, but also reached up to 20 kHz to 44 kHz, which is beyond what the human ear can discern

equipment to check for the presence of a call, and found that the frog was screaming at a frequency much higher than humans could hear.

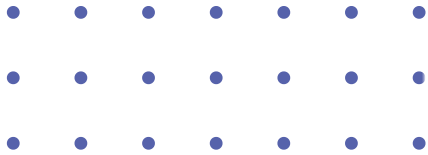
After analysing the call, they ascertained that the call's frequency spanned the 7 kHz to 20 kHz range, which is within humans' hearing range, but also reached up to 20 kHz to 44 kHz, which is beyond what the human ear can discern.

Researchers think leaf litter frogs emit these ultrasonic calls to stave off predators or, possibly, attract other animals that might attack the predator and protect the frogs.

One of the scientists involved in this study, Mariana Retuci Pontes, had previously suspected the frogs used ultrasonic screams as a defence mechanism after she had come across what looked like a Hensel's big-headed frog (*Ischnocnema henselii*) in Brazil's rainforests.

When she picked up this frog to photograph it, it made defensive movements that resembled those of the leaf litter frog. However, she did not have the equipment to record its calls on hand at the time and could not tell if they were ultrasonic.

The finding that the leaf litter frog emits ultrasonic sounds has kicked up questions for the researchers about which predators are affected by the screams, how they react to it and what the scream's ultimate purpose is.



Frogs

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ome summer, we are used to seeing heat alerts from the India

A portrait of a man with dark hair and glasses, wearing a black polo shirt. He has his arms crossed and is smiling slightly. The background is white.

Heat Waves

- According to the IMD, the definition of a heatwave depends on the physiography of regions.
- The IMD will declare a heatwave if the maximum temperature recorded at a station is 40 degrees Celsius or more in the plains, 37 degrees Celsius or more in the coast, and 30 degrees Celsius or more in the hills.
- A heatwave's severity is determined by its departure from normal temperature.
- There is a 'normal heatwave' when the departure is by 4.5-6.4 degrees Celsius and a 'severe heatwave' if the departure is greater.
- Heatwave declaration could also be based on actual maximum temperature: a 'heatwave' is when this figure is greater than 45 degrees Celsius and a 'severe heatwave' when greater than 47 degrees Celsius

Heat action plans (HAPs).



- heat action plans (HAPs).-HAPs aim to increase preparedness and lower the adverse impacts of extreme heat by outlining strategies and measures to prepare for, address, and recover from heatwaves.
- HAPs in India follow a general pattern.
- They provide a snapshot of regions' heat profile, including information on the number of past heatwave events, yearly trends in the summer maximum temperature, land surface temperature, and so on, followed by a vulnerability assessment which maps out regions that require immediate attention and a response plan.
- This plan presents recommendations for mitigating and addressing heatwave impacts before, during, and after a heatwave and outlines the roles and responsibilities of various line departments, such as the disaster management authority, labour department, and police.

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What do the HAPs recommend?

- HAPs typically suggest a combination of measures such as using forecasts and early warning systems to alert the public and relevant authorities about heatwaves, educating the public through campaigns that provide information on risks associated with heatwaves, building heat shelters and cooling centres, and providing clean drinking water to avoid dehydration.
- HAPs provide directives for hospitals to be well equipped with supplies and an adequate number of trained healthcare workers to recognise and treat a large influx of patients with heat-related illnesses.
- HAPs also suggest long-term measures such as adopting urban planning strategies that promote tree planting, using heat-resistant building materials to reduce urban heat island effect, and using cool roofing technologies to reduce solar absorption, thereby decreasing indoor temperatures

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What debilitates HAPs from addressing the problem effectively?

- **The local context**
- **Inconsistent methods**
- **Vulnerable populations:**
- **Resource allocation:**
- **Breaking down silos:**

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Reforms needed in the voting process

When were Electronic Voting Machines (EVMs) first introduced? What have been the concerns raised by activists about EVMs? What are the voting practices in other countries? How can the process of voting be made more robust?

EXPLAINER

Rangarajan. R

The story so far:

The Supreme Court has decided to hear petitions seeking 100% cross-verification of the Voter Verifiable Paper Audit Trail (VVPAT) slips with the vote count as per Electronic Voting Machines (EVMs).

What is the history of voting process?

In the first two general elections of 1952 and 1957, a separate box was placed for each candidate with their election symbol. Voters had to drop a blank ballot paper into the box of the candidate whom they wanted to vote for. Thereafter from the third election, the ballot paper with names of candidate and their symbols was introduced with voters putting a stamp on the candidate of their choice.

The EVM was introduced on a trial basis in 1982 in the Assembly constituency of Paravur in Kerala. They were deployed in all booths during the Assembly elections of Tamil Nadu, Kerala, Puducherry and West Bengal in 2001. The Supreme Court in various judgments has upheld the validity of using EVMs in elections. In the 2004 general elections to the Lok Sabha, EVMs were used in all 543 constituencies. In *Subramanian Swamy versus Election Commission of India* (2013), the Supreme Court ruled that a paper trail is an indispensable requirement for free and fair elections. The 2019 elections had EVMs backed with 100% VVPAT in all constituencies.

What are international practices?

Many western democracies continue to have paper ballots for their elections. Countries like England, France, The Netherlands and the U.S. have discontinued the use of EVMs, for national or federal elections, after trials in the last two decades. In Germany, the Supreme Court of the country declared the use of EVMs in elections as



Ensuring transparency: An official marks an EVM at a distribution centre in Coimbatore on April 11. AFP

unconstitutional in 2009. Some countries like Brazil, however, use EVMs for their elections. Among our neighbours, Pakistan does not use EVMs. Bangladesh experimented in a few constituencies in 2018 but reverted to paper ballots for the general elections in 2024.

What are the features of EVMs?

EVMs bring significant benefits to the electoral process. First, the EVM has virtually eradicated booth capturing by limiting the rate of vote casting to four votes a minute and thus significantly increasing the time required for stuffing false votes. Second, invalid votes that were a bane of paper ballots and also a bone of contention during counting process have been eliminated through

EVMs. Third, considering the size of our electorate which is close to one billion, the use of EVMs is eco-friendly as it reduces the consumption of paper. Finally, it provides administrative convenience for the polling officers on the day of the poll and has made the counting process faster and error-free. There are mechanisms to uphold the integrity of EVM and VVPAT process. These include random allocation of EVMs to booths before polls; conduct of a mock poll to display the correctness of EVMs and VVPAT before commencement of the actual poll; and the serial number of EVMs along with total votes polled shared with agents of candidates to verify the same at the time of counting of votes.

Despite its advantages, there have been

doubts raised about the functioning of EVMs by various political parties and civil society activists from time to time. The most repeated allegation is that EVMs are susceptible to hacking as it is an electronic device. The ECI has time and again clarified that it is a standalone device like a calculator with no connectivity to any external device and hence free from any kind of external hack. The sample size for matching of the EVM count with VVPAT slips at present is five per assembly constituency/segment. This is not based on any scientific criteria and may fail to detect defective EVMs during counting. The present process also allows for booth-wise polling behaviour to be identified by various parties that can result in profiling and intimidation.

What can be the way forward?

In a transparent democracy, each citizen must be able to comprehend and verify the steps in the election process without any special technical knowledge. The 100% use of VVPAT has enabled the voters to verify that their votes are 'recorded as cast'. However, few additional steps need to be adopted to make the entire process more robust and ensure that the votes are 'counted as recorded'. 100% match of EVM count with VVPAT slips would be unscientific and cumbersome. The sample for matching of EVM count and VVPAT slips should be decided in a scientific manner by dividing each State into large regions as suggested by experts. In case of even a single error, the VVPAT slips should be counted fully for the concerned region and form the basis for results. This would instil a statistically significant confidence in the counting process. Further, in order to provide a degree of cover for voters at the booth level, 'totaliser' machines can be introduced that would aggregate votes in 15-20 EVMs before revealing the candidate-wise count.

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



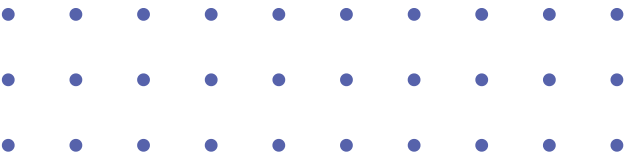
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The Great Indian Bustard and climate action verdict



In a recent judgment, the Supreme Court of India has recognised the existence of a fundamental right to be free from the adverse impacts of climate change (hereinafter ‘the right’). The judgment has garnered significant attention from environmentalists, mostly focusing only on its impacts on the protection of the Great Indian Bustard. Taking a more comprehensive view, this article analyses the judgment from the lens of inclusive climate action. It argues that first, by limiting itself to only recognising the right, the Court has allowed time and space for a productive discourse on the right’s content. Accordingly, this could enable a more informed articulation of the right in the future. Second, given the nature of the core issue in this case, using the just transition framework is an excellent approach forward. It can facilitate equitable climate action, including, articulation of a more reflexive and inclusive right.

The Right

The States of Rajasthan and Gujarat are home to the critically endangered Great Indian Bustard. At the same time, both States also hold significant potential for the development of solar and wind power. In 2019, certain public-spirited individuals (petitioners), filed a public interest litigation, seeking conservation of the bustard. In the interim, they sought an order seeking a ban on further construction of solar and wind energy infrastructure, and the laying of overhead power transmission lines linked to these. They argued that these power lines were a hazard, causing the bustards to die due to frequent collisions with the lines. In its decision the Supreme Court imposed a blanket ban on the laying of overhead power lines in an area of 99,000 square kilometres; this included areas identified as priority and potential areas for bustard conservation. The Court also passed an order for undergrounding existing power lines, both high and low voltage.

The government challenged this order citing India’s international climate commitments on transitioning to non-fossil fuels and reducing carbon emissions. It argued that the blanket ban was issued for an area much larger than the actual area in which the bustard dwells. This area, it reiterated, held a major proportion of the country’s wind and solar energy potential. Further, it argued that undergrounding power lines was practically impossible. Lastly, it attributed the decline in the bustard population to other factors such as poaching, habitat destruction, and predation.

In its decision on March 21, 2024, the Court modified the earlier order, recalling the blanket prohibition on transmission lines. It left the recalibration of the order to scientific experts. To that end, it set up an expert committee to, *inter*



Kanika Jamwal

is a doctoral candidate in environmental law at the Faculty of Law, National University of Singapore, Singapore

With the final decision of India’s top court still pending, this is an ideal chance for the judiciary to pursue the just transition framework and enable inclusive and equitable climate action

alia, assess the feasibility of undergrounding power lines, and identifying measures for bustard conservation. This committee is required to submit its report by July 2024, after which the Court will pronounce its final judgment.

In a first, the Court used this opportunity to recognise the existence of a right against the adverse impacts of climate change. It noted that the right is recognised by the right to equality (Article 14) and the right to life (Article 21) enshrined under the Constitution of India. The Court began by explaining the threat posed by the impacts of climate change to the enjoyment of the right to life. Thereafter, it highlighted that disproportionate vulnerability to these impacts threatens the affected persons’ right to equality. Concluding this discussion, the Court found that the source of the right is in a conjunctive reading of judicial jurisprudence on Articles 21 and 14; India’s climate change action and international commitments, and, the scientific consensus on the adverse impacts of climate change.

Notably, the Court recognised the existence of the right, but did not articulate it any further. Additionally, it also underlined the need for articulation. However, it steered clear of undertaking that task. Arguably, the conscious choice of not articulating the right and only recognising it departs from the Court’s usual practice in environmental cases. Much of Indian environmental law has developed through the Court’s judicial decisions in public interest cases. In several cases, it has transplanted, recognised, and articulated environmental rights and legal principles. While appreciated for being proactive, this practice has been critiqued for judicial overreach and the creation of imprecise rights. Contrastingly, in this decision, the Court’s approach has been that of restraint. Arguably, this is an optimal approach at this early stage of the recognition of the right – in that, it catalyses the discourse on climate rights, simultaneously providing time and space for articulating a more informed right.

However, it must be noted that the Court’s recognition of the right does not appear in the operative part of the judgment. Therefore, it is not binding *per se*. While it will be instrumental in shaping future climate action, the extent to which it can do so remains to be seen.

Just transition framework

The central issue at stake was limiting the adverse impacts of renewable energy projects on the bustard. As rightly noted by conservationist Debadityo Sinha, the judgment approaches the central issue as presenting two competing choices, i.e., either protecting biodiversity or allowing mitigative climate action. In other words, it projects biodiversity protection and climate action as adversarial choices.

Furthermore, the recognition of the right is also contextualised in this approach which juxtaposed biodiversity protection and mitigative climate action. Accordingly, the right so recognised only relates to protecting humans’ interests against climate change.

Going forward, adopting an alternative approach could preclude this conundrum. This approach is: utilising the just transition framework. Currently being used in climate cases around the world, it aims to make transitions to a low carbon economy more equitable and inclusive. It particularly serves the interests of those most affected by such transitions. This includes, *inter alia*, workers, vulnerable communities, and small and medium-sized enterprises. Where the core issue is similar to the one in the present case, using the just transitions framework is an excellent approach. In that it allows protecting underrepresented interests (in the instant case, of the bustard) being threatened by slow carbon transition projects (in this case, solar energy).

This approach is advantageous in three ways. First, it will preclude climate action and protection of biodiversity from being pitted as adversarial choices. Instead, it can create a case for inclusive climate action, i.e., climate action alive to varied rights and interests. Second, it can enable the articulation of more reflexive and inclusive climate rights. To that end, utilising it in climate litigation can ensure that articulation and enforcement of climate rights are sensitive to the interests of the non-human nature and furthers ecological justice. Third, if the framework is used in the final decision of the Court, this case will be one of the first just transition litigations to consider a non-human interest. Of the existing just transition litigations globally, only one other case concerns protecting the interests of the non-human environment. Thus, the present case will be a frontrunner in such litigation. Theoretically, it will contribute to expanding the concept of a just transition to considering more than human interests.

A ‘shared burden’

Given that the final decision of the Court is still pending, this is an excellent opportunity for the judiciary to use the just transition framework and facilitate inclusive and equitable climate action. A right against climate change has been recognised and is yet to be articulated. This provides a productive space for initiating a discourse on the content of the right – an opportunity to make it inclusive and effective. However, this burden is a shared one. It falls not only on the state but also on activists, litigants, and academics – who provide content to rights by participating (indirectly or directly) in the process of their recognition, articulation, and enforcement.



Great Indian bustard



Key Facts

A

Common Name

Great Indian bustard

Aa

Scientific Name

Ardeotis nigriceps



Population

200 individuals worldwide



Height

100 cms or 1 metre



Length

Wingspan of 210-250 cm



Weight:

15-18 kg



Status

Listed in Schedule I of the Indian Wildlife (Protection) Act, 1972, in the CMS Convention and in Appendix I of CITES, as Critically Endangered on the IUCN Red List and the National Wildlife Action Plan (2002-2016). It has also been identified as one of the species for the recovery programme under the Integrated Development of Wildlife Habitats of the Ministry of Environment and Forests, Government of India.



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- They breed mostly during the monsoon season when females lay a single egg on open ground. Males have a gular pouch, which helps produce a resonant booming mating call to attract females and can be heard up to a distance of 500 metres.
- Males play no role in the incubation and care of the young, which remain with the mother till the next breeding season. These birds are opportunist eaters.
- Their diet ranges widely depending on the seasonal availability of food.

- The biggest threat to this species is hunting, which is still prevalent in Pakistan.
- This is followed by occasional poaching outside Protected Areas, collisions with high tension electric wires, fast moving vehicles and free-ranging dogs in villages



Topics



- Mount Ruang Eruption
- Liver and Gut Functions
- Lower Private Investment
-
- Mains



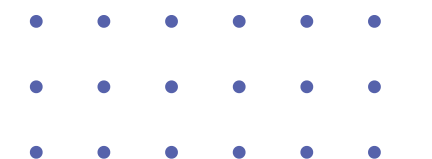
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Scare in Indonesia

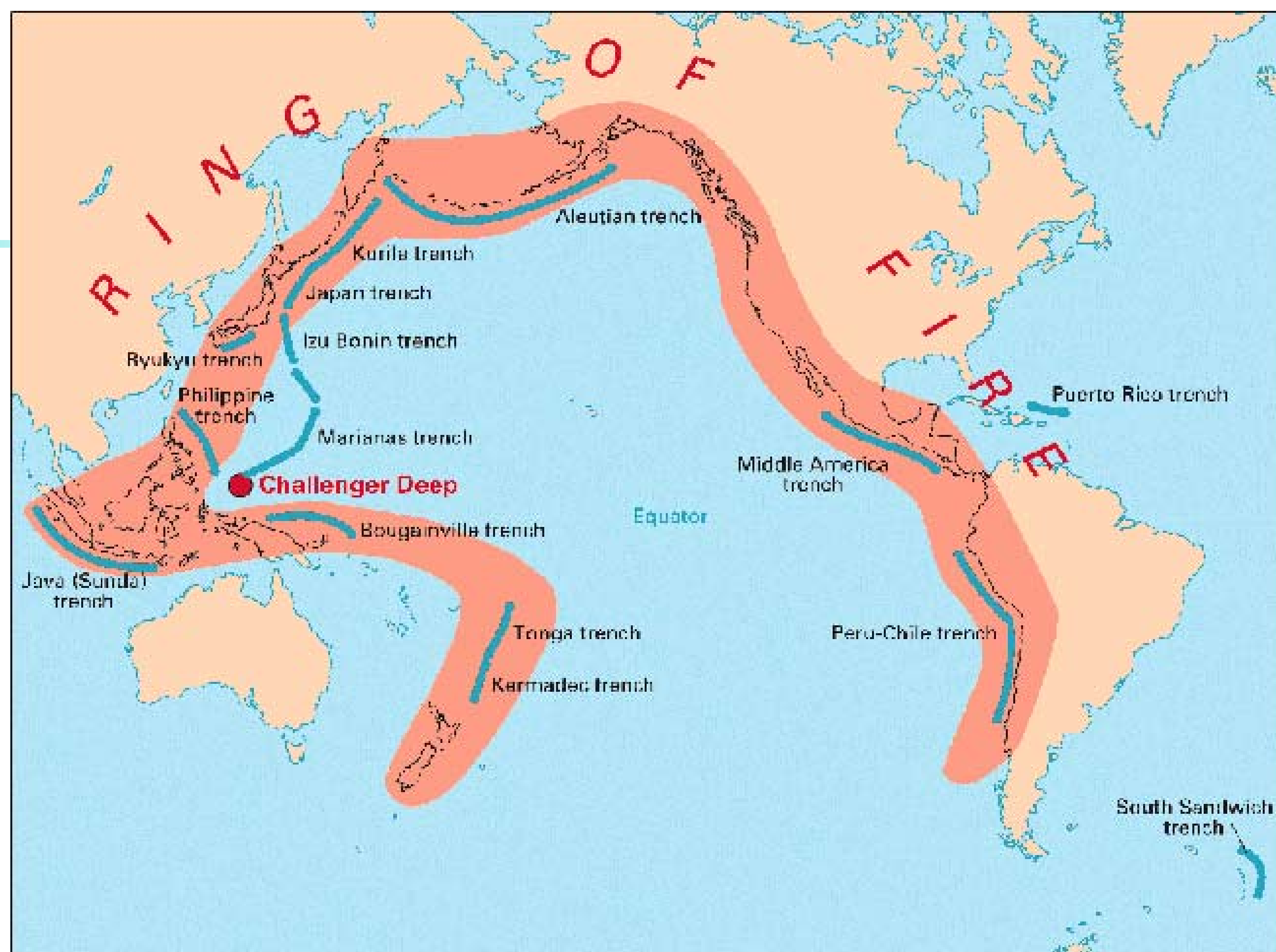


Lava and smoke erupt from Indonesia's Mount Ruang on Wednesday, forcing evacuation of thousands of people. AFP (REPORT ON PAGE 14)



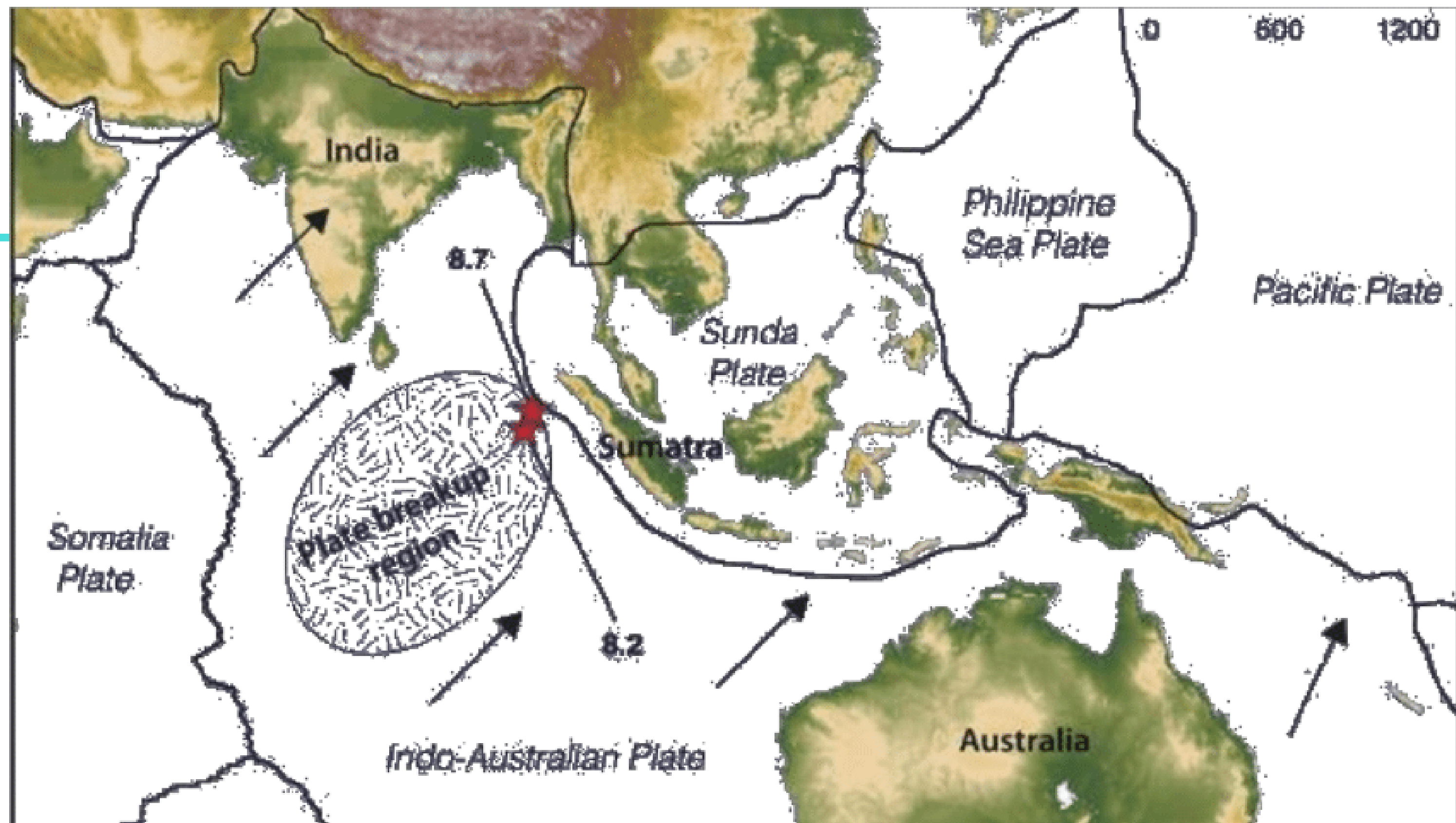
Mount Ruang Eruption

- Ruang is the southernmost stratovolcano in the Sangihe Islands arc, North Sulawesi, Indonesia.
- It comprises an island 4 by 5 kilometres wide.
- The summit contains a partial lava dome and reaches some 725 metres in altitude.
-



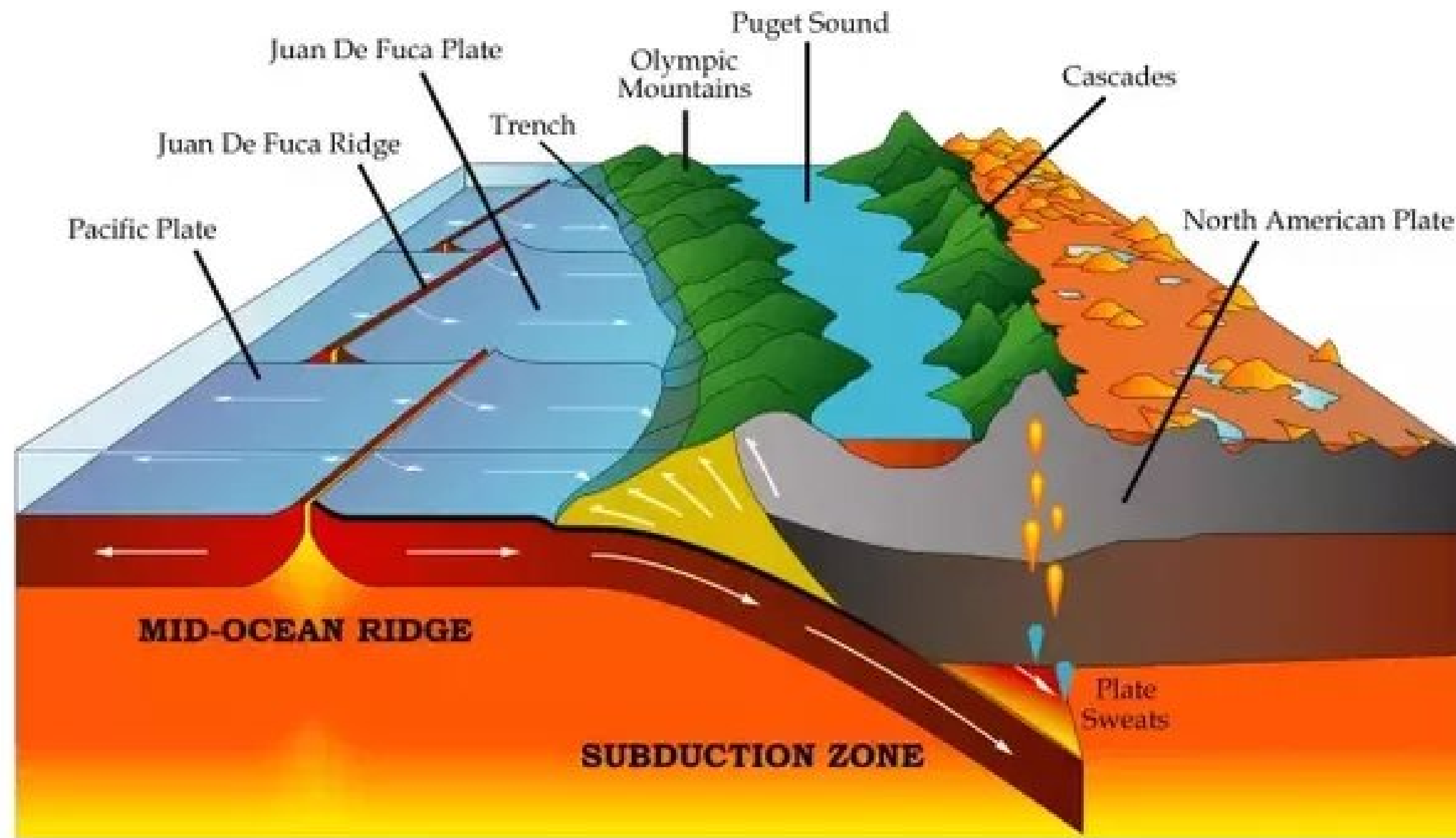
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*Fig. 3. Three-dimensional view of the tectonics of the Pacific Northwest. As the Juan de Fuca Plate subducts beneath North America, two parallel mountain ranges form. Coastal mountains, like the **Olympics**, are rock and sediment uplifted from the ocean. The **Cascades** are volcanoes above the zone where the top of the plate gets so hot it sweats water and other fluids. Puget Sound is the area that remained near sea level as the two mountain ranges developed. (Illustration by Bernard Garcia).*

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Mohamed Rela

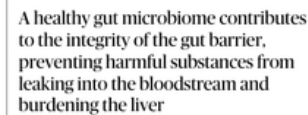
Understanding liver function

The Gut: gateway to health

The Interplay: liver-gut axis

A large mural on a beach titled "WORLD LIVER DAY". The mural features a large, stylized liver in the center. To the left, a person is depicted with a liver transplant, and to the right, another person is shown with a liver. The text "HEALTHY LIVER for HEALTHY LIFE" is written on the right side of the mural. The mural is set against a backdrop of a beach and a bridge.

A sand sculpture to promote a 'Healthy Liver for Healthy Life' created by artist Sudarshan Pattnaik at Marina beach in Chennai. THE HINDU



Limit sugar and processed foods: Excessive sugar and processed foods not only disrupt the gut microbiota but also contribute to fatty liver disease and insulin resistance. Opting for whole, unprocessed

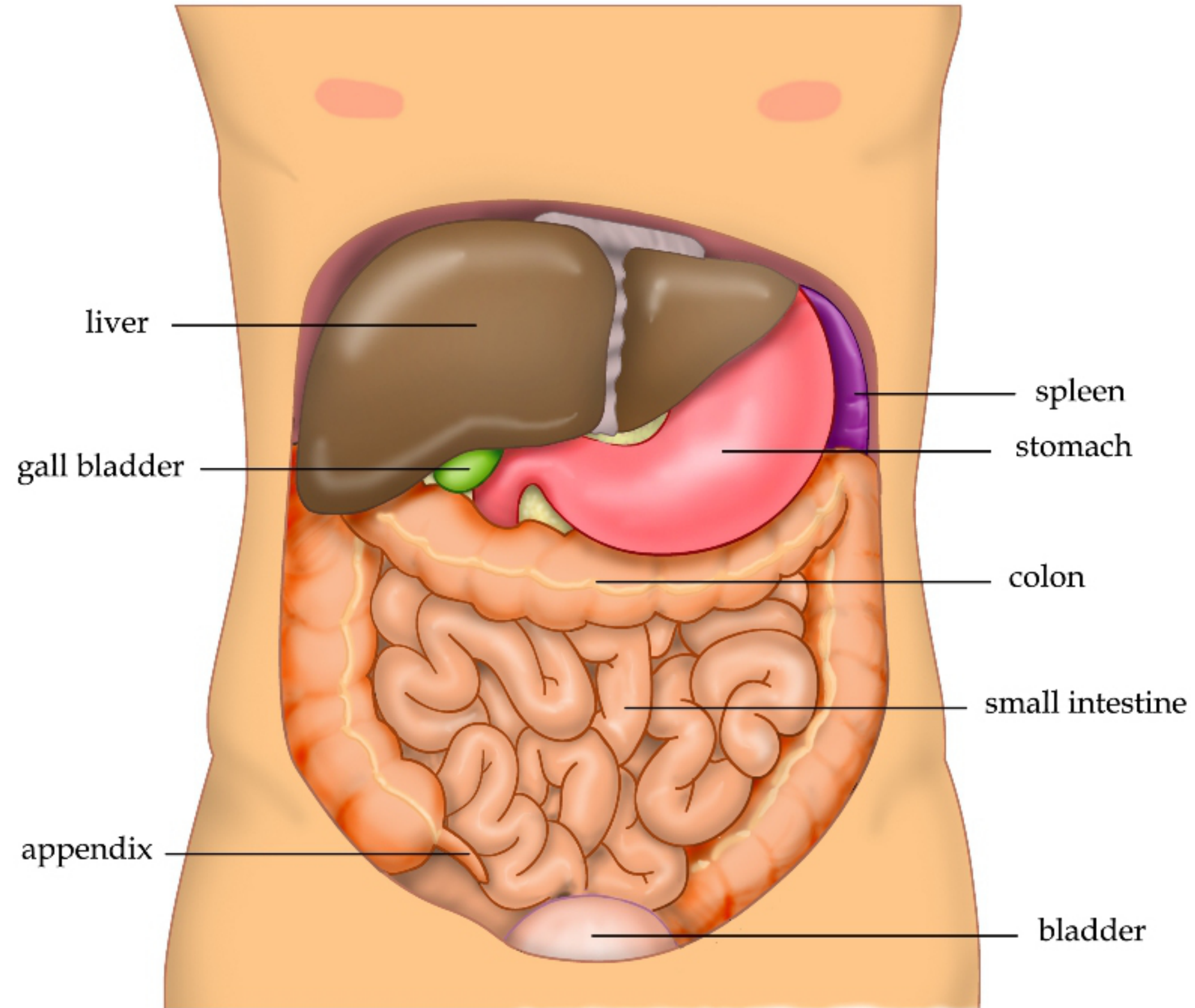
Manage stress: Chronic stress can wreak havoc on gut health by altering gut permeability and microbiota composition. Prioritising stress management techniques like meditation, yoga, or deep breathing exercises can mitigate its adverse effects.

(Prof. Mohamed Rela is Chairman, Dr. Rela Institute & Medical Centre, Chennai.)



Understanding liver function

- The liver, often hailed as the body's powerhouse, boasts a repertoire of functions crucial for our overall well-being.
- Primarily, it detoxifies harmful substances, be it environmental toxins or metabolic byproducts, ensuring our bloodstream remains clean.
- Additionally, the liver synthesises essential proteins, stores glycogen for energy, and metabolises fats, carbohydrates, and proteins, thereby regulating blood sugar levels and cholesterol



The Gut: gateway to health

- mere passageway for food, the gut hosts trillions of microorganisms collectively known as the gut microbiota.
- This bustling community aids in breaking down food, synthesising vitamins, and, crucially, bolstering our immune system.
- Maintaining a diverse and balanced gut microbiome is pivotal for overall health.
- However, modern lifestyles, marked by processed foods, antibiotics, and chronic stress, often disrupt this delicate equilibrium, paving the way for gastrointestinal disorders like irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), and leaky gut syndrome.

- intricate interplay between the liver and the gut, often referred to as the liver-gut axis.
- This bidirectional communication system involves various molecules, hormones, and immune cells shuttling between the two organs, influencing each other's function.
- One crucial link is the bile produced by the liver, which aids in fat digestion. Interestingly, bile acids also act as signaling molecules in the gut, modulating the composition of the gut microbiota.
- Conversely, metabolites produced by gut bacteria can influence liver metabolism and inflammation.
- Moreover, a healthy gut microbiome contributes to the integrity of the gut barrier, preventing harmful substances from leaking into the bloodstream and burdening the liver.
- Conversely, a compromised gut barrier, as seen in conditions like leaky gut syndrome, can trigger systemic inflammation and liver dysfunction

India's nuanced approach in the South China Sea

In March 2024, India's External Affairs Minister, S. Jaishankar, articulated, in a joint statement during his visit to Manila, India's full support for the Philippines in upholding its national sovereignty. Mr. Jaishankar's comment was made amid the ongoing South China or West Philippine Sea dispute between Manila and Beijing which witnessed, arguably, its most intense and volatile year in 2023, with frequent tensions at sea and diplomatic friction. A joint statement in 2023 between New Delhi and Manila had also called for China to adhere to the rules-based maritime order and acknowledge the International Court of Justice ruling of 2016 in favour of Manila. Both these statements are part of an evolving approach that signals a departure from India's earlier more cautionary and neutral position *vis-à-vis* the South China Sea. New Delhi's position on the South China Sea has changed significantly in recent years, mirroring its broader strategic and economic aspirations on the global stage through a more clearly articulated stance backing the provisions of international maritime law, sovereignty, and sovereign rights in the South China Sea.

A policy evolution

New Delhi's engagement with the region was initially primarily economic, driven by its Look East Policy, which aimed to enhance economic integration with Southeast Asia and the imperative to secure energy resources to fuel its growing economy. The participation of Indian state-owned enterprises, such as the Oil and Natural Gas Corporation's overseas arm (ONGC Videsh), in oil and gas exploration projects in Vietnam's exclusive economic zones (EEZs) and other similar ventures not only signified India's economic stakes in the region but also its support for the principle of freedom of exploration and exploitation of maritime resources within the bounds of international law, specifically the United Nations Convention on the Law of the Sea (UNCLOS).



Harsh V. Pant

is Vice-President for Studies and Foreign Policy at the Observer Research Foundation (ORF), New Delhi



Pratnashree Basu

is an Associate Fellow, Indo-Pacific, at the Observer Research Foundation (ORF), Kolkata

New Delhi's strategic recalibration recognises the South China Sea's critical importance to regional security and the global maritime order

The transformation of India's policy orientation from Look East to Act East under Prime Minister Narendra Modi's administration has marked a shift towards a more strategic and active engagement with the Indo-Pacific region. This policy evolution reflects India's acknowledgment of the changing geopolitical landscape and the need for a more proactive and multifaceted foreign policy approach with the Act East Policy emphasising not only economic integration but also strategic partnerships and expanded security cooperation with countries in the Indo-Pacific including Vietnam, Malaysia, and Singapore, besides the Philippines. India has also simultaneously strengthened its own capacities through forward positioning, mission-based deployments, reinforced maritime domain awareness, and deep-water maritime facilities.

India's complex ties with China

With geopolitical tensions in the South China Sea having steadily escalated, particularly due to China's assertive territorial claims and militarisation efforts, India's stance has become more nuanced while simultaneously becoming less cautious. The evolution of India's position on the South China Sea cannot be decoupled from its complex relationship with China. The two countries have a long history of border disputes which have intensified since the Galwan Valley incident of 2020, with Beijing's periodic incursions into India's territory and, most recently, even renaming Indian villages in Arunachal Pradesh.

The Galwan Valley incident also saw India sending a frontline warship to the South China Sea in a demonstration of India's capability for asymmetric deterrence. China's assertive posture and territorial claims in the South China Sea and along India's land border have substantially disruptive implications for regional stability. India's strategic engagements, including regular naval exercises and the strengthening of military cooperation with Southeast Asian nations, serve

dual purposes: they underscore India's commitment to regional security and act as a counter to China's unlawful assertions.

The ASEAN factor

New Delhi's strategic recalibration has been driven by a recognition of the South China Sea's critical importance to regional security and the global maritime order. The disputes in the South China Sea, primarily involving China and several Association of Southeast Asian Nations (ASEAN) countries, have implications for the freedom of navigation and overflight – principles that are vital for not only India's trade and energy transportation routes but also that of countries across the globe. As a responsible stakeholder in the Indo-Pacific, India can no longer shy away from taking unambiguous positions on matters of such critical importance. Its centrality in the Indo-Pacific theatre means that its periphery is no longer only the Indian Ocean but also the wider maritime domain where China's rise is challenging the status quo in ways not anticipated before. The ASEAN centrality in India's Indo-Pacific strategy also makes it imperative for India to buttress the ASEAN position, though differences within the regional grouping continue to pose a challenge to such endeavours.

New Delhi's advocacy for a rules-based international maritime order, especially its emphasis on UNCLOS, reflects a stance against unilateral actions that threaten regional stability. This stance, while rooted in India's principled foreign policy approach, also indirectly challenges China's expansive territorial claims and activities in the South China Sea and reflects India's positioning of itself as a responsible stakeholder committed to regional stability and security. India's nuanced approach in the South China Sea, therefore, is emblematic of its broader strategy aiming to safeguard its interests while contributing to a collective effort to maintain peace, stability, and respect for international law in the Indo-Pacific region.



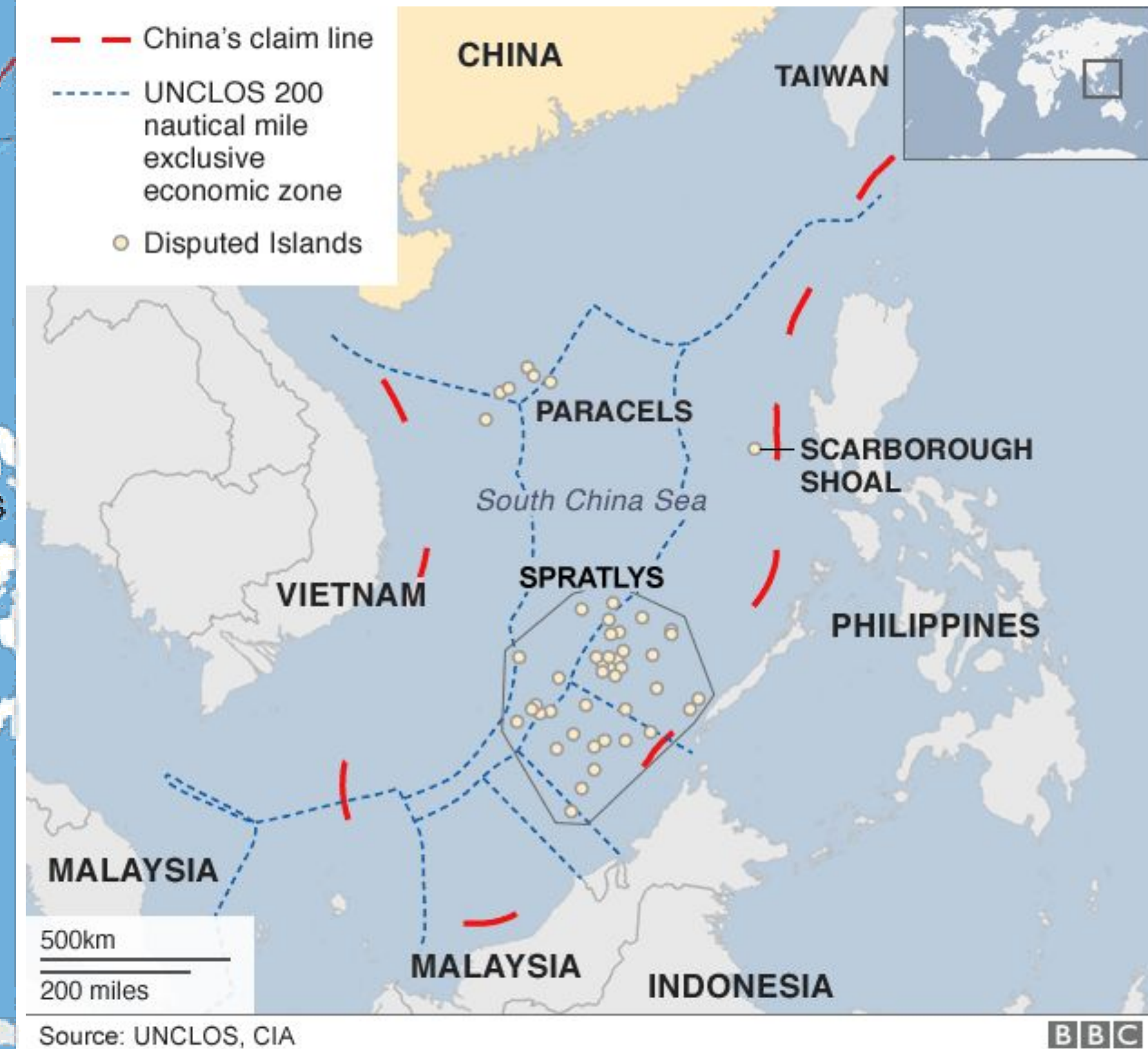
India in South china

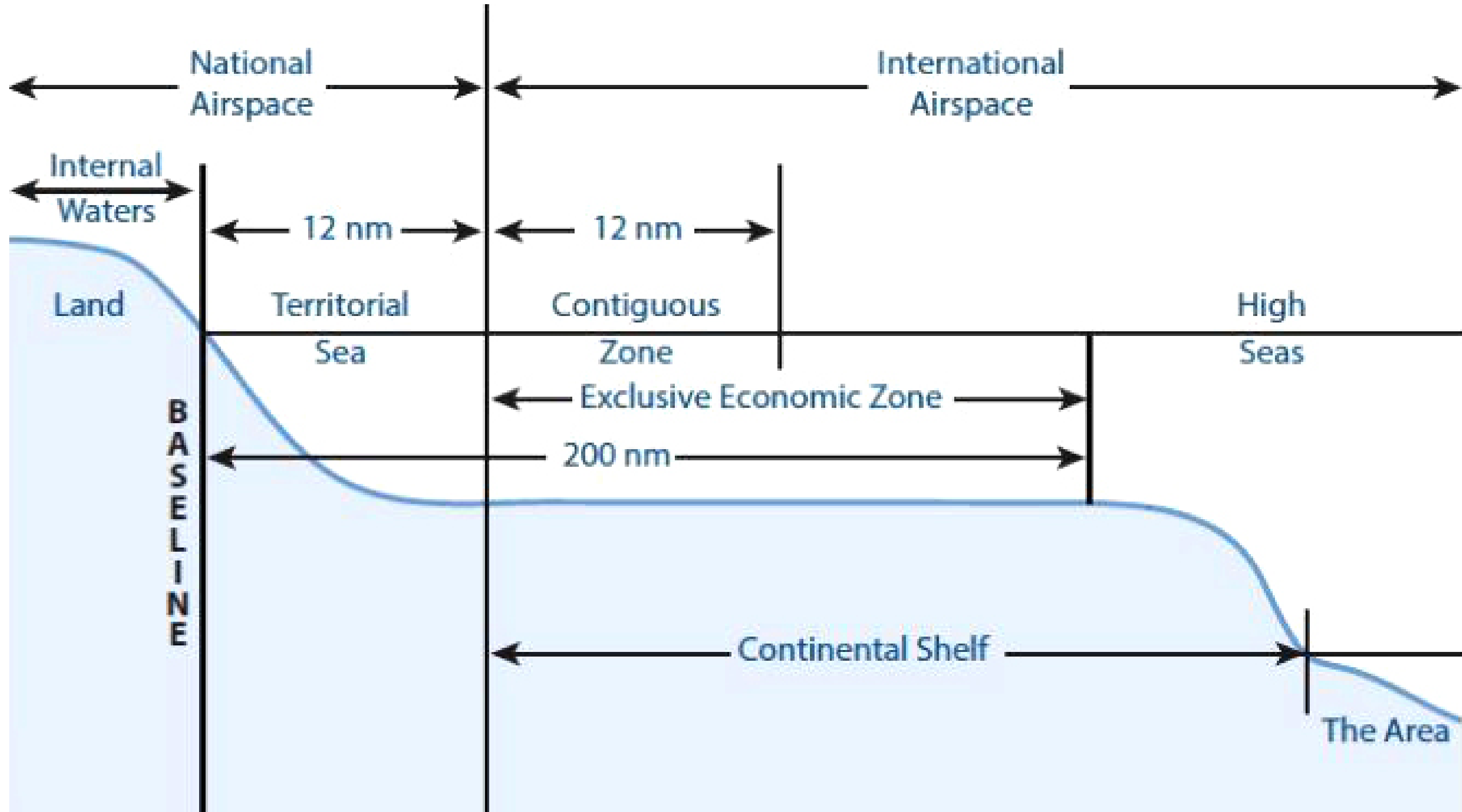


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Why have private investments dropped?

What is private Gross Fixed Capital Formation? When did private investments pick up in India? Will strong consumption spending increase private sector confidence? How do government policies affect private capital formation?

EXPLAINER

Prashanth Perumal

The story so far:

The failure of private investment, as measured by private Gross Fixed Capital Formation (GFCF) as a percentage of gross domestic product (GDP) at current prices, to pick up pace has been one of the major issues plaguing the Indian economy. Private investment witnessed a steady decline since 2011-12 and the government has been hoping that large Indian corporations would step in and ramp up investment. In fact, in 2019, the Centre slashed corporate taxes from 30% to 22% hoping that the move would encourage private investment.

What is GFCF and why does it matter?

GFCF refers to the growth in the size of fixed capital in an economy. Fixed capital refers to things such as buildings and machinery, for instance, which require investment to be created. So private GFCF can serve as a rough indicator of how much the private sector in an economy is willing to invest. Overall GFCF also includes capital formation as a result of investment by the government.

GFCF matters because fixed capital, by helping workers produce a greater amount of goods and services each year, helps to boost economic growth and improve living standards. In other words, fixed capital is what largely determines the overall output of an economy and hence what consumers can actually purchase in the market. Developed economies such as the U.S. possess more fixed capital per capita than developing economies such as India.

What is the trend seen in private investment in India?

In India, private investment began to pick up significantly mostly after the economic reforms of the late-1980s and the early-1990s that improved private sector



GETTY IMAGES

confidence. From independence to economic liberalisation, private investment largely remained either slightly below or above 10% of the GDP. Public investment as a percentage of GDP, on the other hand, steadily rose over the decades from less than 3% of GDP in 1950-51 to overtake private investment as a percentage of GDP in the early 1980s. It, however, began to drop post-liberalisation with private investment taking on the leading role in fixed capital formation.

The growth in private investment lasted until the global financial crisis of 2007-08. It rose from around 10% of GDP in the 1980s to around 27% in 2007-08. From 2011-12 onwards, however, private investment began to drop and hit a low of 19.6% of the GDP in 2020-21.

Why has private investment fallen?

Many economists in India have blamed

low private consumption expenditure as the primary reason behind the failure of private investment to pick up over the last decade, and particularly since the onset of the pandemic. Their reasoning is that strong consumption spending is required to give businesses the confidence that there will be sufficient demand for their output once they decide to invest in building fixed capital. Hence these economists have advised that the government should put more money into the hands of the people to boost consumption expenditure, and thus help kick start private investment.

Historically, however, an increase in private consumption has not led to a rise in private investment in India. In fact, a drop in consumption spending has boosted private investment rather than dampening it. Private final consumption expenditure dropped steadily from nearly

90% of GDP in 1950-51 to hit a low of 54.7% of GDP in 2010-11, which was a year prior to when private investment hit a peak and began its long decline. And since 2011-12, private consumption has risen while private investment has witnessed a worrying fall as a percentage of GDP. The inverse relationship between consumption and investment is likely because the money that is allocated towards savings and investment, either by the government or by private businesses, comes at the cost of lower consumption expenditure. Other economists believe that structural problems may likely be the core reason behind the significant fall in private investment as a percentage of GDP over the last decade or so. They have cited unfavourable government policy and policy uncertainty as major issues affecting private investment. The rise in private investment in the 1990s and the 2000s correlated with the economic reforms programme started in 1991. The drop in private investment, on the other hand, correlated with the slowdown in the pace of reforms in the last two decades under both the UPA (second term) and NDA governments. Further, policy uncertainty can discourage private investment as investors expect stability to carry out risky long-term projects.

THE GIST



Gross Fixed Capital Formation refers to the growth in the size of fixed capital in an economy. Fixed capital refers to things such as buildings and machinery, for instance, which require investment to be created.



The biggest cost of low private investment would be slower economic growth as a larger fixed capital base is crucial to boost economic output.



Many economists in India have blamed low private consumption expenditure as the primary reason behind the failure of private investment to pick up over the last decade, and particularly since the onset of the pandemic.

What about low private investment?

The biggest cost of low private investment would be slower economic growth as a larger fixed capital base is crucial to boost economic output. The push by the government to increase government investment is also seen as a negative by some who believe that it crowds out private investment.

Others, however, think that government investment compensates for the lack of private investment. It should be noted, however, that private investors are considered to be better allocators of capital than public officials, helping avoid wasteful spending. Further, taxes imposed to raise money for public spending can be a significant drag on the economy.



Lower Private Investment

- The failure of private investment, as measured by private Gross Fixed Capital Formation (GFCF) as a percentage of gross domestic product (GDP) at current prices, to pick up pace has been one of the major issues plaguing the Indian economy.

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Topics



- Inflation - disinflation vs deflation
- Private investment
- Soloman Islands
- Paris club
- Hainan province
- Mains



By saurabh pandey sir.



‘Conditions not ripe for easing restrictive monetary stance’

Downward pressure on inflation must be maintained until a better balance of risks becomes evident, MPC minutes cite RBI’s Patra as saying

The Hindu Bureau
MUMBAI

Price stability has to be restored in order to ensure that the rising growth trajectory in the economy is sustained and economic conditions are not yet ripe to ease the restrictive monetary stance, RBI Deputy Governor Michael Debabrata Patra emphasised at the April 3-5 meeting of the Monetary Policy Committee (MPC), the minutes released on Friday show.

Observing that recent inflation prints and high frequency data on salient food prices indicated that food inflation risks remained elevated, Dr. Patra said, “A relatively shallow and short-lived winter trough is giving way to a build-up of price momentum as summer sets in, with forecasts of rising temperatures up to May 2024.”

Official retail inflation data for March released last week showed food price inflation remained sticky at 8.52%, barely slower than February’s 8.66% as price gains quickened in cereals and meat.

‘Does not assure’

Stating that the headroom provided by “steady core disinflation and fuel price deflation does not assure a faster alignment of the head-

No let-up for now

Price stability has to be restored in order to ensure that the rising growth trajectory is sustained, MPC’s Patra says

Recent inflation prints, high frequency data on salient food prices indicate food inflation risks remain elevated’

Stronger revival in private consumption will depend on greater confidence that inflation is declining



Real interest rate excessively high, imposing costs on growth, says Jayanth R. Varma

dline with the target,” he underlined that headline inflation could consequently be expected to remain in the upper reaches of the RBI’s 2%-6% tolerance band until favourable base effects came into play in the second quarter of 2024-25.

“Conditions are not yet in place for any let-up in the restrictive stance of monetary policy. Downward pressure on inflation must be maintained until a better balance of risks becomes evident and the layers of uncertainty clouding the near-term clear away,” Dr. Patra emphasised.

Crucially, he underlined that while domestic demand was expanding and the investment outlook was improving, “a stronger revival in private consumption and in corporate sales growth” would be contingent on greater confidence that inflation was declining

on a durable basis.

Governor Shaktikanta Das too stressed the importance of staying unwaveringly focussed on ensuring durable price stability.

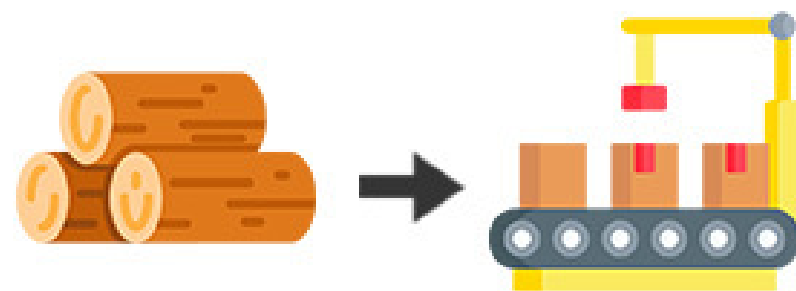
‘Spillover risk’

“Success in the disinflation process should not distract us from the vulnerability of the inflation trajectory to the frequent incidences of supply side shocks, especially to food inflation due to adverse weather events and other factors. Overlapping food price shocks... may also result in spillovers to core inflation,” Mr. Das underlined.

However, external member Jayanth R. Varma, the sole voice of dissent on the six-member MPC, voted to cut the policy repo rate by 25 basis points, arguing that the real interest rate was currently excessively high and imposed costs on the economy’s growth momentum.

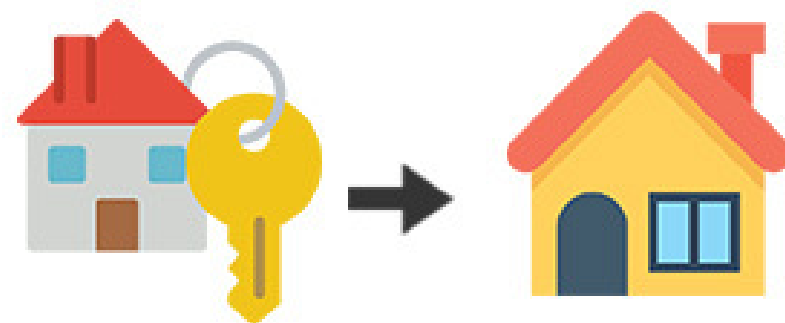


What Causes Inflation?



Cost-push Inflation:

When production cost rise and the producers pass the increase on to consumers.



Demand-pull Inflation:

When demand for goods increases and exceeds production capacity.

Price ↑↑↑



Value of money ↓↓↓

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Causes of Inflation:

Factors affecting Demand:

1. Increase in Money Supply:
2. Increase in Disposable Income:
3. Increase in Public Expenditure:
4. Increase in Consumer Spending:
5. Cheap Monetary Policy:
6. Deficit Financing:
7. Expansion of the Private Sector:
8. Increase in Population:
9. Black Money:
10. Repayment of Public Debt:
11. Increase in Exports:

Factors affecting Supply:

1. Shortage of Factors of Production:
2. Industrial Disputes:
3. Natural Calamities:
4. Artificial Scarcities:
5. Increase in Exports:
6. Lop-sided Production:

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Disinflation vs Deflation

- Deflation occurs when the inflation rate falls below zero, and prices generally decline throughout an economy.
- Disinflation is what happens when the inflation rate falls but remains positive.
- In disinflation, prices continue to increase but at a slower rate

'Private investment deals stay robust at \$57 bn in '23'

G. Balachandar
CHENNAI

Despite the global economic slowdown, private investments (which includes private equity, venture capital and private credit) in India remained robust in 2023. The calendar year saw investments worth about \$57 billion across 1,301 deals, up from the \$54 billion in 2022, according to a report by Praxis Global Alliance.

Key sectors such as energy and renewables, engineering and construction, real estate and healthcare and life-sciences received about 50% of the total funding in 2023.

Growth stage investments (26%), late and buyout deals (36%) and private credit deals (19%) dominated. Buyout investments reached \$12 billion, primarily driven by large deals in the healthcare and life-sciences sector.

The share of PE/VC buyouts is increasing in India driven by conglomerates hiving off new businesses, platform creation, and operational improvement, Praxis said.

India attracted 196 new PE/VC investors in 2023, including 121 international and 75 domestic players. Large deals (over \$500 million) almost doubled to 21 in 2023 from 11 in 2022. Green deals rose to \$8.1 billion in 2023 (\$5.2 billion) on growing investments in ESG and climate initiatives.

Private credit investments and overall exits touched all-time highs of about \$11 billion and \$26 billion each in 2023.

(The writer is with The Hindu businessline)



Private investment

Private investments are assets outside of publicly traded stocks and bonds, and primarily fall into one of three categories:

- Private credit
- Private equity (PE)
- Real assets

Private investments are subject to regulatory requirements that identify investor requirements and the processes used for finding and approving investors.

Private Credit

- Private credit or private debt is the provision of debt ~~financing~~ to companies from sources other than banks or public markets.
- These sources typically include debt financing from funds or private lenders.

Private Equity (PE)

This is capital investment made into companies that are not publicly traded. The most common types of PE include:

- **Venture capital (VC).** Early-stage investment, often in companies that aren't currently profitable. VC investments have a higher expected rate of return but significantly higher risk and likelihood of loss of investment.
- **Growth equity (GE).** Strategic investment in private companies, more mature than early stage, could be looking to grow as a whole or specific market area, product innovation or internal operating unit.
- **Leveraged buyouts (LBO).** PE firm or firms taking majority positions in companies along with debt financing, looking to control and improve or turnaround opportunistic businesses with expectation of a future sale for profit.

Real Assets

Real assets commonly refer to the following:

- **Commercial and residential real estate**
- **Natural resources such as energy, or commodities from the timber and farming industries**
- **Investments in infrastructure projects**

The Hindu analysis by saurabh pandey sir



HONIARA

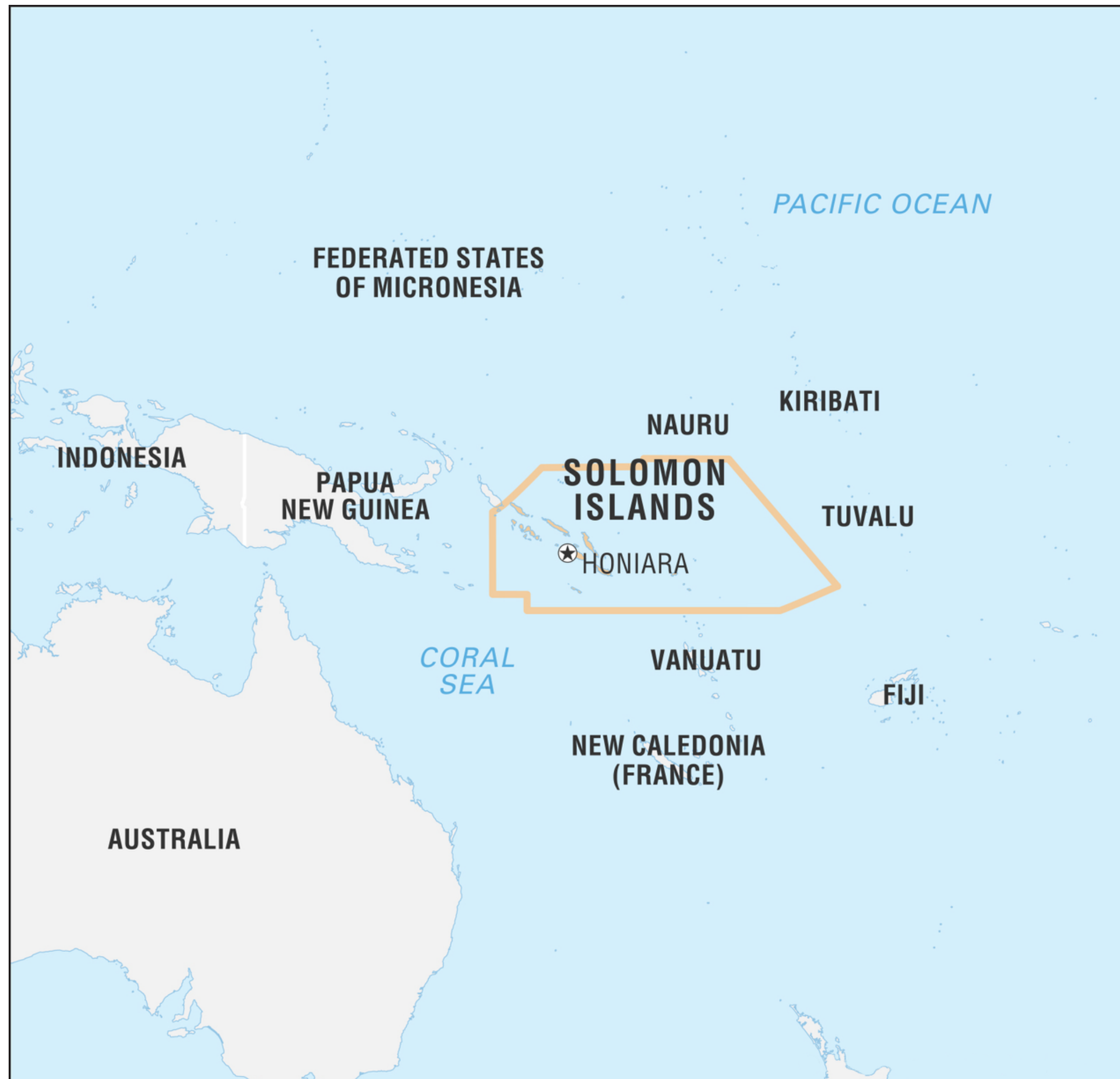
Pro-China PM retains his seat in Solomon Islands election



AFP

▲ Solomon Islands Prime Minister Manasseh Sogavare was set on Saturday to retain his seat in elections, local media reported, paving way for the pro-China leader to try to form a government. Mr. Sogavare is one of China's most loyal friends in South Pacific and has vowed to deepen ties with Beijing if he returns to power. AFP





Solomon Islands

- Solomon Islands is an archipelagic state situated in the south-west Pacific Ocean, approximately 2,000 kms to the northeast of Australia. Its land mass of 28,400 km² extends over nearly 1000 islands comprising nine main island groups. The capital, Honiara, is located on Guadalcanal, the largest island.
- The population of Solomon Islands, estimated to be about 720,956 (2019), is predominantly Melanesian, although there are small Polynesian, Micronesian, Chinese and European communities.
- There are 63 distinct languages in the country, with numerous local dialects.
- English is the official language, but Solomons' Pijin is most commonly spoken

- Solomon Islands was first settled sometime between 30,000 and 28,000 BC by people coming from the Bismarck Islands and New Guinea when sea levels were lower and Buka and Bougainville were physically joined to southern Solomon Islands in one landmass (Greater Bougainville).
- In 1893, the UK Government established a protectorate over the eastern group of islands, with Germany controlling most of the west.
- The UK protectorate was extended to all nine main island groups now part of Solomon Islands, while Buka and Bougainville became part of German New Guinea (later incorporated into Papua New Guinea).

Africa's ballooning debt crisis needs a political fix, contend experts

Meera Srinivasan
ACCRA, GHANA

Ghana's women vendors and hawkers are hard to miss. Attired in bright colours and bold prints, they walk swiftly on capital Accra's streets, bearing baskets with various items on their heads, as infants wrapped in cloth carriers sit clasping their shoulders. As key contributors to the country's informal economy, the women make a fine balancing act look easy.

Their labour, like scores of fellow Ghanians', is crucial not only for finding incomes for their families, but also for helping rebuild the country's fragile national economy. In December 2022, Ghana defaulted on most of its \$30 billion foreign debt, as its economy crashed. The government is currently grappling with creditors to restructure its debt.

Ghana, like several other African countries, is neck-deep in debt and stifled by its repayment schedule. Addressing the Paris Club in June last year, African Development Bank Group President Akinwumi A. Adesina said external outstanding debt service payments for 16 African countries rose to \$22.3 billion in 2023, significantly burdening government revenue.

Debt and distress

For the median sub-Saharan African country, the loan interest to revenue ratio has doubled in the past decade to 11 % – a rate almost four times higher than in advanced economies, according to a 2023 International Monetary Fund publication.

To reflect on the growing incidence of countries getting trapped in a cycle of debt and distress, eco-



Senior Nigerian academic Adebayo Olukoshi delivering a lecture during the conference on 'African debt crisis'. X/@DEVECONNETWORK

nomists and policy experts from different parts of the world converged at a recent international conference on the 'African debt crisis' in the coastal city of Accra.

Organised by the International Development Economics Associates (IDEAs) network in late March, the conference flagged both common features and distinct challenges of debt-distressed countries across Africa, Asia, and Latin America. Speakers sought substantial reform of the international financial architecture that, they argued, unfairly burdened the Global South.

They mulled a more active role for the UN in negotiating debt treatment – including crucial haircuts on the principal amount owed – through a comparable system monitored by a transparent, multilateral body.

Senior Nigerian academic Adebayo Olukoshi contended that the relationship between creditors and debtor nations reproduces the dynamic of dominance and subordination in the post-colonial era.

"Driven by international agencies and powerful actors, the narratives of 'fastest growing economy' and 'emerging markets' pushed many African governments into indiscrimi-

nate borrowing," he noted, pointing to loans that invariably fuel consumption. "Cabals" comprising local elite, lawyers, and think tanks paid little attention to development outcomes of the high-interest loans, he said.

Noted Malaysian economist Jomo Kwame Sundaram cited the U.S. Federal Reserve's decision to hike interest rates aggressively since 2022 as one of the chief reasons for the crisis facing the Global South.

Predatory nature

"In terms of the damage done to a number of economies, it was far more serious in Africa," he said. "Low-income countries are increasingly borrowing from private creditors. Why? Because rich countries won't make affordable credit available," he said, pointing to the apparently predatory nature of private credit, that rarely gets attention amid the "propaganda around Chinese debt".

The "battle of narratives" on Africa's debt problem came into sharp focus at the forum. Zambian political economist Grieve Chelwa argued that the premise that the current crisis is solely a problem of governance and corruption needs to be squarely challenged, for the problem of debt is structural.

"The current [debt] problem cannot be reduced to financial mismanagement. That analysis will only lead to a repetition of the crisis," he said.

Zambia has opted for a comprehensive debt treatment plan with its official creditors under the G20 Common Framework. Zambia's approach is a test case, and the government is yet to firm up a debt relief plan even after protracted negotiations. The deal with private creditors, too, drags on.

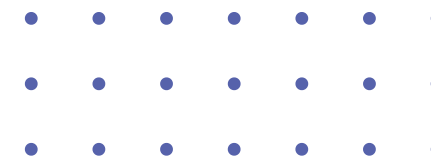
Common Framework

Although the Paris Club endorsed the G20 Common Framework, the initiative has not been very productive, according to José Antonio Ocampo, economist and former Minister of Finance and Public Credit, Colombia. "The push now is for an expanded role of multilateral banks and international cooperation on taxation," he pointed out.

Until the architecture is reformed, indebted countries will invariably resort to more loans on similar terms and "structural adjustment programmes" that enable them. Two decades of structural adjustment programmes show they kill growth, rather than reducing countries' external debt stock, contended Senegalese development economist Ndong Samba Sylla.

"The lack of monetary sovereignty is linked to the global system. The international financial architecture is telling our countries we won't give you good prices or cheap credit," he said.

(The writer was invited by the International Development Economic Associates [IDEAs] network for the conference held in Ghana last month.)



What is the Paris Club?

The Paris Club is an informal group of creditor countries that work together to support nations facing financial difficulties, chiefly those struggling to pay off debts.

Established in 1956, the club has its headquarters in the city it is named after. The group aims to help stabilise the macroeconomic and financial situation of countries and promote sustainable economic growth.

What does the Paris Club do?

The Paris Club helps countries tide over financial difficulties. Countries facing financial constraints and unable to meet their debt repayment deadlines can approach the Paris Club for support in mediating with creditor countries.

The club provides debt treatment to countries. This includes:

- negotiating new terms for the loan
- extending repayment deadlines
- having the owed amount reduced, and
- cancelling some of the debt owed

This provides nations in debt with a communication channel with their lenders with mediators present. This has been a relatively successful approach for the Paris Club as club members have generally been the creditors of debts accrued by developing nations.

Paris Club



Paris Club Meaning



Brief History of the Paris Club and its Debt Relief Initiatives



The Paris Club and Debt Relief

01

The Paris Club is made up of 22 creditor countries, including the United States, Japan, and Germany

02

Debt relief can come in various forms, including debt restructuring, debt cancellation, and debt rescheduling

03

Debt relief initiatives can be controversial, as some argue that it rewards countries for poor financial management

04

The Paris Club has provided debt relief to many countries over the years, including Nigeria, Afghanistan, and Iraq

05

Debt relief can have a significant impact on a country's economy

The origins and role of the Paris Club in recent days

- The Paris Club originated from a meeting held in Paris in 1956 when Argentina agreed to meet its public creditors.
- Over time, the Paris Club has played a significant role in debt agreements worldwide.
- According to its website, the club has reached 478 agreements with 102 debtor countries since its inception.
- The total amount of debt treated within the framework of Paris Club agreements stands at a staggering \$614 billion, highlighting its substantial involvement in resolving debt crises

- The creditor countries meet ten times every year in Paris, France, for a Tour d'Horizon to discuss issues of debt in broader terms as well as hold negotiating sessions.
- Observer countries and organisations attend the Paris Club meetings to participate in the discussions and offer technical advice. However, they cannot participate in the negotiation itself.
- India is among the observers, along with the International Monetary Fund (IMF), World Bank, OECD, United Nations Conference on Trade and Development (UNCTAD), European Commission, African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development (EBRD), and Inter-American Development Bank (IADB).

Hainan Free Trade Port construction has gained momentum, says China

Nikhil M. Babu
BEIJING

Amid ongoing tensions in the South China sea, Liu Xiaoming, Governor of Hainan province – the southern most and the only tropical island province of China in the South China Sea – said that the construction of the Hainan Free Trade Port (FTP) has taken shape and gained momentum, six years after Chinese President Xi Jinping’s announcement of establishing the FTP.

Hainan, a lush tropical island, is not very far from the Philippines and there has been tensions between both the countries over the disputed South China Sea.

The FTP blueprint is ambitious and as per the

In the first phase, China aims to establish island as its most open economic region by 2025

plan, in the first phase, China aims to establish the about 35,000 sq km island as its most open economic region by 2025. The ultimate goal is to build a tropical Dubai in the middle of the South China Sea by 2035. “The construction of the Hainan FTP has taken shape and gained momentum, serving as both a booster and an accelerator for Hainan’s high-quality development,” the Governor said while addressing a press conference last week. “Going forward, we

will actively advance emerging marine industries such as deep-sea technology, marine intelligent equipment manufacturing, and deep-sea aquaculture. We have a greater goal of building a stronger Hainan with a thriving marine industry over the next decade,” he added.

The Governor said the government will also focus on the aerospace industry as Hainan is ideally suited for the development of the aerospace industry due to its geographical latitude.

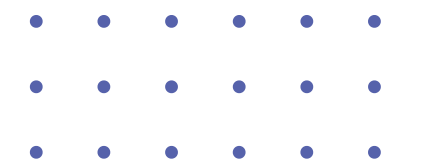
“The No. 1 launchpad of China’s first commercial spacecraft launch site was completed at the end of last year, and the construction of the No. 2 launchpad was finished at the end of March, expected to be cap-

able of supporting regular launches starting in June,” he said.

The Governor said many leading domestic commercial aerospace enterprises are competing for launch opportunities.

“With a focus on the rocket chain, we will also expand and promote the establishment of ‘space plus’ industrial projects, such as the satellite chain and the data chain, striving to develop the Wenchang International Aerospace City into a hub that integrates space launches, R&D, manufacturing, tourism, and international exchanges,” he said.

(The correspondent is in China at the invitation of the China Public Diplomacy Association.)



- **construction of the Hainan Free Trade Port (FTP) has taken shape**
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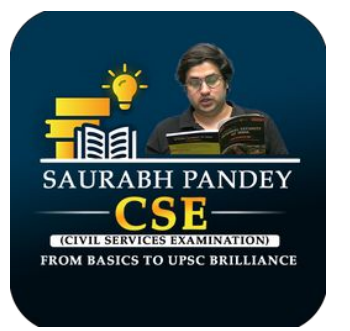


The Hindu analysis by saurabh pandey sir





Topics



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- Brazil's biggest floating solar plant
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- Water stress in india
- Andaman and Nicobar
- Renewable energy
- Mains By saurabh pandey sir



The mpox virus uses a 'genomic accordion' to evolve and infect humans

The mpox family of viruses is known to be able to evade selective evolutionary pressures by duplicating genes or accumulating mutations and expanding its genome or contracting it by deleting or inactivating genes. In an April 18 study, scientists reported the part of the mpox genome where these changes happen

Sridhar Sivasubbu
Vinod Scaria

Poxviruses have long been a cause of fear as well as curiosity for humankind. One particularly infamous poxvirus, smallpox, alone may have killed more than 500 million people in the last century.

Smallpox didn't discriminate between rich, poor, young, old, and killed a third of the individuals whom it infected. The turning point came with evidence of the efficacy of the smallpox vaccine. Thus followed a concerted effort worldwide to administer the vaccine and eventually eradicate the dread disease. This feat has stood as a testament to the power of sustained global public health initiatives.

Mpox's 15 minutes

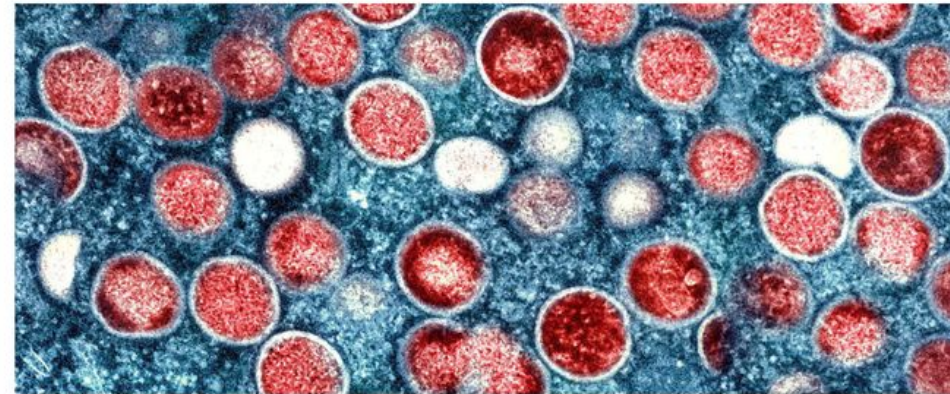
Another poxvirus, mpox, was recently in the headlines after a rapidly expanding global outbreak in 2022-2023. The virus was previously called 'monkeypox' after a spillover event in a research facility involving monkeys in 1958; the name is considered both wrong and inappropriate today: since then, researchers have identified mpox in many sporadic outbreaks among humans. They have also found multiple mpox lineages have been circulating in humans, adapting by accumulating mutations modulated largely by the APOBEC proteins.

But it wasn't until 2022 that the disease became widely known, thanks to outbreaks in more than 118 countries and the World Health Organisation (WHO) quickly declaring it a public health emergency. To date, this outbreak has infected almost 100,000 people. Based on WHO data, infections have a mortality rate of 1-10%.

The outbreak was due to one clade (strains of the virus descended from a common ancestor) – called IIb – having developed very high human-to-human transmission through close contact and spread through the sexual route. While the rate of new infections has been dropping, mpox continues to circulate among unvaccinated individuals worldwide. This increases the chance that a more virulent and transmissible strain might emerge and become endemic somewhere.

Expanding, contracting as required

Mpox, like all poxviruses, are DNA viruses. The mpox genome has about 197 kilobases (kb). The core genes are those closely conserved (i.e. preserved during evolution) by various poxviruses plus two



A colourised transmission electron micrograph of mpox particles (red) found within an infected cell (blue), cultured in the laboratory, captured and colour-enhanced at the NIAID Integrated Research Facility in the U.S. NIAID/AP

sections about 6.4 kb long, one at each end of the genome.

Researchers don't yet know what function these sections serve but suspect they influence how well the poxviruses can infect different hosts.

The mpox genome also has a sequence of bases repeating in a pattern, which researchers believe play a role in the virus's evolution.

The *mpox* family of viruses is also known to be able to evade selective evolutionary pressures. It does this by duplicating genes and/or accumulating mutations and expanding its genome significantly – or contracting its genome by deleting gene stretches or inactivating them. Such rhythmic expansions and contractions are called genomic accretions.

Find the accordion

In a study published on April 18 by *Nature Communications*, researchers at the Icahn School of Medicine in New York and multiple institutions in Spain extensively sequenced the genome of the mpox virus implicated in the 2022 outbreak. They used advanced genome sequencing technologies to piece together a comprehensive genome of the mpox virus from scratch.

They found that the 6.4-kb-long sections of the virus strongly influenced the virus's human-to-human transmissibility. They also reported that variations in three genes in particular could affect the virus's evolution. Importantly, 6.4-kb-long sections, which scientists had previously considered to be not so informative, were actually found to be the virus's genomic accor-



One particularly infamous poxvirus, smallpox, alone may have killed more than 500 million people in the last century.

All mpox genomes can be divided into two distinct yet broad clades: I and II. Clade I is thought to have a higher mortality. Each clade has sub-clades, or lineages, defined by specific evolutionary processes.

Researchers have also found evidence of significantly different mpox virulence in animal models. The new study, like others like it, further the idea that the 2022 outbreak largely involved a new lineage of the virus, clade IIb, that was even better adapted to human-to-human transmission than clades I or IIa.

The outbreak in the DRC

Between September 2023 and February 2024, health workers detected a large mpox outbreak detected in the Democratic Republic of the Congo (DRC), centred on a mining village and quickly spreading to a number of regions within the country.

This outbreak was associated with a significantly larger spread as well as mortality. Researchers soon confirmed mpox clade I was responsible.

This outbreak differed from earlier ones, which were sporadic and self-contained spillover events, by spreading through human-to-human

contact and affecting young adults rather than children. A preprint paper, uploaded by researchers from Belgium, Canada, the DRC, France, Ghana, Nigeria, South Africa, and the U.S., on April 14 describes the genomes of virus samples obtained from 241 individuals suspected to have been infected during the outbreak.

The genomic data suggests a distinct lineage of clade I being associated with human-to-human transmission.

The researchers also found evidence – in fragments of the genome that closely resembled viruses isolated and sequenced in recent years – of the hypothesis that this lineage emerged from a very recent zoonotic spillover.

One eye on the genome

As with any viral infection, without urgent intervention, the outbreak has the potential to spread rapidly across national, and even continental, boundaries and emerge as another global outbreak.

To prevent such an outcome, genome sequences from before and during mpox outbreaks have provided well-lit glimpses of the evolutionary dynamics the virus uses to invent new ways to move between and survive in different populations of animals and people.

Thus, through rigorous genomic investigations and coordinated public health efforts, we can mitigate the threat of emerging pathogens and the world's health security.

(The authors are senior consultants at the Vishwanath Cancer Care Foundation and Adjunct Professors at Indian Institute of Technology Kanpur. All opinions expressed are personal.)

THE GIST

Mpox was in the headlines after a rapidly expanding global outbreak in 2022-2023.

The virus was previously called 'monkeypox' after a spillover event in a research facility involving monkeys in 1958.

Researchers sequenced the genome of the mpox virus implicated in the 2022 outbreak. Mpox are DNA viruses. The mpox genome has about 197 kilobases: the core genes plus two sections about 6.4 kb long, one at each end of the genome

These sections of the virus genome were found to strongly influence human-to-human transmissibility. These were eventually found to be the virus's genomic accords



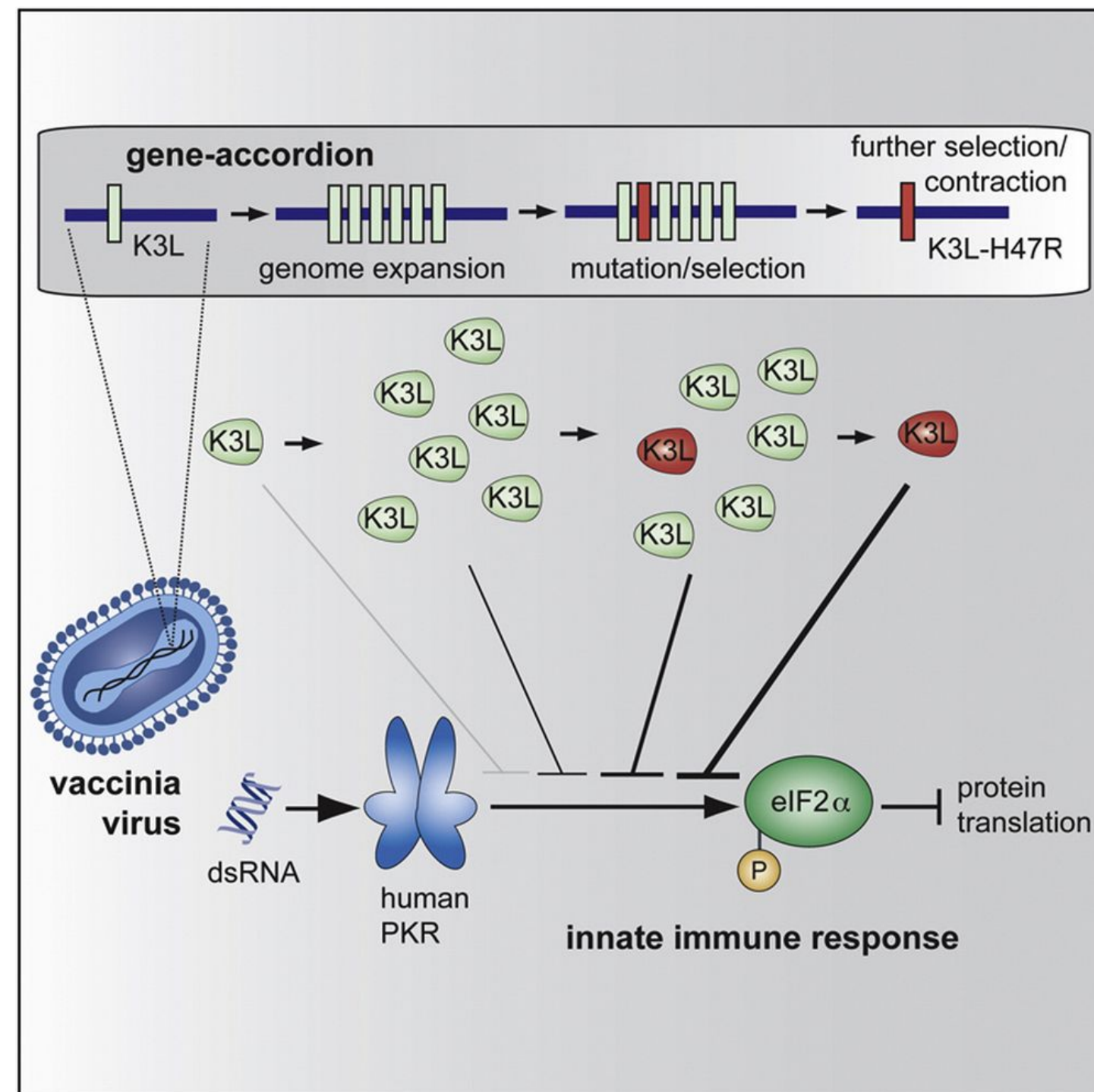
poxvirus

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The Hindu analysis by saurabh.pandey sir



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BIG SHOT



Brazil's biggest floating solar plant, with 10,500 plates on the water's surface, as seen from a drone at the Billings dam developed by Empresa Metropolitana de Aguas e Energia in São Paulo. While the Latin American country has been working to increase the share of solar power in its national grid, heat waves – such as one that passed through in early March – have lowered panel efficiencies by up to 15%. REUTERS



Brazil's biggest floating solar plant



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- The Billings Reservoir (locally known as Represa Billings) is the largest reservoir in São Paulo, Brazil, covering a total of 127 km².
- It is named after Asa White Kenney Billings, the American hydroelectric engineer who was instrumental in building it.



The Hindu analysis by saurabh.pandey sir



WHAT IS IT?

Antihistamine: a pill for your sneeze?

Vasudevan Mukunth

Chances are you've taken an antihistamine this week. Antihistamines are common drugs that can be purchased without a prescription and are used to treat short-lived allergic reactions, like a sneezing fit or an itch.

As the name suggests, an antihistamine drug acts against the activity of the histamine receptor — proteins that bind to a compound in the body called histamine. This compound consists of two attached to each other: ethylamine ($\text{CH}_3\text{CH}_2\text{NH}_2$) and imidazole ($\text{C}_2\text{N}_2\text{H}_4$), the latter being a ring.

Depending on its location, histamine performs broadly four types of functions, each involving different histamine receptors called H1, H2, H3, and H4. The H1 receptor is found mostly in the inner surface of blood and lymphatic vessels, neurons, and smooth muscle cells. H1 antihistamines are used to block the effects of minor allergies.

Certain cells in the gastric glands release histamine, which encourage nearby parietal cells with H2 receptors to release gastric acid for digestion.

H3 receptors are located in cells in the central nervous system, where they use histamine to regulate the release of other neurotransmitters, including dopamine and serotonin. Similarly, H4 receptors use histamine



An antihistamine drug acts against the activity of the histamine receptor. TOWFIQU BARBHUIYA/UNSPLASH

to regulate the body's inflammatory response, including allergic reactions as well.

Currently, there is a lot of research ongoing on H3 and H4 receptors, in particular to alleviate the effects of neurological and immunological disorders, respectively, using specialised drugs.

For feedback and suggestions
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with the subject 'Daily page'



.Antihistamines

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Preparing India for water stress, climate resilience

As the India Meteorological Department (IMD) predicts a hotter summer and longer heat waves from April to June, India must also prepare for water stress. The challenge is that we are programmed to consider acute stresses (heat, water, or extreme weather) as temporary, to be handled often as disaster relief. We must move from panic reactions when disaster strikes (like the water crisis in Bengaluru), to understand and respond to the chronic nature of risks we face. Moreover, climate action cannot be left to a few sectors or businesses. Nor can environmental sustainability be reduced to sapling plantation drives over a few days.

This Earth Day (April 22) should be a wake-up call. The climate is the economy now, and the economic production frontier will expand or shrink depending on how we understand the intersections between land, food, energy and water.

India houses 18% of the world's population on 2.4% of the earth's surface area and has just 4% of global freshwater resources. Nearly half its rivers are polluted, and 150 of its primary reservoirs are currently at just 38% of their total live storage capacity. Further, it is the largest user of groundwater in the world. And three-quarters of India's districts are hotspots for extreme climate events.

Against this backdrop, India has invested heavily in disaster preparedness, but the nature of climatic shocks will continue to change. There will be sudden shocks (heavy rainfall, rapid declines in water availability) as well as slow onset but periodic stresses (reduced water retention in soils, changes in trend lines for rainfall). Seasonal disaster preparedness and responses are no longer sufficient to tackle climate risks.

Water flows through the economy

For long, we have not taken cognisance of the many ways by which water flows through our economy and, instead, addressed water (and other natural resources) in silos. Water connects our hydrological, food, and energy systems, impacting millions of people.

How does this connection work? Precipitation is the primary source of soil moisture and water stored in vegetation (green water) and the water available in rivers and aquifers (blue water). Both blue and green water impact the food we grow – irrigating crops, influencing harvests, and being critical to the economy. But this sector that employs the most is increasingly climate vulnerable. The India Employment Report 2024 shows that agriculture still employs around 45% of the population and absorbs most of the country's labour force. At the same time, a Council on Energy, Environment and Water (CEEW) study showed that monsoon rainfall is



Arunabha Ghosh

is the CEO, Council on Energy, Environment and Water (CEEW) and Commissioner, Global Commission on the Economics of Water



Nitin Bassi

is the Senior Programme Lead at the Council on Energy, Environment and Water (CEEW)

The climate is the economy now, and understanding the crucial intersections between land, food, energy and water will influence how the economy functions

changing patterns in India, with 55% of 'tehsils' or sub-districts seeing a significant increase of more than 10% in southwest monsoon rainfall in the last decade, compared to the previous three. But this increased rainfall is frequently coming from short-duration, heavy rain, affecting crop sowing, irrigation and harvesting. Making the agricultural sector more resilient to climatic and water stresses matters for jobs, growth and sustainability.

Water is also a key component of the world's clean energy transition. Green hydrogen, seen as a crucial pillar for decarbonising industry and long-distance transport sectors, is produced using water and electricity sourced from renewables. Pumped storage hydropower – which acts as a natural battery and is essential to balance the power grid load – is an important component of a clean but reliable power system.

Then there is the climate crisis and its impact on hydrometeorological disasters. According to the UN World Water Development Report 2020, almost 75% of natural disasters in the last two decades were related to water. According to CEEW analysis, between 1970 and 2019, the number of flood associated events (such as landslides, thunderstorms and cloud bursts) increased by up to 20 times in India. Freshwater, one of the nine planetary boundaries, has been transgressed (2023 study).

The ingredients of water security

What India does to ensure water for domestic supply, food security, and the clean energy transition will matter to its economy. But its experiences will hold lessons for other water-stressed developing countries and emerging economies. Attaining this water security will need a mix of the right policies, judicious use of water, including reuse of urban wastewater, and finance for adapting to a changing world.

First, effective water governance needs policies that recognise its interactions with food and energy systems. However, CEEW and International Water Management Institute (IWMI) analysis shows that although India has adopted several policies, most do not recognise this nexus while planning or at the implementation stage. For instance, while the scaling up of green hydrogen is desirable, the link with water availability is not always considered. Similarly, the impact of scaling up solar irrigation pumps on groundwater levels must be analysed to deploy the technology where there is an optimal mix of solar resource and higher groundwater levels. Policies should incorporate the food-land-water nexus through localised evidence and community engagement.

Second, India needs to focus on the judicious



use of blue and green water through water accounting and efficient reuse. The National Water Mission targets increasing water use efficiency by 20% by 2025. Similarly, the Atal Mission on Rejuvenation and Urban Transformation (AMRUT) 2.0 calls for reducing non-revenue water, which is lost before it reaches the end user, to less than 20% in urban local

bodies. However, these are not backed by any baseline set using water accounting principles that will help quantify the, say, "20 per cent" change in freshwater use. For instance, in the absence of water use data for the reference year, it is difficult to quantify the potential water saving in one sector, such as agriculture, that can then be diverted to other sectors, such as

industries or domestic purposes, which will drive India's water demand. Water accounting is essential for promoting water use efficiency and creating incentives for investments in treated wastewater reuse.

Third, leverage financial tools to raise money for climate adaptation in the water sector. Following global trends, India's climate action has been largely focused on mitigation in the industrial, energy, and transport sectors. Financial commitments for climate change adaptation in the water and agriculture sectors are still relatively small. In 2019-20, for which aggregate estimates are available, the per capita annual spending on climate change mitigation was about ₹2,200, whereas for adaptation, it was only ₹260. More funding is needed for adaptation-specific interventions such as strengthening wastewater management, providing incentives to promote climate-resilient agricultural practices (micro irrigation and crop diversification), and scaling up desalination plants as an alternative water source for thermal plants and green hydrogen production. Market innovations such as India's Green Credit Programme have the potential to partially bridge the adaptation funding gap by encouraging investment in wastewater treatment, desalination plants, and agricultural extension services. Considering the investments in India under Corporate Social Responsibility (between 2014-15 and 2020-21), there is a potential to leverage about ₹12,000 crore worth of investments every year.

Expectations that systemic change will occur overnight are unrealistic. But it is possible to make a start by pursuing more coherence in water, energy and climate policies, creating data-driven baselines to increase water savings, and enabling new financial instruments and markets for adaptation investments. A water-secure economy is the first step towards a climate-resilient one.

The views expressed are personal



Water stress in india

- India houses 18% of the world's population on 2.4% of the earth's surface area and has just 4% of global freshwater resources. Nearly half its rivers are polluted, and 150 of its primary reservoirs are currently at just 38% of their total live storage capacity.
- Further, it is the largest user of groundwater in the world.
- And three-quarters of India's districts are hotspots for extreme climate events.
- Against this backdrop, India has invested heavily in disaster preparedness, but the nature of climatic shocks will continue to change.
- There will be sudden shocks (heavy rainfall, rapid declines in water availability) as well as slow onset but periodic stresses (reduced water retention in soils, changes in trend lines for rainfall).

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Importance of water



- Water connects our hydrological, food, and energy systems, impacting millions of people.
- Precipitation is the primary source of soil moisture and water stored in vegetation (green water) and the water available in rivers and aquifers (blue water).
- Both blue and green water impact the food we grow — irrigating crops, influencing harvests, and being critical to the economy.
- But this sector that employs the most is increasingly climate vulnerable.
- The India Employment Report 2024 shows that agriculture still employs around 45% of the population and absorbs most of the country's labour force.

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- Water is also a key component of the world's clean energy transition.
- Green hydrogen, seen as a crucial pillar for decarbonising industry and long-distance transport sectors, is produced using water and electricity sourced from renewables.
- Pumped storage hydropower — which acts as a natural battery and is essential to balance the power grid load — is an important component of a clean but reliable power system

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Water security

- What India does to ensure water for domestic supply, food security, and the clean energy transition will matter to its economy.
- First, effective water governance needs policies that recognise its interactions with food and energy systems.
- Second, India needs to focus on the judicious use of blue and green water through water accounting and efficient reuse.
- The National Water Mission targets increasing water use efficiency by 20% by 2025.
- Similarly, the Atal Mission on Rejuvenation and Urban Transformation (AMRUT) 2.0 calls for reducing non-revenue water, which is lost before it reaches the end user, to less than 20% in urban local bodies

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- Third, leverage financial tools to raise money for climate adaptation in the water sector.
- Following global trends, India's climate action has been largely focused on mitigation in the industrial, energy, and transport sectors.
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Empower the guardians of the earth, do not rob them

In the southern expanse of the Andaman and Nicobar archipelago, off the shores of Little Nicobar, lie seven tiny islands. Classified as “uninhabited” in the government’s records, these islets are nonetheless integral to the indigenous communities of the region. Two, officially called Meroë and Menchal, are known as Piruii and Pingaeyak, respectively, to the Payuh, the indigenous southern Nicobarese peoples, who hold traditional rights over these and other islets.

For millennia, these historically isolated indigenes have relied on these islands as resource reservoirs for sustenance and protected them. Menchal is revered, used, and protected under the spiritual realm called Pingaeyak (a spirit that is believed to reside on the island), prohibiting the overexploitation of resources or any undue harm to its ecosystem. Similarly, Meroë is believed to be the abode of a legendary islander community. Here, too, spiritual belief systems influence how the islanders use and protect natural resources.

Meroë and Menchal are managed by community elders as guardians and specific individual caretakers. They ensure the protection of the island’s resources and sustainability. In today’s world, this phenomenon goes by the name of “conservation” and “sustainable use”, among other terms and phrases.

Conservation colonialism

In May 2022, in complete disregard of the indigenous land ownership and management systems, the Andaman and Nicobar (A&N) administration issued three public notices, announcing its intention to create three wildlife sanctuaries: a coral sanctuary at Meroë Island, a megapode sanctuary at Menchal Island, and a leatherback turtle sanctuary on Little Nicobar Island.

In mid-July, the A&N administration issued an order asserting that it did not receive any claims or objections from any individual regarding the land and marine areas within the three proposed sanctuaries; that no individual enjoys any rights



Ajay Saini

teaches at the Indian Institute of Technology Delhi



Manish Chandi

is with the Wildlife Conservation Society (WCS)-India

A unilateral decision to establish three wildlife sanctuaries in the southern Nicobar will deprive the indigenous peoples of their ancestral territories and lifeways

within the boundaries of the proposed sanctuaries. And, that there will be “restriction on the people of neighbouring area to enter into these islands... in the national interest.”

Approximately 1,200 southern Nicobarese inhabit Patai Takaru (Great Nicobar Island), and Patai t-bhi (Little Nicobar Island), holding traditional rights over both inhabited and ostensibly “uninhabited” islands. Yet, the A&N administration neither consulted nor informed the southern Nicobarese of its plans.

Despite verbal supplications and a letter in August 2022 from the Little & Great Nicobar Tribal Council that expressed the community’s concerns to the A&N administration and the Ministry of Environment, Forest and Climate Change, the A&N administration proceeded to issue official notifications in October 2022, designating the whole of Meroë (2.73 square kilometres) and Menchal (1.29 sq. km), along with a 13.75 sq. km area on Little Nicobar (140 sq. km), as wildlife sanctuaries.

Masking an ecological disaster

The selection of Meroë and Menchal Islands as conservation reserves for coral reefs and Megapode birds is arbitrary. Menchal does not have more than a pair or two of the endemic Megapode birds. Similarly, questions arise regarding the actual diversity and abundance of corals on Meroë Island.

Notably, the announcement of wildlife sanctuaries coincided with growing scrutiny and criticism from experts over the denotification of the Galathea Bay Wildlife Sanctuary for a ₹72,000-crore mega project on Great Nicobar, a UNESCO Biosphere Reserve.

Establishing exclusionary conservation areas in a region, which is already a paradise for biodiversity, stems from the fact that the champions of the mega project are aware of the extensive environmental and social damage that

the project will entail. It will devastate about eight to 10 lakh evergreen forest trees, smother and gouge out scores of coral reefs found along Galathea Bay, destroy the nesting site for the globally endangered Leatherback sea turtle species, devastate hundreds of nesting mounds of Nicobar Megapodes, and kill as many crocodiles.

Furthermore, it will prevent the indigenous Great Nicobar islanders from returning to their pre-tsunami homeland where they husbanded pigs and chicken, cultivated coconut and betel nut trees, and lived simple and gregarious lives. Most importantly, it will uproot three or more settlements of the Shompen (a ‘Particularly Vulnerable Tribal Group’) and permanently destroy their foraging and hunting grounds.

The unilateral decision to establish wildlife sanctuaries disregards the islands’ profound significance to the indigenous population. Their ancestral lands are unjustly perceived as “no-man’s-land” to appease conservationists, investors, public opinion, and more.

Support earth’s guardians

Globally, governments blatantly violate indigenous people’s rights by evicting them from their ancestral lands, often under the guise of development, national interest, conservation projects, among others. Approximately 476 million indigenous peoples, constitute about 6% of the global population. Indigenous territories cover roughly 22% of the planet and harbour 80% of its biodiversity.

Indigenous peoples are the original guardians of our earth. The world must learn from their wisdom. Reason and justice dictate that in southern Nicobar, we should support and empower the islanders to continue to steward their ancestral territories, rather than robbing them of their lands, resources, lifeways, and worldviews.

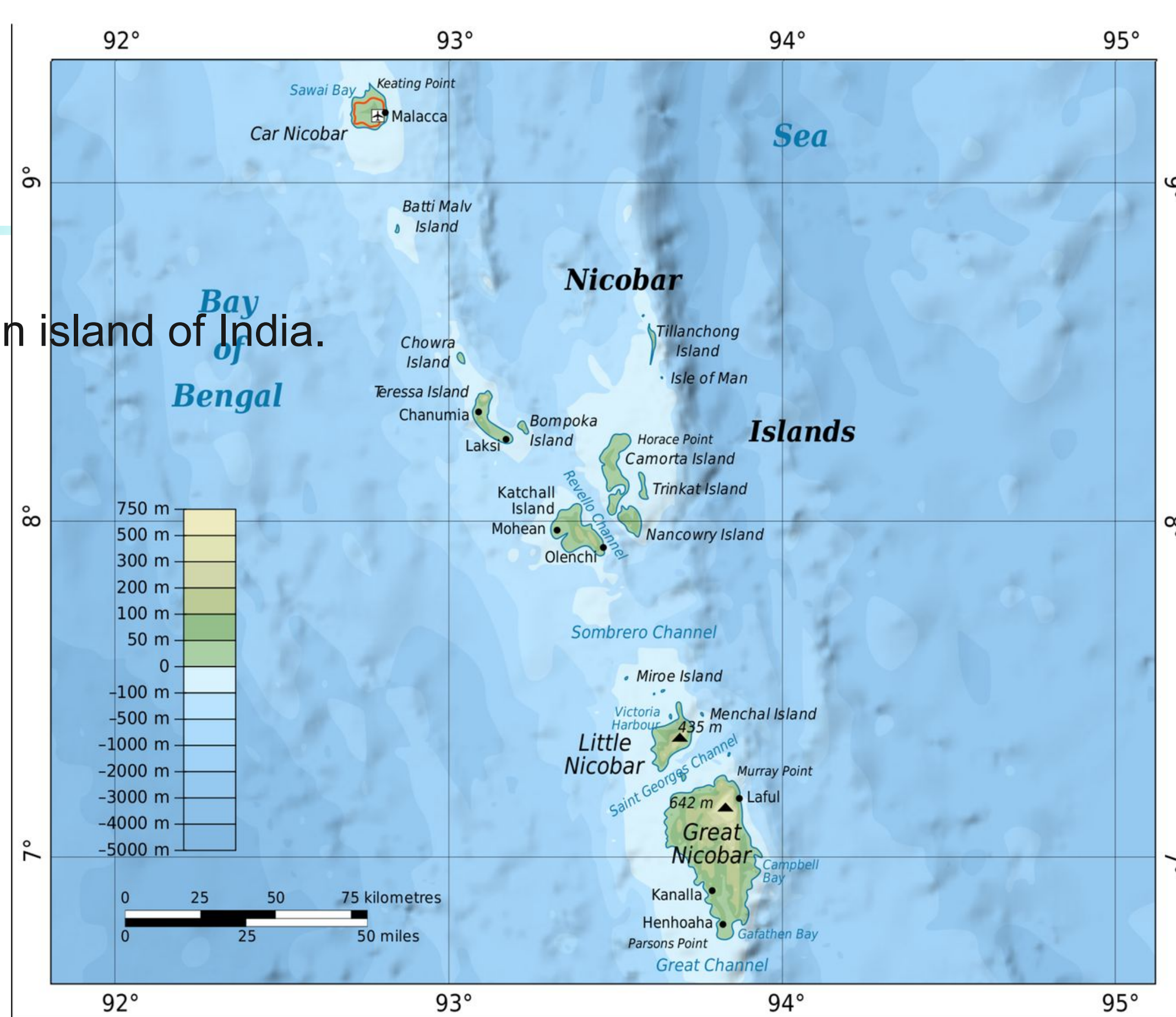


Andaman and Nicobar

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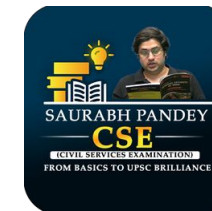


Meroe Island is an island of India.

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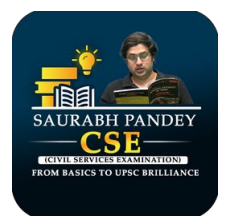
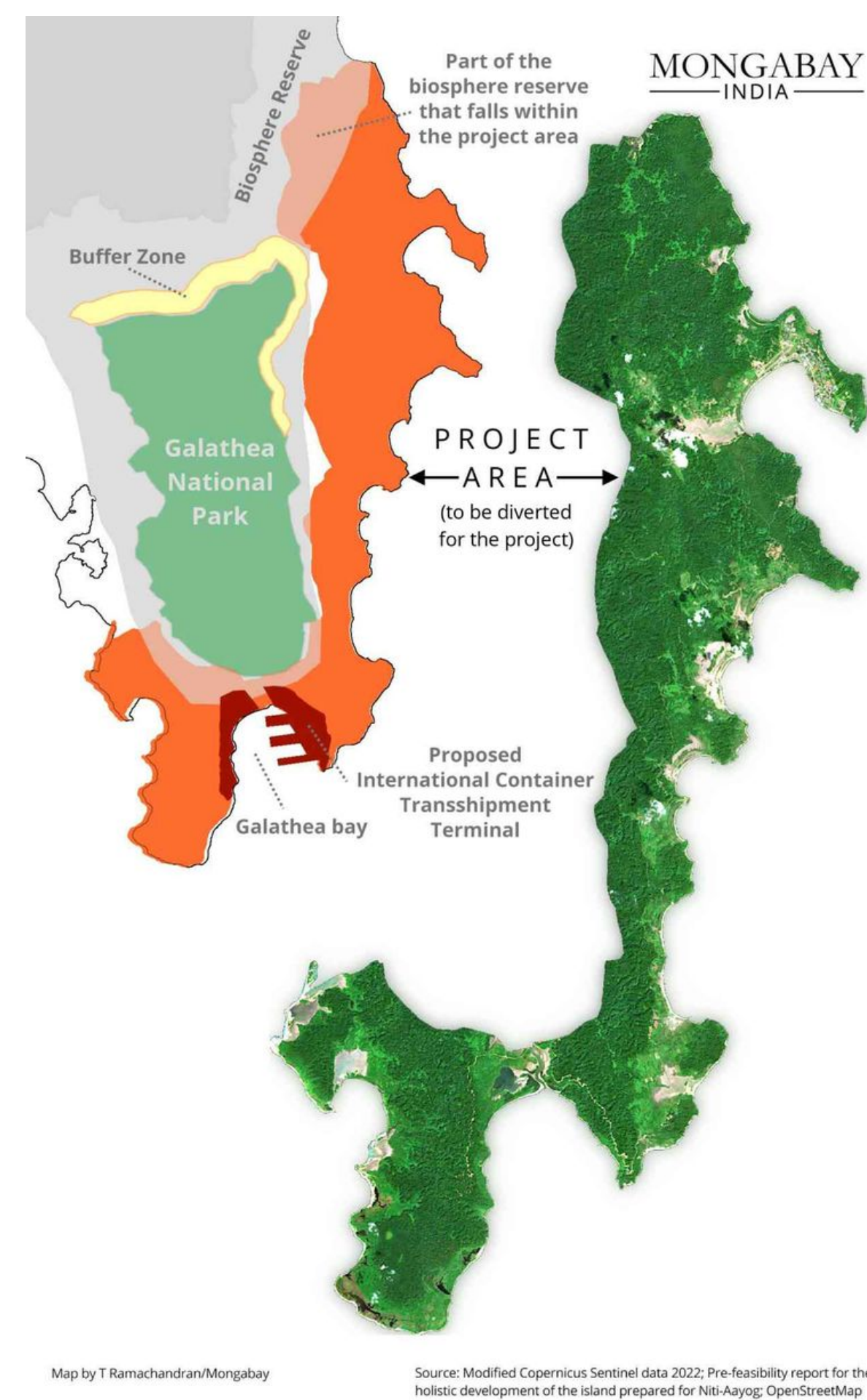
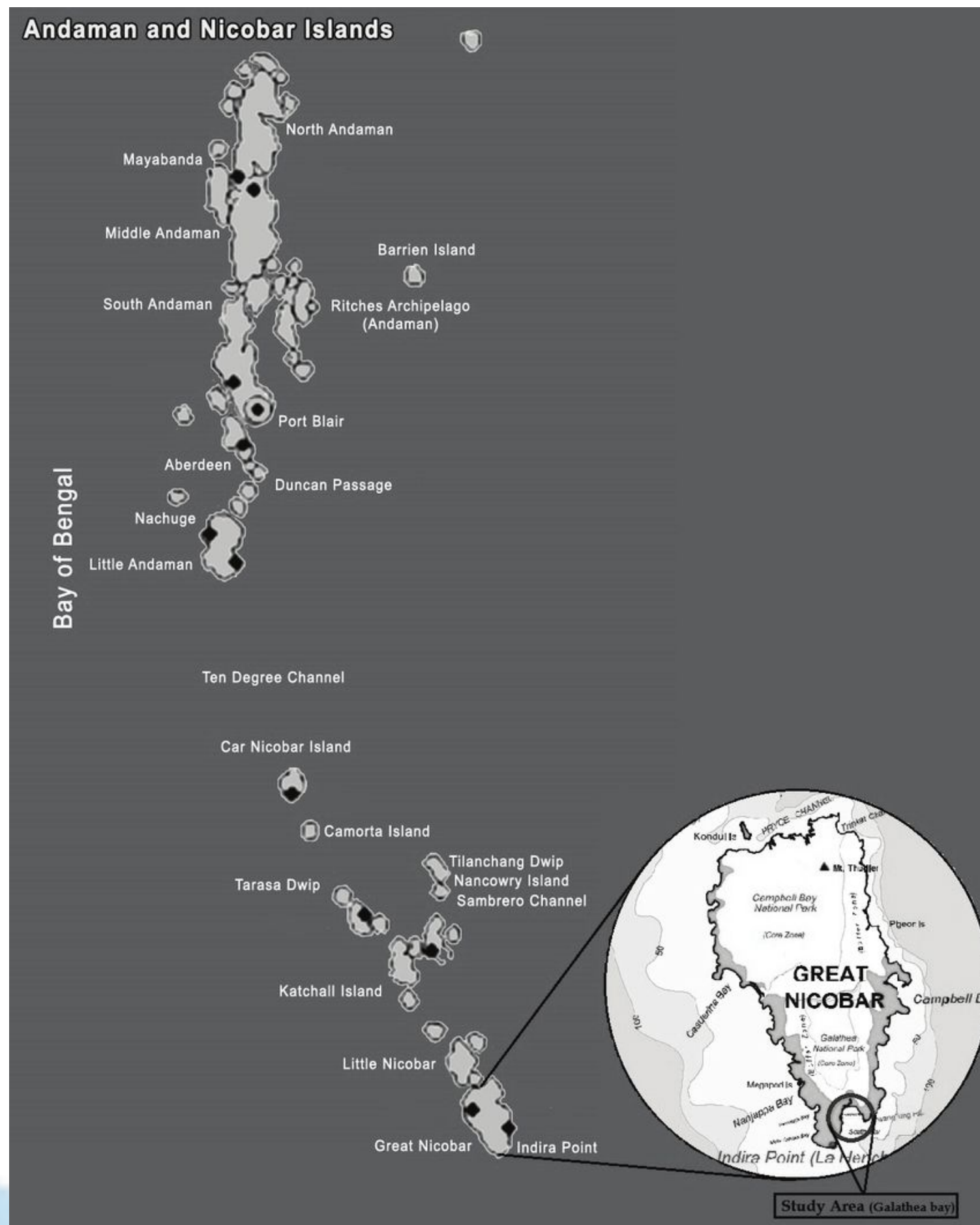
Galathea National Park



- Galathea National Park is a national park located in the Union Territory of Andaman and Nicobar Islands, India.
- It is located on the island of Great Nicobar in the Nicobar Islands, which lie in the eastern Indian Ocean (Bay of Bengal).
- The total area of this park is some 110 square kilometres, and it was gazetted as a National Park of India in 1992.
- Galathea forms part of what has been designated as the Great Nicobar Biosphere Reserve, which also includes the larger Campbell Bay National Park, separated from Galathea by a 12-km forest buffer zone.

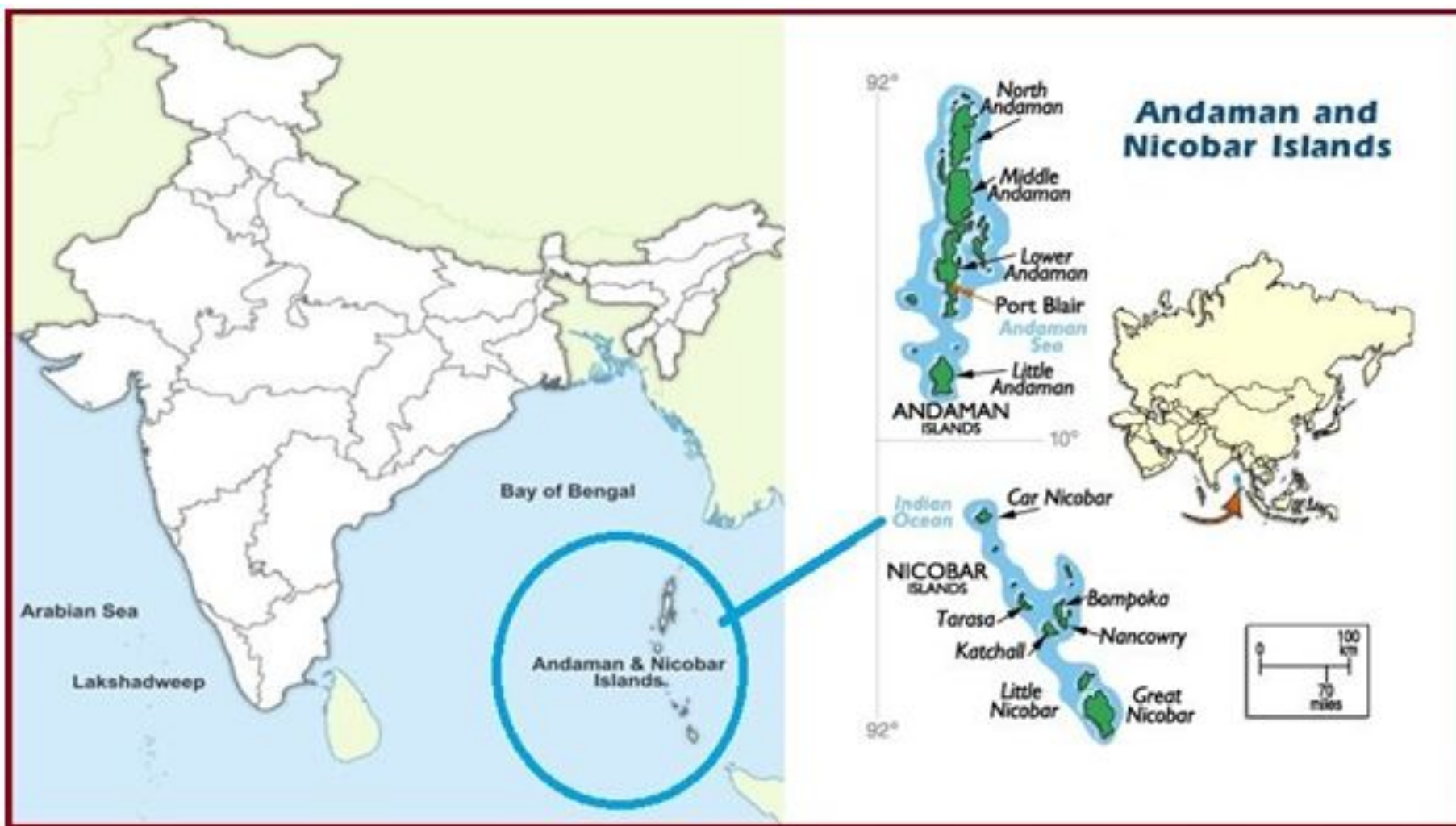
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Leatherback turtle

Leatherback turtles are named for their shell, which is leather-like rather than hard, like other turtles.

They are the largest sea turtle species and also one of the most migratory, crossing both the Atlantic and Pacific Oceans. Pacific leatherbacks migrate from nesting beaches in the Coral Triangle all the way to the California coast to feed on the abundant jellyfish every summer and fall.

Although their distribution is wide, numbers of leatherback turtles have seriously declined during the last century as a result of intense egg collection and fisheries bycatch. Globally, leatherback status according to IUCN is listed as Vulnerable, but many subpopulations (such as in the Pacific and Southwest Atlantic) are Critically Endangered.



STATUS
Vulnerable



SCIENTIFIC NAME
Dermochelys coriacea



WEIGHT
600-1500 pounds



LENGTH
55-63 inches



HABITATS
Oceans

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The challenges of renewable energy

At a recent speech, the United Nations Climate Change Executive Secretary Simon Stiell said the “next two years are essential in saving our planet.” Record-breaking heat, shortage of water, and other environmental issues are regular headlines in the context of the need to achieve development, increase employment, and reduce poverty and inequality, among others. Yet, the linkages between the pathways of development, sustainability, and climate change mitigation are far from well-understood. Our current models of development drive greenhouse gas (GHG) emissions, are unsustainable, and inequitable. Although India aims to achieve Net Zero GHG emissions by 2070, mainly led by a massive transition to large-scale renewable energy, the implications of such a transition on developmental or sustainability outcomes are unclear at the local and national levels.

Examining solar parks

Let us take the example of large-scale solar parks – a key pillar of India’s mitigation strategy. We have 214 sq. km of land under solar parks, but some studies estimate that we may need 50,000-75,000 sq. km, which is about half the size of Tamil Nadu, to achieve our Net Zero targets.

At the local level, farmers in villages near India’s two largest solar parks - in Bhadla in Rajasthan and Pavagada in Karnataka - report different experiences. In Bhadla, farmers have lost sacred common lands called Orans and pastoralists are faced with shrinking grazing lands, forcing some to sell their livestock at throwaway prices. Such losses have led to protests demanding recognition of common land under the Forest Rights Act (FRA), 2006. On the other hand, many farmers in Pavagada were content with the steady annual income they received by leasing out land for solar parks. This land was drought-stricken and did not yield significant agricultural income. All the same, water security issues and economic disparity between large and small landowners are



Sukanya Khar

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Kaveri Iychettira

is researcher at the School of Public Policy at IIT Delhi

Large-scale renewable energy development can avoid reproducing the injustices of past large-scale infrastructure projects, while being sensitive to developmental objectives

challenges for the region.

At a more regional or national scale, solar parks may compete for essential natural resources. Solar panels require large amounts of water for their regular cleaning. Yet, our current national-level estimates for the land available for solar parks do not account for the availability of nearby water sources. Similarly, the land needed for solar parks may compete with other productive activities – agriculture and related livelihoods, with the potential for impacts on food security. Impacts on biodiversity loss with the construction of large-scale solar parks are also location-specific, and under-researched. For instance, open natural systems such as deserts provide essential ecosystem services that, if disturbed, would cause ecological damage and even contribute to climate change. Crucially, all of these resource requirements and impacts on livelihoods and biodiversity are subject to uncertainty regarding feasibility and economic viability of other emerging low carbon technologies and the changing climate itself.

Different approaches

Large-scale renewable energy development can avoid reproducing the injustices of past large-scale infrastructure projects, while being sensitive to developmental objectives. Experimenting with ownership models is one approach. The parks need not necessarily be owned by the state or private companies. Community initiatives could help generate revenues for the communities, further promoting small businesses and upskilling, improving incomes, stimulating local economies, and improving energy access.

Solar and wind park development is exempted from Environmental and Social Impact Assessment. The legal and regulatory architecture must be revised and strengthened to limit adverse social and environmental consequences. In terms of impacts on small and medium landowners where private land is being used, there is no mechanism to monitor

if a fair price is paid to those leasing their land. Involving local governance units in the planning and siting processes can provide an opportunity to align local developmental objectives with solar park development.

Wasteland classification needs a significant overhaul. Recognition of commons under the FRA would help improve environmental and equity outcomes by granting land ownership to communities dependent on commons.

If such land is to be leased or acquired for solar parks, solar park development corporations will have to engage with local governance units such as the Gram Sabha to initiate the project.

Encouraging research and experimenting with ‘agrivoltaics’ is another way to think about sustainably developing renewable energy. Agrivoltaics pair solar with agriculture, creating energy and providing space for crops, grazing, and native habitats under and between panels. Thus, farmers can grow crops while also being ‘prosumers’ – producers and consumers – of energy.

Many of these challenges and opportunities relate to solar in particular, but similar issues abound with other mitigation technologies. Wind energy, for instance, has adverse consequences on bird ecosystems. Large-scale renewable energy projects could have positive employment outcomes at the district level, but they lead to massive employment shifts between sectors at the national level. Adequate skilling and training programmes targeting the unskilled and poorer populations are essential to protect them.

Seize the opportunity

We are at the cusp of a second green revolution, this time involving energy. We have an opportunity to anticipate the unintended consequences of this revolution, and align our technological, economic, and institutional structures to maximise synergies between sustainability, climate change mitigation, and development related outcomes.



Renewable energy

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Solar and wind park development

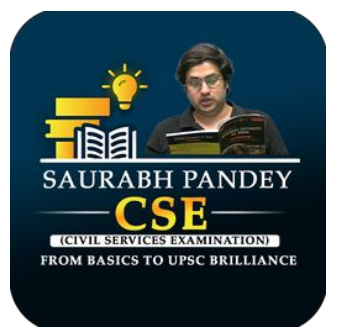
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Topics



- AI IN DRUG DISCOVERY
- Europe is 'warming faster
- Approach towards climate change
- Earthquake in Taiwan
- Star campaigner
- post-stroke depression (PSD)
- Mains

By saurabh pandey sir



The tools helping scientists up the rate at which they find new drugs

As advances in drug-target discovery pull away from drug development, the spotlight on tools, and expertise required for the latter — including molecular docking simulations, chemical libraries, structural and computational biologists, institute-industry collaboration — has grown harsher

Somdatta Karak

India is one of the world's leading manufacturers as well as consumers of antimicrobial drugs. However, many of these life-saving drugs are now becoming ineffective against disease-causing bacteria. Around 4.9 million people around the world died in 2019 due to ineffective antimicrobial drugs. These deaths include those due to the infections as well as the morbidity resulting from antimicrobial resistance. Yet, we have also been struggling to find new drugs.

One way out of this crisis is for researchers to discover new pathways crucial for the survival of pathogens, and disrupt them. However, the modern targeted drug-discovery process is a complex process and often requires customised solutions for each target.

How does drug discovery begin?

Two research groups working at the CSIR-Centre for Cellular and Molecular Biology, Hyderabad, recently identified potential targets for new antimalarial drugs by studying the basic biology of *Escherichia coli* bacteria and the human malarial parasite *Plasmodium falciparum*.

Manjula Reddy's group has been studying how the bacteria's outer cell-walls expand when the bacterial cell grows in size before dividing into two. The group's focus is on the peptidoglycan layer, a mesh of sugar and amino acids in *E. coli* essential for the bacteria's survival. When the cell grows, the mesh breaks and extra peptidoglycan material is added to enlarge the mesh.

In the last decade, Dr. Reddy's group has identified a set of peptidoglycan hydrolase enzymes that are responsible for cutting the peptidoglycan layer, with the latest one published in the journal *PLoS Genetics* in February. These enzymes are present in all types of bacteria, and are potent drug targets. Inhibiting them could prevent the peptidoglycan layer from expanding, thus killing the bacteria.

Likewise, Puran Singh Sijwali's group studies how the *P. falciparum* parasite grows in human red blood cells and liver cells, depending on its developmental stage. The group focuses on how the parasite degrades its own proteins that it doesn't need anymore. It uses a class of enzymes called Cullin RING ligases. They tag proteins with another small protein called ubiquitin. The protein degradation apparatus identifies the ubiquitin and breaks the protein to which ubiquitin is attached.

Recently, Dr. Sijwali's group reported two such enzymes crucial for the parasite's development in the journal *PLoS Pathogens*.

How many steps does discovery have?

The next step for them is to find drugs that act on these identified targets. But a quick search on the PubMed database (of life science and biomedical research papers) shows scientists across the world publishing thousands of papers reporting new drug targets — however, most of them haven't translated to new drugs yet.

A major reason for the barrier is the need for people with expertise in various areas to work together over an extended period of time.



The road between identifying new drug targets and actually having drugs against those targets is long but necessary. GETTY IMAGES

Normally, the drug-discovery process starts with finding an inhibitor molecule that binds to a target and blocks its function. Researchers check for how well the two molecules bond with each other, which depends on their structures and chemical properties. Dr. Reddy developed a simple and robust assay that lets her visualise if drug-like molecules act on her target enzymes. But most scientists need access to the structures of their potential drug targets to move the work ahead.

Dr. Reddy works with *E. coli*, a model organism. Many protein structures of *E. coli* are already available in databases. But this isn't the case for the work of Dr. Sijwali and others: determining the enzymes' structures they have been working with is challenging because these are large molecules made of multiple proteins (each containing more than 20,000 atoms).

How else can structures be revealed?

The next best thing is to assess an enzyme's structure based on the known structures of similar molecules, known as homologs, in other organisms. The more evolutionarily related the homologs are, the more similar their structures will be.

Scientists then run the structures of the target molecules through computer programmes called molecular docking simulations. These programmes try to fit the known structures of small drug-like compounds into the structure of the target molecule and predict how well they will bind each other. It helps that multiple such chemical libraries are available.

There are libraries of drugs already approved by agencies such as the U.S. Food and Drug Administration for their safety and many of them are already sold in the market for a disease. There are also much larger libraries of chemical



Around 4.9 million people around the world died in 2019 due to ineffective antimicrobial drugs. These deaths include those due to the infections as well as the morbidity resulting from antimicrobial resistance

compounds that research institutes have made and/or identified to be effective against a disease of their interest but which haven't yet been tested for human safety.

Can artificial intelligence help?

Where existing libraries also fall short, some AI-driven computer programs can also predict the structures of potential drug molecules. Chemists can synthesise them *de novo* (from scratch) or one can pick existing molecules with similar structures and modify them.

Some, like Dr. Sijwali, are contributing their expertise to AI-based companies to help with computational drug discovery, and plan to work with the pharmaceutical industry to synthesise them.

Others recommend drug companies add the newly discovered targets to their to-be-tested lists. These companies already have the capacity to conduct high-throughput screening — a process in which researchers check the suitability of thousands or even millions of molecules in parallel. Such molecules are more logistically and financially feasible than one scientist testing a handful of drug targets.

Why is drug discovery challenging?

Once a suitable group of molecules has

been identified, they will have to be tested procedurally for safety and efficacy. First in a cell culture model and then in experimental animal models, researchers check if the inhibitors selectively work against pathogens (rather than against human cells). Today, many startups also work as contract research labs and perform such tests. After this begin the clinical trials, which are closely regulated to ensure they are ethically conducted and produce data uncompromised by any bias. If the trials' results surpass a predetermined threshold of success, regulatory authorities approve the drugs for the market.

This road between identifying new drug targets and actually having drugs against those targets is long but necessary. It requires expertise of many kinds to ease the process. Developing tools such as molecular docking simulations, AI-driven drug discovery, and chemical libraries all exemplify collaborations between infectious disease biologists, structural biologists, computational biologists, chemists, and various research institutions motivated by a common cause and, of course, sufficient funding. This network also has to expand to include startups and the industry at large.

Researchers are making more fundamental discoveries vis-à-vis pathogens that are relevant to more local communities — *P. falciparum* or *Mycobacterium tuberculosis* in South Asia, e.g. The research and innovation community in these regions should take note of them, team up, and use the best techniques and facilities available to them to accelerate drug discovery.

(Somdatta Karak, PhD is the head of science communication at CSIR-Centre for Cellular and Molecular Biology, Hyderabad.)



AI IN DRUG DISCOVERY

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PRESCOUTER

AI in drug discovery & development

Aggregating and synthesizing information

ARPEGGIO
BIOSCIENCES

- 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

PHENOMIC.AI

- Analysis of genome-wide screens
- Identify proteins involved in regulating the cell cycle
- Discovery of the next generation of therapies against cancer.

TRL 3

STRUCTURA
BIOTECHNOLOGY

- 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

Atomwise

- 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

twoAR

- Screen compound libraries for efficacy against a disease
- Identify biologic targets
- Uncover novel disease biology hypotheses supported by real world data.

TRL 4

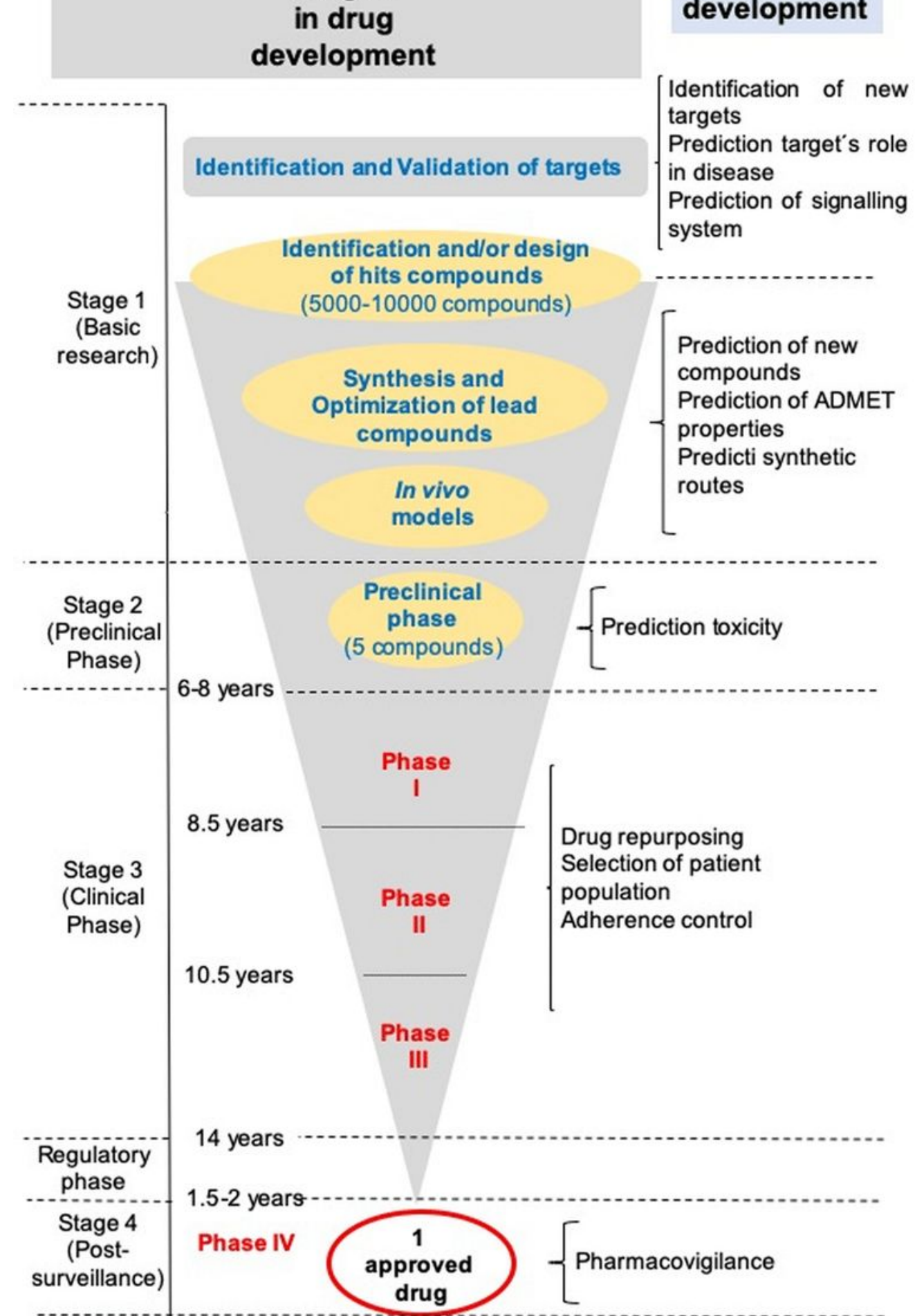
ReviveMed

- 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

The Hindu analysis by saurabh.pandey sir





The Hindu analysis by saurabh pandey sir



A lake of meltwater formed on the tongue of the Rhone Glacier near Goms, Switzerland. AP

Europe is 'warming faster than any other continent'

Associated Press

Europe is the fastest warming continent and its temperatures are rising at roughly twice the global average, two top climate monitoring organisations reported on April 22, warning of the consequences for human health, glacier melt and economic activity.

The U.N.'s World Meteorological Organisation and the European Union's climate agency, Copernicus, said in a joint report the continent has the opportunity to develop targeted strategies to speed up the transition to renewable resources like wind, solar, and hydroelectric power in response to the effects of climate change.

The continent generated 43% of its electricity from renewable resources last year, up from 36% the year before, the agencies say in their European State of the Climate report for last year. More energy in Europe was generated from renewables than from fossil fuels for the second year running.

The latest five-year averages show temperatures in Europe are now running 2.3 degrees Celsius above pre-industrial levels, compared to 1.3 degrees Celsius higher globally, the report says.

"Europe saw yet another year of increasing temperatures and intensifying climate extremes – including heat stress with record temperatures, wildfires, heat

Deaths related to heat have risen. More than 150 lives were lost in storms, floods and wildfires. Climate-related economic losses were estimated at more than €13.4 billion in 2023

waves, glacier ice loss and lack of snowfall," said Elisabeth Hamdouch, the deputy head of unit for Copernicus at the EU's executive commission.

The report serves up a continental complement for WMO's flagship state of the global climate report, which has been published annually for three decades, and this year came with a "red alert" warning that the world isn't doing enough to fight the consequences of global warming.

Copernicus has reported that March marked the 10th straight month of record monthly temperatures. The average sea-surface temperature for the ocean across Europe hit its highest annual level in 2023, the Europe report said.

The report focuses this year on the impact of high temperatures on human health, noting that deaths related to heat have risen across the continent. It said more than 150 lives were lost directly last year in connection with storms, floods and wildfires. The cost of weather- and climate-related economic losses in 2023 were estimated at more than €13.4 billion euros.

"Hundreds of thousands of people were affected by extreme climate events in 2023, which have been responsible for large losses at continental level, estimated to be at least in the tens of billions of euros," said Copernicus director Carlo Buontempo.

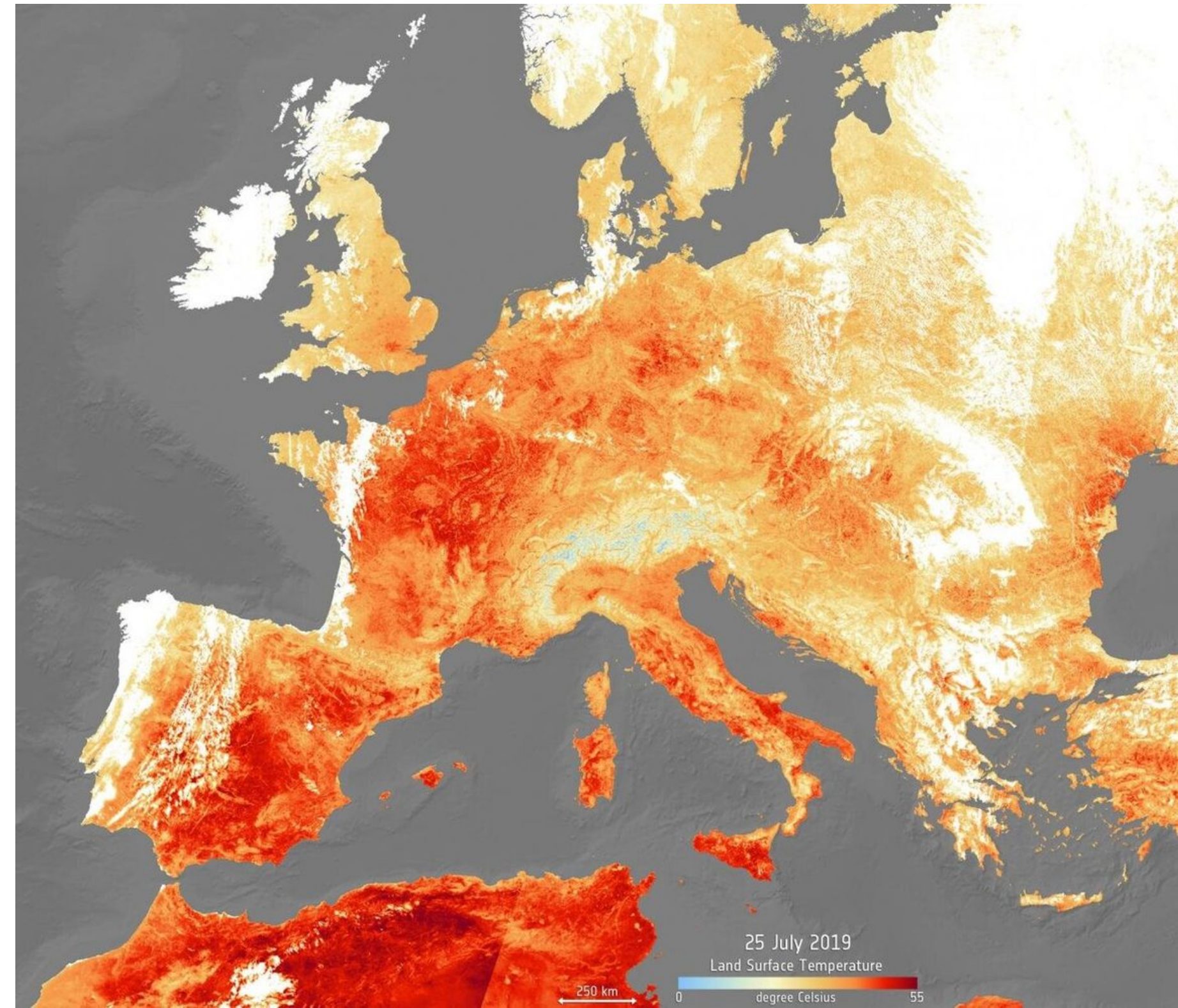
Extreme weather fanned heat waves, wildfires, droughts and flooding, the report said. High temperatures have contributed to a loss of glacier ice on the continent, including in the Alps – which have lost about 10% of their remaining glacier ice over the last two years.



Europe is 'warming faster

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- another year of increasing temperatures and intensifying climate extremes — including heat stress with record temperatures, wildfires, heatwaves, glacier ice loss and lack of snowfall.

- The average sea-surface temperature for the ocean across Europe hit its highest annual level in 2023, the Europe report said.



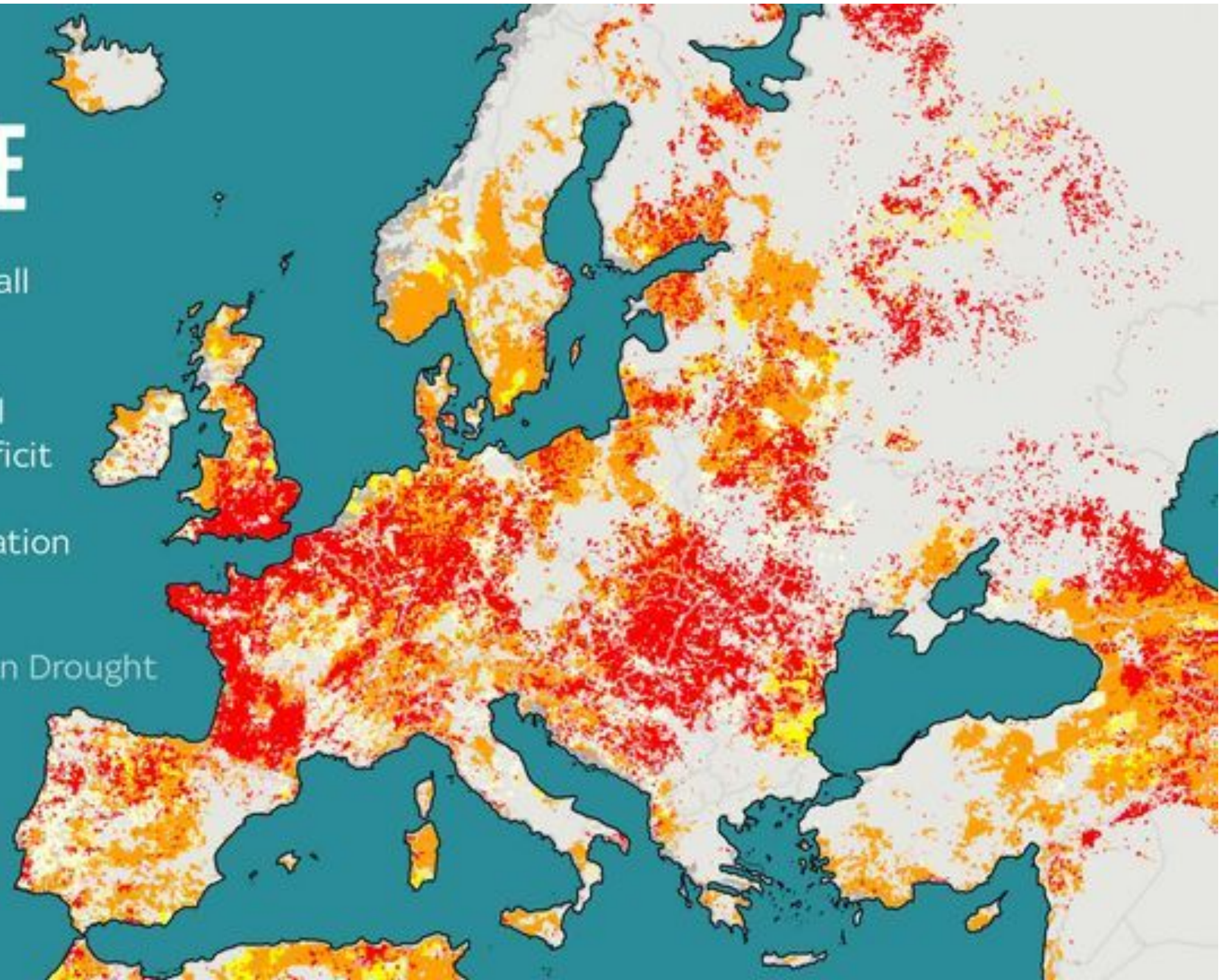
EUROPE

Watch: rainfall deficit

Warning: soil moisture deficit

Alert: vegetation stress

Source: European Drought Observatory
11-20.09.22



Restoring earth's right to 'good health'

In a landmark decision, the European Court of Human Rights found the Government of Switzerland guilty of violating the rights of a group of women senior citizens of a Swiss civil society group called KlimaSeniorinnen, noting that the government's actions to curb emissions were inadequate and had failed to protect women against the impacts of climate change.

As a first of its kind decision anywhere in the world, it highlights how the climate crisis is increasingly becoming a human rights crisis.

A similar watershed moment happened in India a month ago, when the Supreme Court of India ruled that people have a right 'to be free from the adverse impacts of climate change', citing Articles 14 (equality before law and the equal protection of laws) and 21 (right to life and personal liberty) of the Indian Constitution as the sources.

The latest State of the Global Climate Report by the World Meteorological Organization reveals that most climate change indicators reached record levels in 2023. It confirmed 2023 to be the hottest year since we started recording global temperatures. Records were also broken for ocean heat, sea level rise, Antarctic Sea ice loss and glacier retreat.

A planet under stress

The health of the planet is under extreme stress, impacting people's right to live a healthy life. The UN Secretary General António Guterres's message on International Mother Earth Day 2024 underscores the dire situation, 'Humanity is acting like Mother Earth's delinquent child. We depend on nature... Yet, we have brought chaos to the natural world... These actions harm nature, and they harm humanity... Together, we must restore harmony with nature...'. As one of the world's fastest growing economies, India has made rapid strides in decoupling emissions from economic growth. It has already achieved two of its Nationally Determined Contribution (NDC) targets, viz. reducing the emissions intensity of its GDP by 33% to 35% from 2005 level, and achieving 40% cumulative electric power installed capacity from non-fossil fuel sources, well ahead of the target year of 2030.

However, the country remains highly vulnerable to climate change. More than 80% of its population lives in districts that are at risk of climate-induced disasters. Rising temperatures and natural disasters are manifesting into major crises affecting livelihoods and food security, and exacerbating existing socio-economic inequalities.

It is here that the court's observation sets an important precedent, looking at these impacts of climate change from a rights perspective,



Caitlin Wiesen

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Ashish Chaturvedi

is Head, Action for Climate and Environment, United Nations Development Programme (UNDP)-India

Recent judicial pronouncements and observations that attempt to bring the impacts of climate change within the purview of constitutional fundamental rights, pave the way for legal accountability of climate action

affecting humanity's right to health, life, liberty and much more. By bringing the impacts of climate change within the purview of constitutional fundamental rights, it paves the way for legal accountability of climate action.

The observation provides several points of departure with the potential to accelerate climate action both on the demand and supply side – on the demand side, by invoking a more rights-based approach to climate action, and on the supply side, by encouraging integrated approaches and action between government, private sector and civil society.

The first such point of departure could be the adoption of an overarching regulation on climate change which takes forward the policy-driven approach of climate action in India couched in the National and State Action Plans on Climate Change. An overarching regulation has the intended benefits of enhancing state capacities by driving allocation of funds, functions and functionaries.

A report by the London School of Economics and Political Science analysed climate change framework laws across 60 countries, concluding that they have helped establish the strategic direction for national policies that go beyond meeting targets under global environmental conventions. This includes countries from both the Global North such as Germany, Ireland, New Zealand, Finland and South Korea, as well as the Global South such as South Africa and the Philippines.

These laws have resulted in increased public sector staffing and capacity to deliver climate action, including a significant expansion in public sector resourcing. While India has several laws and regulations related to tackling climate change, a framework law can help strengthen climate governance by building effective institutional frameworks and processes, enabling more ambitious climate action.

Further, it has the potential to provide for a more stringent and distributed accountability, and promoting the exchange of knowledge and ideas. Out of all the States and Union Territories in the country, 18 are classified as moderately to highly vulnerable to climate change. A forum that enables the sharing of best practices on implementation of policies can build coherence in policies and actions between States and Union Territories.

SDGs and localisation model

A case in point is India's localisation model for the Sustainable Development Goals (SDGs), which has successfully integrated the SDGs into local-level planning through multi-tiered and multi-stakeholder processes. States and territories take ownership by creating their own SDG road maps and monitoring systems, and

friendly competition among them spurs innovation and faster progress. To ensure effective implementation, capacities of local governments are built. The model also encourages broader participation from businesses, non-governmental organisations, and citizens. This has resulted in a more efficient and collaborative approach to achieve the SDGs.

The second pathway can build inter-ministerial and inter-sectoral approaches. The One Health initiative is one such example which has brought together 13 Ministries and departments in the domains of health, environment, science and technology for disease control, research, and pandemic preparedness. We need to expand this approach to the private sector on integrating a rights-based approach to climate action in their core operations. For instance, the circular economy approaches need to engage with human rights compliant supply chains, including reverse logistics, to have a truly transformative impact.

Rights-based dialogue

The third pathway can leverage the court's observation to empower citizen groups and civil society organisations in fostering a rights-based dialogue on environment, biodiversity and climate action. Within the ambit of environmental policy, it can build consensus on overcoming potential tensions between climate mitigation and action.

This is reflected in the Supreme Court's observation, which came in the backdrop of balancing conservation of the habitat of the Great Indian Bustard, a critically endangered bird species, with developing solar energy parks to meet the country's renewable energy targets. While noting that wildlife conservation cannot come at the cost of citizens' right to be protected from climate change, for which expanding renewable energy capacity is indispensable, the Court insisted upon more dialogues to arrive at a holistic solution.

Every year since 2009, April 22 is commemorated as International Mother Earth Day. The idea of 'Mother' Earth has been embedded in India's culture and traditions for centuries, regarding nature as a 'living' entity rather than just a resource.

In 2022, the Madras High Court in Tamil Nadu, while hearing a case on changing the classification of forest land, declared 'Mother Nature' a 'living being', granting it the status of a legal person with all corresponding rights, duties and liabilities, in order to preserve and conserve it.

We now need to use these judgments and observations to restore Mother Earth's right to good health, and by doing so, protect the right of people to a future free from the impacts of climate change.



• Approach towards climate change

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The Hindu analysis by saurabh.pandey sir



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A lesson from Taiwan in quake resilience

In the last two decades, major earthquakes have occurred in many parts of the world including Indonesia, Japan, China, Italy, Nepal, Afghanistan, Pakistan, Ecuador, Mexico, Morocco, and the Turkey-Syria border. On April 3, Taiwan was struck by an earthquake of 7.4 magnitude. These earthquakes cannot be treated as random occurrences, as earthquake-prone regions share some tectonic similarities.

Earthquakes occur in certain regional bands. The spatial distribution is explained by the theory of plate tectonics, which explains how the Earth's outermost layer, the lithosphere, is broken into 15 major fragments or plates which are constantly moving relative to each other. This is why powerful earthquakes are concentrated along convergent plate boundaries like the Himalayas, a tectonic product of the convergence of the Indian and Eurasian plates.

The earthquake in Nepal in 2015 caused severe devastation in central Nepal, but spared India. This was an example of an earthquake originating from under the Himalayas. On April 4, 2024, the region around Manali in Himachal Pradesh was struck by an earthquake of magnitude 5.3. On the same day, 119 years ago, an earthquake occurred near Kangra, not far from Manali, killing thousands of people and levelling the buildings in the region.

The story of two earthquakes

In the Taiwan region, the Philippine Sea plate is moving northwest towards the Eurasian plate at a velocity of about 7.8 cm per year, which is faster than the motion of the Indian plate. Lying 160 km off the coast of China, Taiwan was formed at a convergent boundary of the Philippine and Eurasian plates in the western Pacific Ocean. It is a country of strong earthquakes. The latest one occurred near the city of Hualien on the eastern coast. In 1999, the Chi-Chi



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earthquake of magnitude 7.7 occurred in the central part of Taiwan and impacted the western region. It killed more than 2,430 people and left 11,305 wounded. It caused more than 50,000 buildings to collapse and partially damaged as many.

The Hualien earthquake killed at least 13 people and injured about 1,000. Most of the deaths were caused by earthquake-triggered rockfalls and not by toppled buildings. Despite being of nearly comparable magnitude, the 2024 earthquake has caused minimal damage compared to the 1999 earthquake.

What is remarkable is that even in Hualien city, located within the epicentre of the latest earthquake, where shaking is expected to be most intense, only about 50 residential buildings and a nine-storey building partially collapsed. In the capital city of Taipei, only 10 houses were severely damaged. These were reported to have been constructed before the implementation of stringent building codes following the 1999 Chi-Chi earthquake.

The 1999 earthquake was a major wake-up call that led to critical administrative reforms to improve emergency response and reduce disasters. The government passed the Disaster Prevention and Protection Act and set up two national centres to handle earthquake coordination and training. Between the Chi-Chi and Hualien earthquakes, Taiwan mounted a consistent effort in implementing building codes.

Today, Taiwan's earthquake preparedness is among the most advanced in the world. The island nation has the most advanced earthquake-monitoring network and early warning systems. Widespread awareness campaigns and drills on earthquake safety have improved the public's understanding of earthquake risks. The government constantly updates the earthquake safety requirements of the new and existing building stock and incentivises residents by offering

subsidies to improve the quake resistance of buildings.

Taiwan has been able to reach sound scientific judgements based on how severe the shaking would be in each location. With the knowledge of the frequency of earthquakes in each source and how severely the ground shakes in a particular area, specific seismic codes can be designed, and specific construction norms can be followed. Taiwan could also use new technologies such as seismic dampers and base isolation systems. Taiwan's most iconic building, Taipei 101, escaped damage during the latest earthquake. One of the components that helped the building retain its integrity was a tuned mass damper, a 660-metric-ton steel sphere suspended by cables within the tower. This acts as a giant pendulum to counter any motion of the building.

What India can do

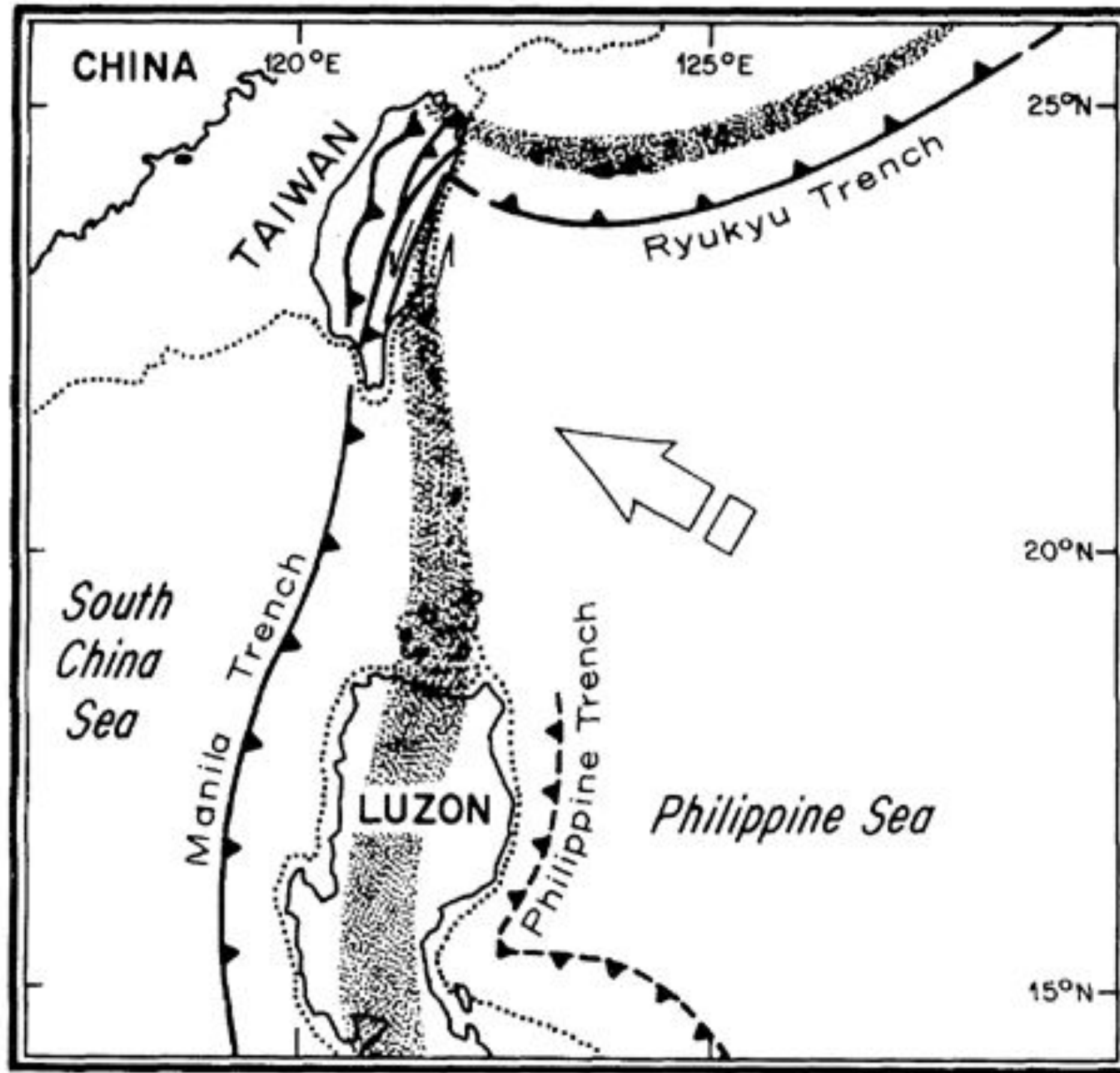
As India is going through a major phase of infrastructural expansion in many tectonically unstable regions including the Himalayas, sometimes flagrantly violating the norms that should be followed in ecologically sensitive areas, earthquake safety should be of particular concern. All infrastructural projects must comply with seismic safety regulations. The Taiwan earthquake provides important lessons for India. These include following seismic codes, constructing safer engineered structures, and overcoming inadequacies in the enforcement and non-compliance of seismic codes. These codes, unique to a particular region, are prepared based on local earthquake activity, building types, and construction materials. Indian code IS 1893 specifies seismic designs based on seismic zonation maps so that buildings do not collapse. In some parts of India, traditional architectural styles possessing earthquake resistivity can be rediscovered and encouraged.



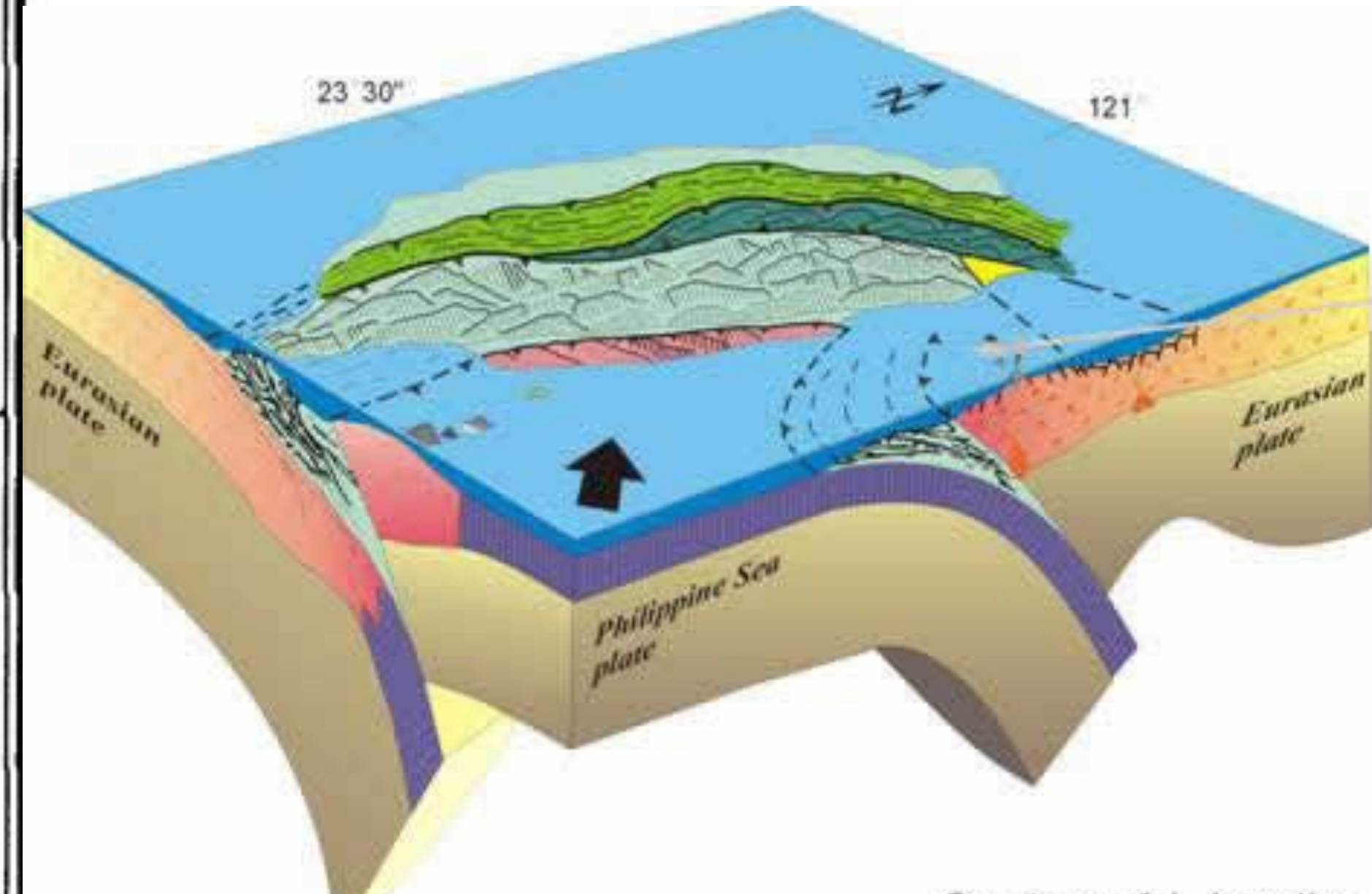
Earthquake in Taiwan

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..... 200 m isobath Volcanic Arc



earthquake preparedness

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What are rules around star campaigner

What does the Representation of the People Act, 1951 state about the expenditure incurred by 'leaders of a political party'? What was the advisory issued by the Election Commission to star campaigners? What did the Supreme Court rule with respect to the matter in 2020?

EXPLAINER

Rangarajan. R

The story so far:

Sunita Kejriwal, wife of Delhi Chief Minister Arvind Kejriwal, was appointed as a 'star campaigner' by the Aam Aadmi Party (AAP) for its campaign in Gujarat.

What are the legal provisions?

Section 77 of the Representation of the People Act, 1951 (RP Act) provides for law relating to expenditure incurred by 'leaders of a political party'. These 'leaders of a political party' are popularly known as 'star campaigners'. These star campaigners are usually the top leaders of a political party but can include other celebrities as well. The only requirement is that these persons have to be members of the political party that appoints them. The RP Act provides that a recognised political party (national or State) can appoint a maximum of 40 star campaigners while a registered unrecognised political party can appoint up to 20. These names are to be communicated to the Election Commission (EC) and Chief Electoral Officer (CEO) of the States as applicable within seven days from the date of notification of such election. In case of a multi-phase election, a political party can submit separate list of star campaigners for different phases. However, it is noticed that all major parties provide a single list for a State that is applicable for all phases.

What are the benefits?

The RP Act provides that expenditure incurred by the 'leaders of a political party' on account of travel by air or any other means of transport for campaigning for their political party shall not be deemed to be part of the election expenditure of a candidate of such party. The election expenditure limit for candidates is ₹95 lakh per Lok Sabha



To the polls: Sunita Kejriwal addresses INDIA bloc's 'Ulgulan Nyaya Maha Rally', in Ranchi on April 21. ANI

constituency in larger States and ₹75 lakh in smaller States. Hence, these star campaigners would be vote-fetchers for candidates set up by respective parties without affecting their expenditure limit. However, this is applicable only if the star campaigners limit themselves to general campaigning for the party. If in any rally/meeting organised, the star campaigner seeks votes in the name of contesting candidate(s) or shares the dais with them, then the rally/meeting expense shall be apportioned to the election expenditure of such candidate(s). If the star campaigner incurs boarding/lodging expenses while campaigning for any candidate(s), it shall be included in the expenditure account of such candidate(s) irrespective of whether it is paid for by the candidate(s). Further,

if any candidate(s) travel with the star campaigner, then 50% of the travel expenditure of the star campaigner shall also be apportioned to such candidate(s).

What are the issues?

The EC has issued an advisory to all political parties to maintain decorum and restraint in campaigning and raise the level of election to 'issue' based debate. It also put star campaigners on notice in case of any violations. The star campaigners of all parties have been guilty of using inappropriate and abusive words against leaders of other political parties – appealing to caste/communal feelings of electors and making unsubstantiated allegations. In January 2020, during a campaign for the Delhi Assembly election, the EC had ordered

removal of Anurag Thakur and Parvesh Verma of BJP from the list of star campaigners for making inflammatory utterances that violated the Model Code of Conduct. In another instance in November 2020, during the campaign for bye-elections to the Madhya Pradesh Assembly, the Supreme Court stayed the order of the EC revoking the star campaigner status of Kamal Nath of the Congress party for making a derogatory statement against a woman candidate of the BJP. The court observed that the EC does not have any such powers. Another issue is with respect to the assessment of expenditure incurred for the rally/meeting of such star campaigners which is always significantly lower than the actual expenditure. This may be due to the rate card used by the EC that does not reflect current market rates for various items. This results in lower apportionment of expenditure to contesting candidates.

What needs to be done?

At present, the RP Act stipulates that political parties can appoint or revoke the appointment of star campaigners. As per Article 324 of the Constitution, the EC is the highest authority that has been vested with the powers of superintendence and control of elections. Hence, the law may be amended to authorise the EC to revoke the 'star campaigner' status of a leader, in case of any serious violation of Model Code of Conduct, thereby depriving the party candidates of expenditure relief for their campaigns. This would hopefully instil a sense of responsibility among them and ensure that campaigns maintain the necessary decorum and restraint. Also, the assessment and apportionment of rally/meeting expenses where star campaigners' campaign for particular candidate(s) should be made more robust.

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

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Star campaigner

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The Hindu analysis by saurabh.pandey sir



What is the treatment for post-stroke depression?

What are the ways in which disability stemming from a stroke manifests in people? How can post-stroke depression be diagnosed? Is behavioural therapy a good remedy?

Alok Kulkarni

The current World Health Organization definition of stroke is to rapidly develop clinical signs of global disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than one of vascular origin. Stroke is associated with substantial neuropsychiatric morbidity including cognitive impairment, dementia, personality change, and mood disorders. Disability stemming from stroke is a mixture of physical, mental, and emotional manifestations. The neuropsychiatric features may be a result of the damage sustained by the brain or may be a function of the individual's reaction to the handicaps imposed on them. Depression is more common among stroke survivors, manifesting as post-stroke depression (PSD).

What are the clinical features of PSD?
There are several reasons outlined for the

genesis of PSD, including the stroke location, genetic factors, availability of social support, and personality factors.

The sudden onset of disability may trigger an emotional response. Brain injury and neurochemical changes may produce changes in the mood. PSD due to a stroke is strongly associated with impaired daily-life activities. The individual may have a family history of depression or may have had a depressive episode prior to the stroke.

To diagnose PSD, a clinician will have to rule out other pathologies mimicking depression. Some stroke symptoms in hospitalised patients overlap with depressive symptoms, including weight loss, fatigue, and altered sleep patterns. A clinician will need to look for symptoms such as dysphoria, loss of pleasure in previously pleasurable activities, feelings of guilt or worthlessness, impaired concentration, indecisiveness, and suicidal thoughts. Speech difficulties occur in about 30% of stroke patients, posing a major challenge to an accurate

diagnosis of depression.

Classificatory systems, while far from perfect, have certain criteria for diagnosing PSD. For example, the DSM-5 describes PSD as a depressive disorder caused by another medical condition. While many studies have prepared different estimates of the frequency of PSD, the majority zero in on a prevalence of around 30%. Gender is not a significant risk factor although some studies have identified the sex to be.

How is PSD treated?

Treating PSD involves biological, psychological, social, and rehabilitation paradigms. Such holistic and comprehensive care may not always be feasible in resource-constrained settings.

Small studies have found cognitive behavioural therapy to be effective at ameliorating depressive symptoms in stroke patients. Behavioural activation therapy could prolong the frequency of enjoyable events. Reminiscence therapy involves recalling prominent life events

and pleasant memories to enhance belonging. Research has shown it can reduce the burden of depressive symptoms following a stroke. Brain stimulation modalities, such as repetitive transcranial magnetic stimulation and transcranial direct current stimulation, have also been effective at relieving PSD.

Psychiatrists may also use antidepressants to treat PSD. There is sufficient and reliable evidence of these drugs' reliability and efficacy. But when doing so, the psychiatrist must carefully consider the type of antidepressant and regularly monitor the individual. The psychiatrist must also discuss the benefits and possible risks before initiating antidepressant therapy. There is also evidence to initiate antidepressant therapy prophylactically in stroke patients, to prevent the onset of depression.

Stroke is a common condition associated with significant morbidity. A common neuropsychiatric sequel of stroke is PSD. If left untreated, it can lead to low-quality of life. With the right treatment approaches, a full remission of depressive symptoms is possible. Stroke-ready hospitals and stroke physicians should work closely with neuropsychiatrists to facilitate better patient outcomes.

Alok Kulkarni is a senior interventional neuropsychiatrist at the Manas Institute of Mental Health and Neurosciences in Karnataka. He received the IMH Marshall Fellowship in Mood Disorders from the University of British Columbia, Vancouver.

THE GIST

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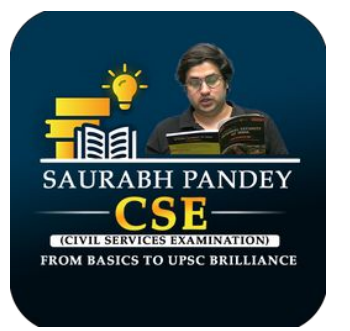
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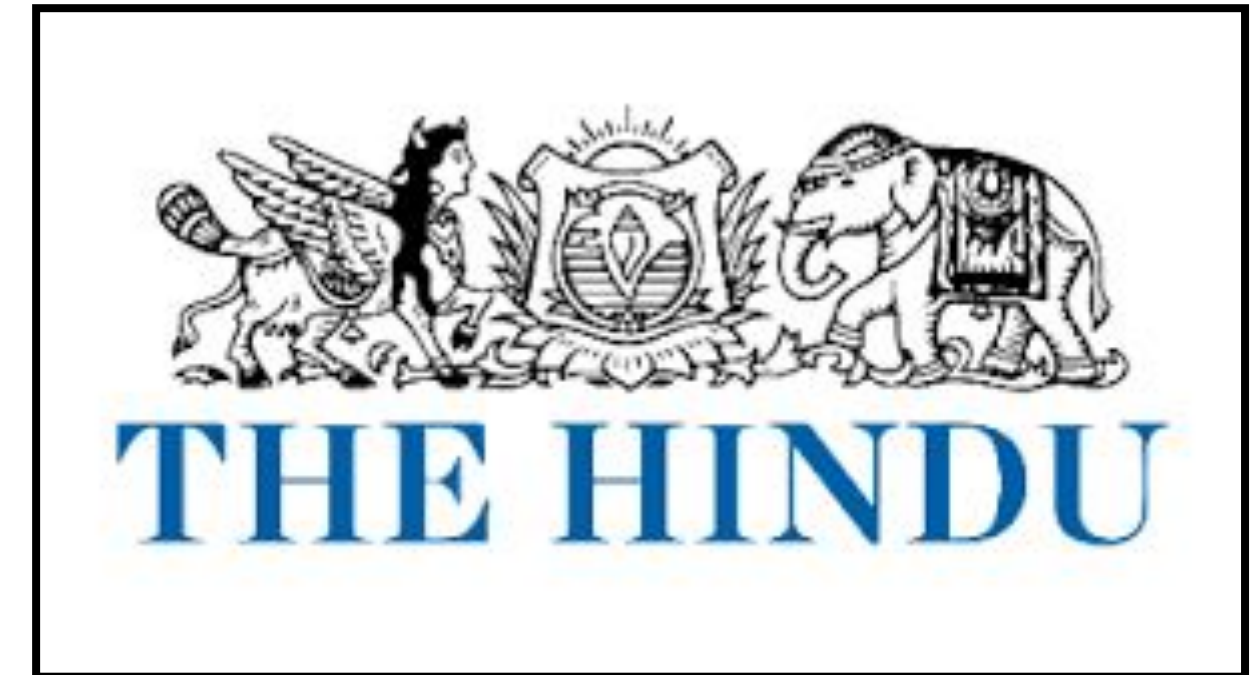


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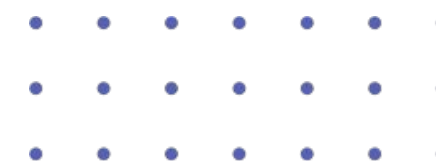
Topics



- Defense against virus
- The fizz in the shaving cream
- Report on Income and Wealth Inequality in India
- PMAY
- Glacial lakes expanding
- Mains



By saurabh pandey sir

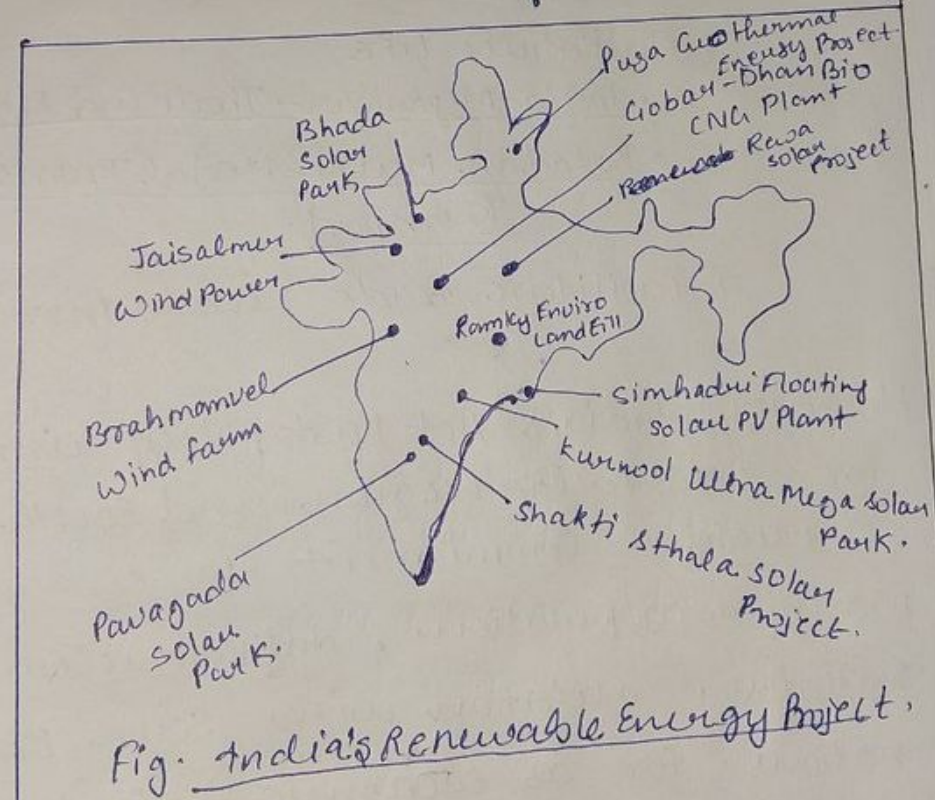


Madhuri Gupta

Renewable energy expansion will impact food security and biodiversity. Examine.

Renewable Energy refers to energy derived from natural resources that are restore on human timescale such as wind, solar, rain, tides and geothermal heat.

The expansion of Renewable Energy can have both positive and negative impact on food security and biodiversity.



In COP28 • India target to achieve 500 GW by 2025.
• Green development Pact → tripling of RE was possible for 80% and emissions.

Positive impact food security and biodiversity

• Environment Relations

- Reduce reliance on fossil fuels.
- Mitigate climate change with help of RE.
- Renewable Energy like wind and solar produce electricity without emitting GHG.
- Reduced Environment degradation.

• Social Relations

- Increase Energy infrastructure.
- Land use efficiency
- Eg → Panel and wind turbines requires less land.
- Preserve land for agriculture, Natural habitats.
- Conserve water.

• Economic Relations

- Increase in investing can create more jobs.
- So economic opportunities improves.
- So enhance food security.
- So developed economic.
- Jobs in R.E is alternative income for rural.

Negative impact of food security and biodiversity.

• Environment Relations

- Disrupt ecosystem and threaten Biodiversity
- due to construction of R.E introduced varieties type of species and plants.

Social Relations

- Land use conflict
- Solar panels and solar park requires large scale land area.
- To reducing food production and harm biodiversity.
- Water scarcity.

Economic Relations

- due to infrastructure wildlife corridor, habitat corridor or green corridor
eff impact Eg → access Roads
- disrupt wildlife populations
- Monoculture farming practices are less supportive for production of food.

Steps taken

- Land use planning and Management.
- Strategic site location/selection.
- Water Resource Management.
- Sustainable Production
- Local community Engagement

Renewable Energy Balancing due to expansion with land use planning, environmental and Economical assessment are vital role to minimize negative impact on food and security and biodiversity.

New type of host defence against Zika, dengue viruses revealed

In an elegant series of experiments, researchers showed that some extracellular vesicles bear the same proteins on their surface that some viruses use to enter cells, and that they compete with these viruses for the same receptors and crowd them out, preventing an infection

Arun Panchapakesan

The mere presence of a virus in a bodily fluid doesn't mean it is transmitted via that route. Zika, dengue, and chikungunya viruses are present in fluids like saliva and semen but don't spread orally or sexually. This fact has puzzled scientists for years, and now a research team has finally explained why.

On March 29, 2020, the World Health Organisation (WHO) posted a tweet that sparked concerns among scientists and prompted many to contact the WHO to say there was enough evidence to discredit the tweet's contents, and suggest it steer clear of such assertions. The tweet was later proven to be factually incorrect but the WHO remained unconvinced for almost two years.

It read "FACT: #COVID19 is NOT airborne".

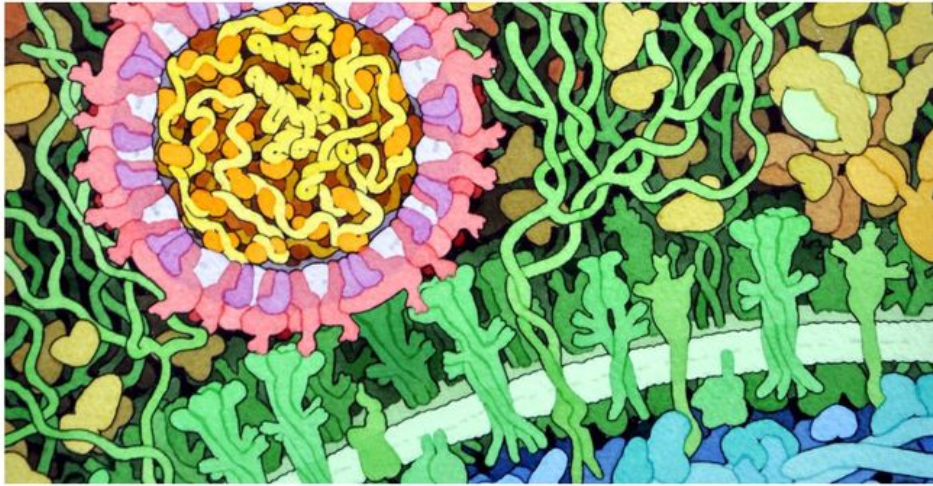
Transmission is a crucial event in a virus's life cycle, yet studying it has been very tricky. A virus that can't transmit is of no consequence to anyone. Successful viruses have extraordinary adaptations selected through years of evolution to ensure they can jump to new hosts.

What does a virus do inside the body?
Most human viruses achieve this by ensuring they are present in bodily fluids that contact the outer environment, and subsequently, a new host.

Once inside the new host, a virus must be present at the correct location to infect new target cells. Viruses are usually highly selective in the cells they infect. This phenomenon, called tropism, occurs because most viruses have special proteins on their outer surface that make contact with a receptor on the host cell. Any cell-type that makes the receptor can be infected by the virus.

For example, the receptor for HIV is a protein called CD4. Only cells that make the CD4 protein, such as T-cells and macrophages, can be infected by HIV. Similarly, SARS-CoV-2 uses a receptor called ACE2. Cells of the respiratory tract and some cardiovascular cells all express ACE2, and are target cells for SARS-CoV-2. HIV can't infect respiratory cells, and SARS-CoV-2 can't infect T-cells or macrophages.

Viral transmission is an outcome of a chase inside the host: between the virus making copies of itself and the immune system trying to destroy the virus and infected cells. The virus must transmit before the immune system beats it or the host dies. One strategy viruses use to achieve this is by making proteins on the surface that have receptors on multiple cell-types. Such a strategy will allow them to infect different cell-types, allowing



A space-fill drawing showing a cross-section through a Zika virus particle as it interacts with a cell. The two main proteins of the viral envelope are shown in red and purple. The lipid membrane of the envelope is shown in lavender. The capsid proteins, in orange, are shown interacting with the RNA genome, in yellow, at the virus's centre. The cell-surface receptor proteins are in green, the cytoskeleton in blue, and blood plasma proteins in gold. DAVID GOODSELL (CC BY 4.0)

access to multiple body fluids, enabling faster transmission.

What is the PS receptor?

One such receptor is for a protein called phosphatidyl serine (PS). The PS protein is usually expressed by dying cells in the body, as a signal to the immune cells to destroy them. The immune cells express the PS receptor and fuse themselves with these cells, quietly destroying them. Viruses hijack this pathway with a process called apoptotic mimicry: by expressing the PS protein on their own surfaces, allowing them to infect the very cells that will destroy them.

The WHO's tweet and its subsequent withdrawal exemplifies the difficulties of studying viral transmission. The problem is especially challenging when we're studying viruses that can use the PS receptor for entry. Since the PS receptor is expressed by many cells – apart from some cells of the immune system – the virus tends to be present in multiple compartments. Yet, the mere presence of a virus in a given compartment wouldn't guarantee transmission from that route.

For example, the Zika virus can be detected in semen, saliva, and breast milk but rarely spreads through these means despite the presence of target cells in the oral and genital cavities. Zika transmits mainly via mosquitoes.

How does the body defend itself?

Now, scientists at the Institute of Molecular Virology at the Ulm University



Transmission is a crucial event in a virus's life cycle. A virus that can't transmit is of no consequence to anyone. Successful viruses have extraordinary adaptations selected through years of evolution to ensure they can jump to new hosts

Medical Centre, Germany, have identified a novel defence mechanism the human body uses to prevent Zika and some other viruses from transmitting via non-conventional routes. The study, published in the journal *Nature Microbiology* on March 25, explains how the body uses extracellular vesicles in these bodily fluids to inhibit viral infection.

Vesicles are small structures enclosed by fat that a cell uses to transport substances from one part of the cell to another. When they are secreted outside the cell, they're called extracellular vesicles. The researchers discovered that these extracellular vesicles are abundant in saliva and semen and contain the same PS proteins on their surface that viruses like Zika use for infection. The team also discovered that the concentration of these extracellular vesicles that contain PS is low in the blood and high in saliva and semen.

THE GIST

▼
A virus must be at the correct location to infect new target cells. Viruses are selective. This is because viruses have special proteins on their outer surface that make contact with a receptor on the host cell. Any cell-type that makes the receptor can be infected

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The HIV receptor is CD4. Only cells that make CD4, such as T-cells and macrophages, can be infected by HIV. SARS-CoV-2 uses a receptor called ACE2. Cells of the respiratory tract express ACE2, and are targets. HIV can't infect respiratory cells, and SARS-CoV-2 can't infect T-cells

▼
Viral transmission is an outcome of a chase inside the host: between the virus making copies of itself and the immune system. The virus must transmit before the immune system beats it or host dies

Through a series of experiments, they demonstrated the PS-containing vesicles compete for the same receptors the viruses use for entry, thus crowding the latter out and preventing an infection.

What does the discovery portend?

The group also showed that all viruses that use the PS receptor for apoptotic mimicry – the dengue, chikungunya, West Nile, ebola, and the vesicular stomatitis viruses – are inhibited by the presence of extracellular vesicles. The vesicles' presence didn't affect the infectivity of viruses that don't use the PS receptor for entry, such as HIV and SARS-CoV-2.

The discovery of PS-coated vesicles for immunity represents a novel type of host defence against viral infection. While it is too early to speculate on potential therapeutic applications from this discovery, it opens up avenues for further research.

One thought-provoking, but also far-fetched, notion arising from the study is the possibility that PS-containing vesicles in humans could have influenced the evolution of mosquito-borne viruses. Perhaps these viruses were forced to look for an alternative when they couldn't spread through saliva or semen, and, to paraphrase Michael Crichton, "life found a way."

(Arun Panchapakesan is an assistant professor at the Y.R. Gaiithonde Centre for AIDS Research and Education, Chennai.)



Defense against virus

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the Hindu analysis by saurabh.pandey sir



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QUESTION CORNER

The fizz in the shaving cream

Q

Q. How do they get all that shaving cream into an aerosol can?

A: Shaving cream is basically soap and water. It is put into a can along with compressed butane gas. Without the gas, all you have is soapy liquid.

When the valve is pressed, some of the gas mixes with the soap and water, escapes, and expands to make foam.

The filling process is like the process used to fill air in the tube of a tyre, or even a balloon.

As long as the pressure is maintained in a closed system and the gas from a pressurised source is not allowed to escape, it takes up a very small amount of space.

The fact that any pressurised gas expands when the pressure is released means that a small quantity of soap and water can make a whole lot of foamy bubbles.



Since pressurised gas expands when the pressure is released, it means that a small quantity of soap and water can make a whole lot of foamy bubbles. GETTY IMAGES

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



The ☐fizz in the shaving cream

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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

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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”.





Report on Income and Wealth Inequality in India

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An overview of the PMAY-U scheme

What are the objectives of the Pradhan Mantri Awas Yojana scheme? How has the in-situ slum redevelopment vertical under the scheme fared? Has the participation of the private sector in social housing been a success? What is the Centre's contribution to the overall investment expenditure?

EXPLAINER

Tikender Panwar

The story so far:

As the current Union government completes two terms, one of its flagship programmes was Housing For All (HfA) by 2022, both in urban and rural areas, planned under the PMAY (Pradhan Mantri Awas Yojana) scheme in 2015.

What is the PMAY scheme?

While the PMAY is a centrally sponsored scheme both the Union and the State governments are supposed to financially contribute to it. The declared objectives of the scheme included rehabilitation of slum dwellers with private developers' participation; promotion of affordable housing for the weaker sections through Credit Linked Subsidy Schemes (CLSS); affordable housing in partnership with public and private sectors; and subsidy for Beneficiary-led Construction (BLC).

How has the scheme panned out?

Even though two more years have passed since the supposed completion of the scheme, HfA remains a distant reality. In August 2022, the government approved the continuation of the PMAY-Urban (PMAY-U) up to December 31, 2024, for the completion of already sanctioned houses till March 31, 2022.

Currently, according to the government's estimates, there is a shortage of around 20 million houses in rural areas and three million in urban centres. However, these figures do not speak of the actual reality. Till 2023, the urban shortfall was more than 60 lakh houses. According to a study by the ICRIER, urban housing shortage increased by 54%, from 1.88 crore in 2012 to 2.9 crore in 2018. Thus, the PMAY-U has actually faltered. Even according to data from the PMAY dashboard (as of April 15), there is a shortfall of around 40 lakh houses from the sanctioned and



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completed segments. This means that the vertical that is supposed to meet the largest demand, called in-situ slum redevelopment (ISSR), has failed. According to a PIB press release, under the ISSR, which is the most pressing need in cities, only 2,10,552 houses have been sanctioned for eligible beneficiaries. According to another report by *Newslandry*, the PMAY-U has only addressed a 25.15% of the housing shortage by delivering 80 lakh homes. Even if the remaining houses sanctioned are constructed by the end of 2024, it would have addressed just about 37% of the real need. Almost 2.4 crore households will still be without a roof.

The current housing programme which was a kind of merger of the Rajiv Awas Yojana into the PMAY has spent over \$29 billion in the last five years providing

support for both rural and urban low-cost housing. Despite this focus and budgetary infusion, "Housing for All" remains an unfulfilled promise.

What ailed the PMAY?

The scheme is euphoric in the participation of the private sector in bridging the gap of public investments in social housing. The current estimates suggest that in the Indian urban landscape around 40% (according to the World Bank, 49%) of the people are living in both designated and informal slums. Hence, the success of the PMAY was dependent on addressing the housing question in the slums.

In some of the projects where spaces occupied by the slum dwellers were handed to private players, the vertical growth of such settlements created more

problems for the residents rather than addressing them. Take for example a multi-storey building with the recurring cost of water, electricity and sewerage utilities which at times went beyond the scope of residents' expenditure. Building typologies and linear design with squeezed spaces dissuaded people from occupying such houses. Land was also a major issue. Land registered under airports, railways, forests, etc., was impossible for ISSR. Moreover, plans for ISSR were drawn up by consultants, without any role from the community.

Another major hurdle is the dichotomy existing between the city's master plans and PMAY-U. Most of the cities' plans are now being dictated by big consultants who favour large capital-intensive technological solutions. Take for example, the transit-oriented development models being advocated by the Delhi Development Authority in its 2041 master plan. It does not speak about social housing and states that this must come from market forces. In such a scenario, almost all verticals of PMAY fail.

It is worth noting that the Centre's contribution to the overall investment expenditure under this scheme is just about 25%, or ₹2.03 lakh crore. The bulk of the money is shelled out by the beneficiary households themselves, that is 60% or ₹4.95 lakh crore. State governments (together with Urban Local Bodies) spend ₹1.33 lakh crore on the scheme as well. The architecture of PMAY does not address the landless and the poor. Around 62% of the houses sanctioned come under the BLC vertical where the government's role is limited to just cost sharing with the beneficiaries. CLSS beneficiaries are supposed to be 21%. In both the above, the government has a limited role with just the provision for providing interest subsidy, whereas land is owned by the beneficiaries. Slum-dwelling families that are to be rehabilitated under ISSR make up just about 2.5% of the total beneficiaries.

The writer is former deputy Mayor, Shimla, and Member, Kerala Urban Commission.

THE GIST

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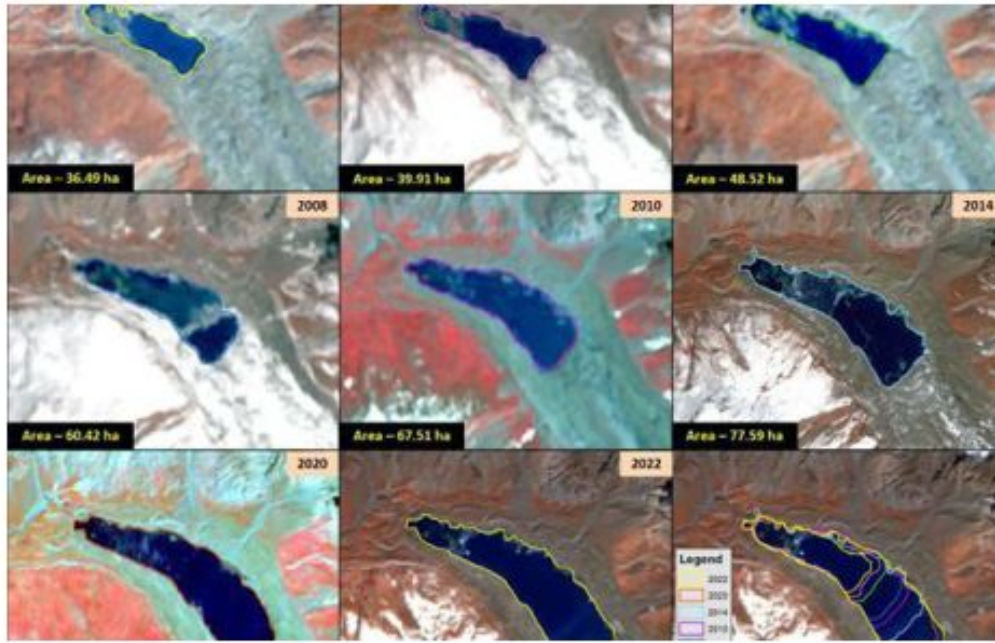


Many glacial lakes expanding, show ISRO images of catchments of Indian Himalayan river basins

Hemanth C.S.
BENGALURU

The Indian Space Research Organisation's (ISRO) long-term satellite imagery covering the catchments of Indian Himalayan river basins from 1984 to 2023 have shown significant changes in glacial lakes.

According to the ISRO, of the 2,431 lakes larger than 10 hectares identified during 2016-17, 676 glacial lakes have notably expanded since 1984. "Specifically, 130 of these lakes are situated within India, with 65, seven, and 58 lakes lo-



The long-term changes in the Ghepang Ghat Glacial Lake area.

cated in the Indus, Ganga, and Brahmaputra River basins, respectively. Of the 676 lakes, 601 lakes (89%)

have expanded more than twice, 10 lakes have grown between 1.5 to 2 times and 65 lakes 1.5 times," the IS-

RO said. It said the elevation-based analysis reveals that 314 lakes are located in the 4,000 to 5,000 m range and 296 lakes are above 5,000 m elevation.

The glacial lakes are categorised based on their formation process into four broad categories, namely Moraine-dammed (water dammed by moraine), Ice-dammed (water dammed by ice), Erosion (water dammed in depressions formed by erosion), and other glacial lakes.

"Among the 676 expanding lakes, the majority of them are Moraine-

dammed [307] followed by Erosion [265], other [96], and Ice-dammed [8] glacial lakes, respectively," the space agency said.

Assessing flood risk

It added that satellite-derived long-term change analyses provide valuable insights for understanding glacial lake dynamics, which are essential for assessing environmental impacts and developing strategies for Glacial Lake Outburst Floods (GLOF) risk management and climate change adaptation in glacial environments.



Glacial lakes expanding,



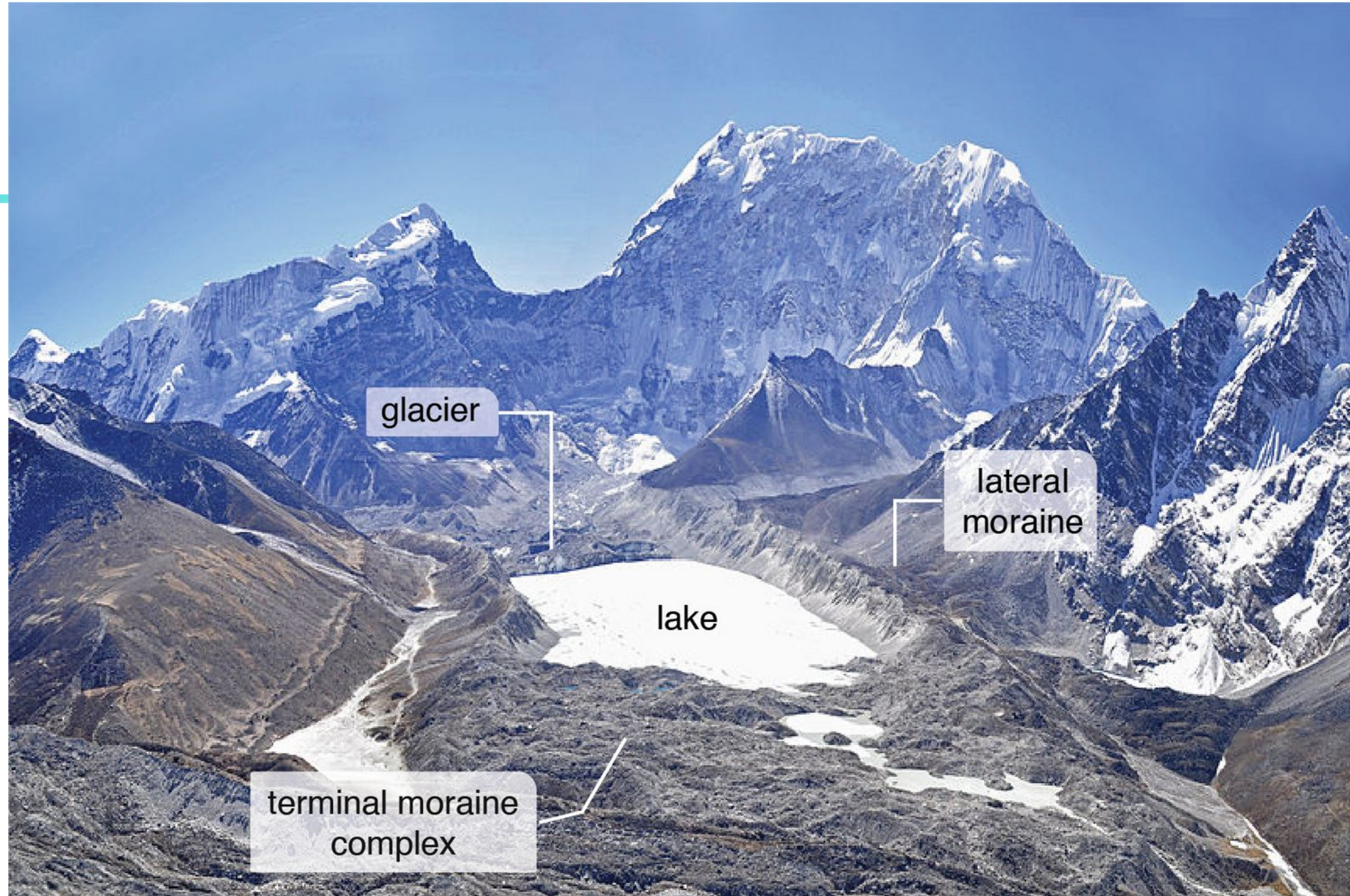
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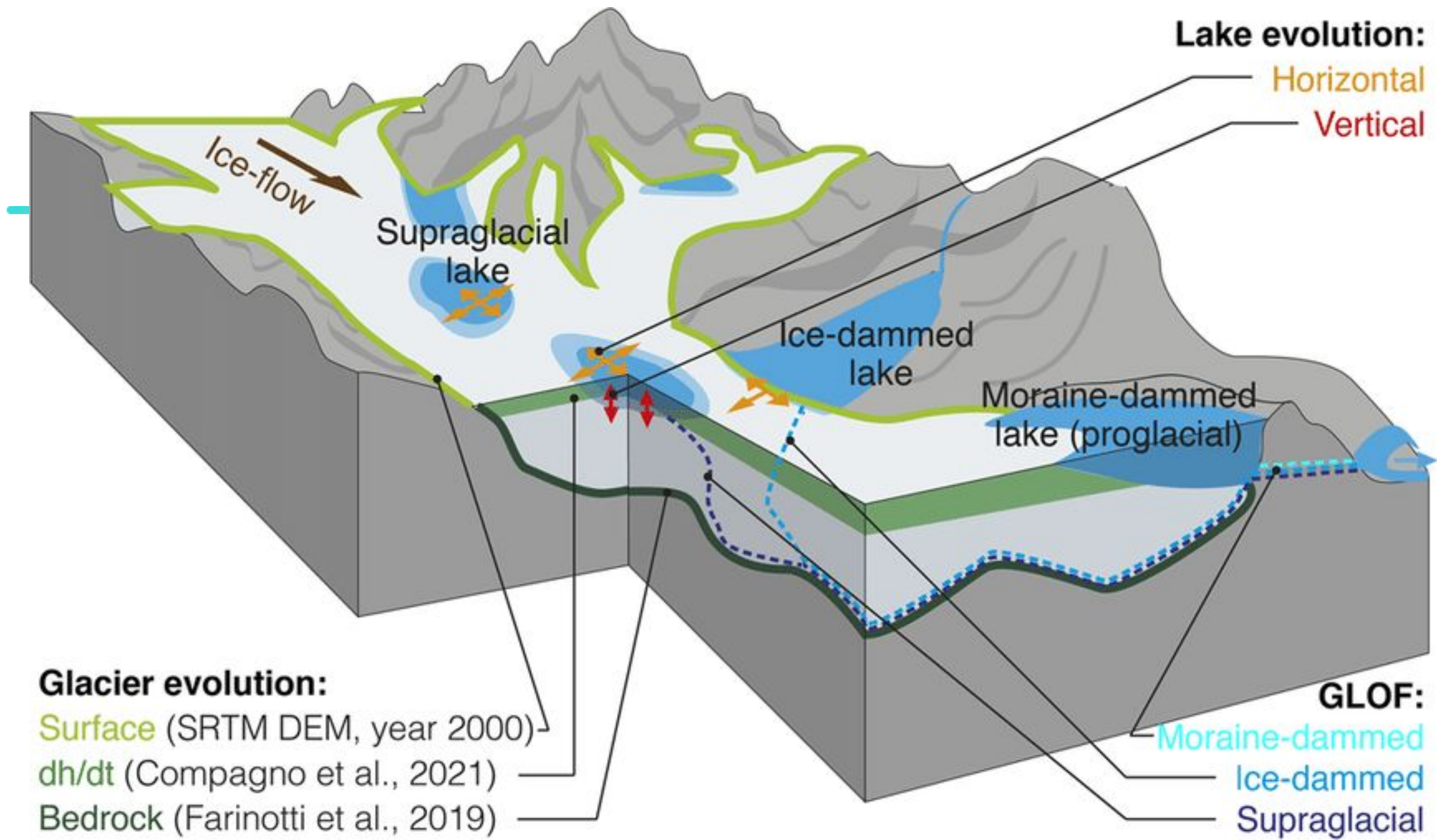
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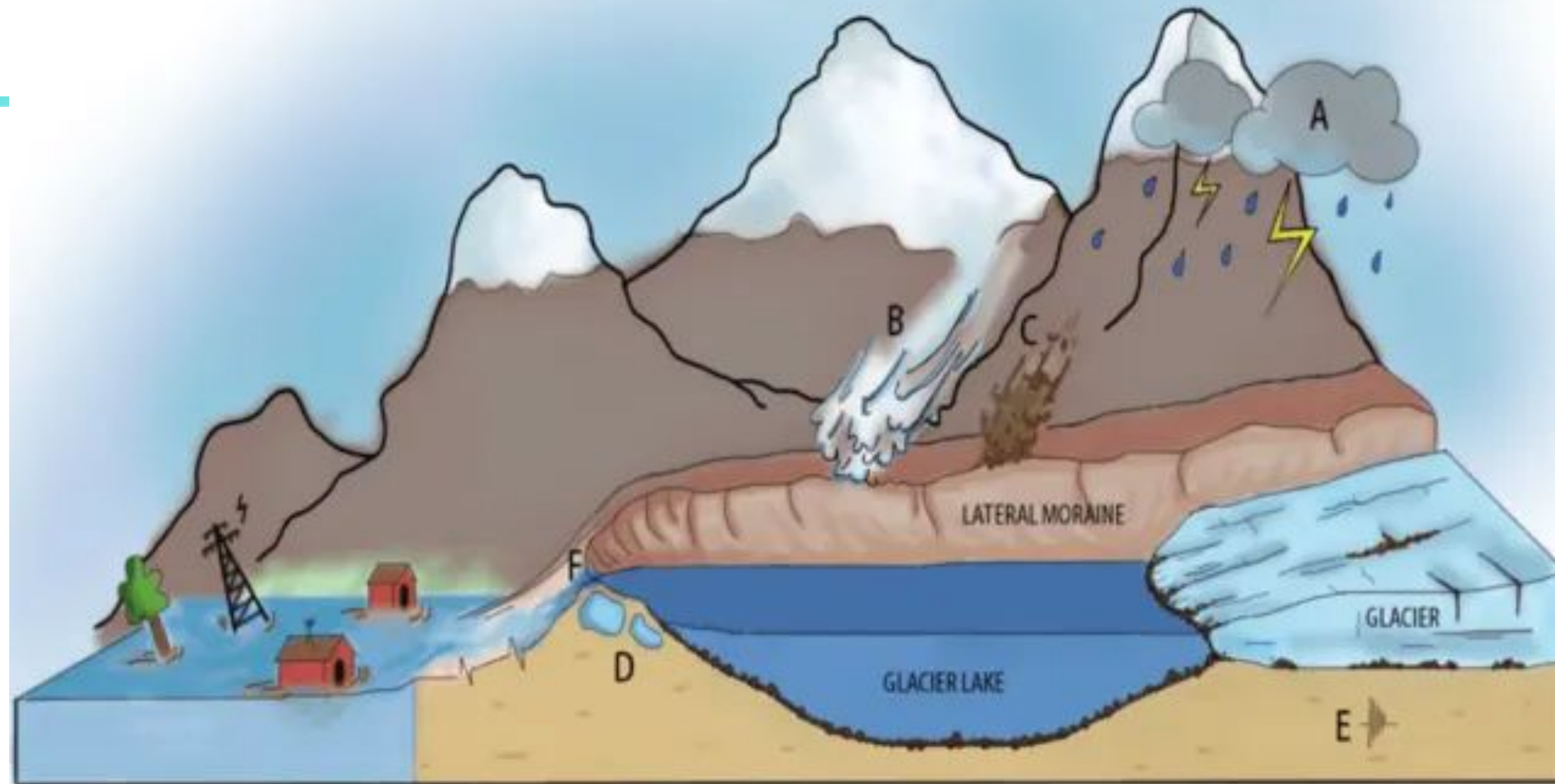





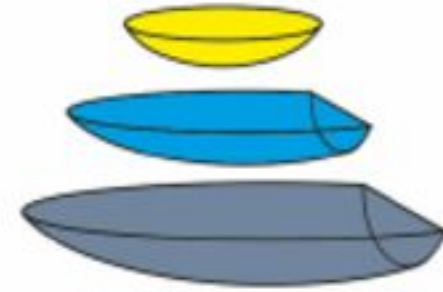
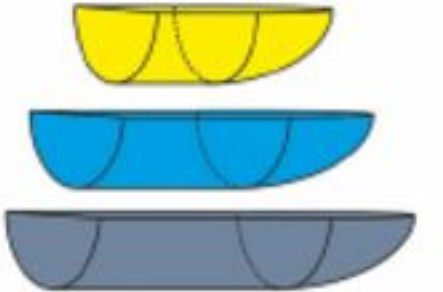
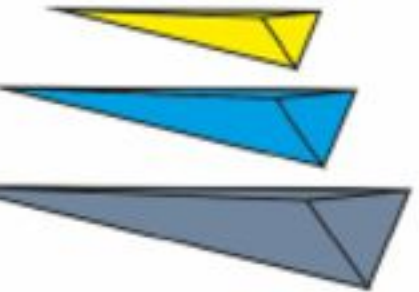
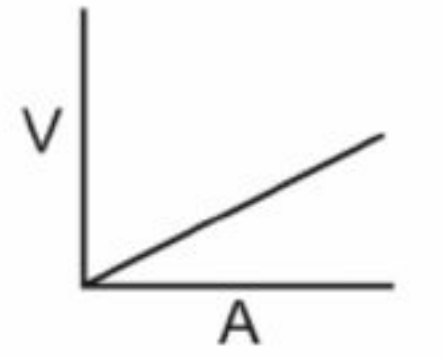
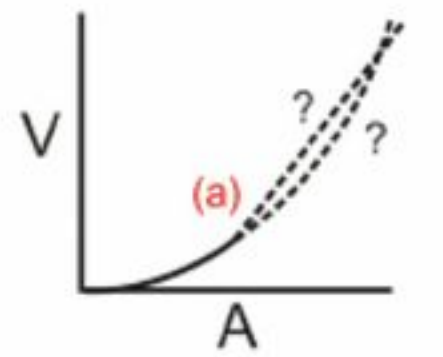




Figure-1: Illustrative graphic showing various reasons for GLOF occurrence
 (A) Cloudburst (B) Snow avalanche (C) Landslide (D) Melting of ice in moraine
 (E) Earthquake (F) Overflow

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	Supraglacial ponds	Supraglacial lake	Moraine-dammed lake	Ice-dammed lake
a				
b	Belvedere Lake, Italian Alps	Ngozumpa Tsho, Nepal	Tasman Lake, New Zealand	Kyagar Glacier, Pakistan
c	Kääb et al., 2003	Thompson et al., 2012	Dykes et al., 2011	Haemmig et al., 2014
d	Expand mainly via marginal melt so tend to be shallow but large areal extent	Expand rapidly via calving once fetch > ~80 m. Multiple calving faces may exist	Expand mainly via calving at glacier terminus. Bottom melting may be minimal	Deep, long, and narrow in areas of high relief. Ice-cliff may dam downstream end
e				
f				
g	Area and volume increase approximately linearly	Relationship may become linear after onset of calving (a)	Area and volume increase approximately linearly	Areal increase is initially dominant but becomes less so as basin fills

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Powerful antidote to toxins in cobra, krait venoms developed

The current process of producing antivenom is outdated, involving injecting large animals with snake venom and collecting the animals' blood for the antibodies it produces. A group of scientists sidestepped animals and used human antibodies instead, eventually finding the potent 95Mat5

Rohini Subrahmanyam

For some people, snakes are exotic yet dangerous creatures of the wild; eerie but elusive, and not something to worry about in day-to-day life. For others, especially some farmers in India and Africa, they are a constant and terrifying threat to life.

Venom from snake bites leads to more than 100,000 deaths every year, with around 400,000 people left permanently disabled. The mortality burden is especially higher in low and middle-income countries in Africa and Asia, with India alone at a staggering average of 58,000 deaths in a year according to a 2020 report. However, considered a "poor man's disease", relatively less attention has been paid to the devastation caused by the bites. In some of these countries, snakebite incidence is distressingly high but inadequate access to proper healthcare prevents fast and efficient treatment, leading to disproportionately more deaths.

Things were set to improve in 2017 when the World Health Organization (WHO) finally stepped in to alert the world about one of its biggest hidden health crises. It officially classified snakebite envenoming as a highest priority neglected tropical disease.

Animals in the middle

A major issue is that the current process of producing antivenom is outdated; it involves injecting large animals like horses with snake venom and collecting the animals' blood for the antibodies it produces against the venom.

But the horses' blood could contain antibodies against other microorganisms as well, even against other components of the venom that are not harmful to humans. So only a fraction of the antibodies in the antivenoms is useful to humans, leading to more variability and the need for larger doses.

In addition, because these antibodies are produced in another animal, the chances of humans developing an adverse or allergic reaction to these antivenoms are also higher.

A variety of venoms

Driven by these concerns, a group of scientists – part of a consortium funded by the Wellcome Trust – decided to sidestep animals and use human antibodies instead. Using a type of toxin found in many kinds of snakes, they synthetically developed a broadly applicable human antibody against the toxin. Their results were recently published in the journal *Science Translational Medicine*.

"Venoms of snakes in India are so diverse that venoms of the same species across regions can't be neutralised by the same antivenom," Kartik Sunagar, head of the Evolutionary Venomics lab at the Indian Institute of Science, Bengaluru, and one of the lead authors of the study, said.

"Even in the same geographical location, if you look at individuals of the same species, antivenom can only neutralise some venoms and not others. There is a stark variation in venoms, so that's why we wanted to figure out a solution that might work across regions



The banded krait (*Bungarus fasciatus*) is a large species of elapid snake found in the Indian subcontinent. ARUP2602 (CC BY-SA 4.0)

and across species."

Screening billions of antibodies

The scientists focused on three-finger toxins (3FTxs) – one of the most abundant and lethal ingredients in elapid venoms. Elapids are a major medically relevant family of snakes that include cobras, kraits, and mambas.

The scientists narrowed their focus on α -neurotoxins, a specific class of 3FTxs that target receptors in human nerve and muscle cells. These toxins prevent the receptors from responding to acetylcholine, a neurotransmitter involved in carrying messages from the neurons to the muscles, leading to paralysis, an inability to breathe, and eventually death.

Joseph Jardine, an antibody expert at Scripps Research Institute, in California, led the initial work of "finding the needle in the haystack" – i.e. finding the best antibody that could target the toxins among the billions of human antibodies available.

The scientists first synthesised variants of their toxin of interest, called long-chain 3FTxs (3FTx-L, a type of three-finger α -neurotoxins), in the lab. They then screened billions of human antibodies expressed on the surface of yeast cells for ones that bound best to the toxins in their study. This selection of antibodies far exceeds any number of antibodies that an animal's immune system could cook up in response to a venom. After multiple rounds, they had a shortlist of antibodies that broadly reacted with most of the 3FTx variants they used.

All but king cobra

Nicholas Casewell's group at the Liverpool School for Tropical Medicine in the U.K. then tested the antibodies *in vitro* in human cells, to see which of them could best neutralise the toxins. This step



The mortality burden is especially higher in low and middle-income countries in Africa and Asia, with India alone at a staggering average of 58,000 deaths in a year according to a 2020 report

brought them to an antibody they dubbed 95Mat5.

Finally, Dr. Sunagar's group tested 95Mat5 *in vivo* in mice, to see if this broadly neutralising antibody could help protect against lethal doses of α -bungarotoxin, the 3FTx-L in the highly venomous many-banded kraits. They also injected mice with whole venom from king cobras, black mambas, and monocled cobras – all different elapid snakes from Asia and Africa with venom containing 3FTx-L variants – and tested to check how their antibody worked against them.

They found 95Mat5 worked well against all the snake venoms, protecting the mice from death, with the only exception being the king cobras' venom, where the antibody delayed but could not prevent death.

"We were surprised by the results of the black mamba, where the 3FTx-L is only 17% of the total venom composition. By knocking out that one toxin, we were able to protect mice fully from the other toxins in the venom in what may be a synergistic effect," said Irene Khalek, a scientist at Scripps Research Institute and one of the authors of the study.

An 'impossible' find

"The study is really well-performed, and I would expect that the antibody could be

used as an important component in future antivenoms against mambas and cobras in Africa and Asia," Andreas Hougaard Laustsen-Kiel, head of the Tropical Pharmacology Lab at the Technical University of Denmark, said.

Dr. Laustsen-Kiel was involved in a different study, published in *Nature Communications* last year, where a group of scientists discovered a similar broadly neutralising antibody against long-chain α -neurotoxins from snakes.

"Because snake venoms are so complex, I would have thought it impossible to make an antibody that could knockout the whole venom," Dr. Sunagar said.

Closer to a universal solution

In the current study, the scientists found one reason why their antibody worked so well against their toxins of interest: the crystal structures of their antibody 95Mat5 and 3FTx-L variants revealed that the antibody bound the toxin exactly where the toxin would have bound its target receptor in human nerve and muscle cells. By mimicking the receptor-toxin interaction, the antibody could whisk the toxins away from the receptors and prevent them from exerting their deadly effects.

The current antibody works well against a specific kind of toxin present in the venom of many dangerous snakes, but it is also a small first step towards a universal antivenom.

The scientists said they are keen on discovering specific antibodies like these against toxins in other snake venoms as well, like in vipers.

"We need to discover antibodies for a couple of other toxins, then we can have a universal solution for the majority of snakes in the world," Dr. Sunagar said.

(Rohini Subrahmanyam is a freelance journalist.)



Snakebite as disease

- World Health Organization (WHO) □ stepped in to alert the world about one of its biggest hidden health crises.
- It officially classified snakebite envenoming as a highest priority neglected tropical disease.
- A major issue is that the current process of producing antivenom is outdated: it involves injecting large animals like horses with snake venom and collecting the animals' blood for the antibodies it produces against the venom.
- But the horses' blood could contain antibodies against other microorganisms as well, even against other components of the venom that are not harmful to humans.

The Hindu analysis by saurabh.pandey sir

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The Indian seafarer deserves better in choppy high seas

Amid rising safety concerns among Indian seafarers following the recent attacks on commercial ships in sensitive geographical areas such as the Red Sea and the Strait of Hormuz, India submitted three papers to the 111th Session of the International Maritime Organization's (IMO) Legal Committee (LEG), which is from April 22 to 26, 2024. These submissions address crucial issues such as seafarers' security, contract terms, and broader maritime security challenges. India has stressed the need for a comprehensive approach to maritime security and advocated improved contractual conditions for seafarers. While acknowledging the IMO's efforts to combat maritime fraud, India has called for broader international cooperation to tackle various maritime threats, including piracy, armed robbery, extremist attacks, regional conflicts, and emerging risks such as drone attacks and the use of maritime weapons.

Sea piracy is back

Recent pirate attacks off the coast of Somalia, including hijackings, suggest a resurgence of piracy. In December 2023 and January 2024, Somali pirates targeted vessels such as the *MV Ruen* and *MV Lila Norfolk*. India has called for vigilance, proactive measures, and international cooperation to combat piracy and protect seafarers, in line with the United Nations Convention on the Law of the Sea.

India has also highlighted the impact of unlawful recruitment practices on seafarers' well-being and international trade. Since 2020, over 200 cases of seafarer exploitation have been reported to the Indian Maritime Administration. India has urged international coordination to address these issues and ensure seafarers' rights under the Maritime Labour Convention, 2006.

The maritime industry, vital for global trade, depends heavily on seafarers who often face challenges and risks.

India, with 9.35% of global seafarers and



K.M. Seethi

an Indian Council of Social Science Research (ICSSR) Senior Fellow, is Director, Inter University Centre for Social Science Research and Extension (IUCSSRE), Mahatma Gandhi University (MGU), Kerala. He was Senior Professor of International Relations and Dean of Social Sciences at the MGU

With Indians playing a significant role in keeping the global shipping industry running, their welfare and safety acquires significance

ranking third globally, confronts these issues, evident from recent incidents such as the seizure of *MSC Aries* and the detention of *MT Heroic Idun* at Nigeria (this last case went on for several months).

These events highlight the vulnerabilities of Indian seafarers, catalogued by a survey, showing how a majority lacked legal representation, felt unfairly treated, and were unaware of their rights. India has submitted papers to the IMO's Legal Committee, which emphasise seafarers' security and contract terms. Yet, enhanced international cooperation is needed to safeguard seafarers and ensure uninterrupted navigation, especially amid rising incidents involving Indian seafarers and geopolitical tensions.

Three years ago, the Maritime Union of India highlighted a 40% increase in kidnappings in the Gulf of Guinea, with 134 cases of assault, injury, and threats reported. Incidents such as the kidnapping of 20 Indian nationals from the *MT Duke* (off the western coast of Africa) and the ship owners paying hefty ransoms highlight the dangers faced by seafarers.

An Indian initiative on rights

In response, the Indian government and the National Human Rights Commission (NHRC) launched the 'human rights at sea' initiative. Reports reveal cases of seafarers being held in foreign jails, stranded in foreign waters, and subjected to illegal detentions. 'Human Rights at Sea' has highlighted abuses against Indian seafarers, including 200 held in foreign jails and 65 stranded in Indonesia for 151 days. The NHRC has highlighted the challenges of holding ship owners accountable for violations against Indian seafarers operating under foreign registrations to evade taxes and has stressed the need for proactive cooperation among stakeholders and mechanisms to protect human rights in the maritime industry.

Maritime piracy is a growing concern for Indian seafarers. With around 2,50,000 Indian

seafarers serving on specialised cargo vessels worldwide, recent data from the International Maritime Bureau show a more than 10% increase in serious piracy incidents over the last 10 months. Armed pirates have boarded nearly 90% of targeted cargo ships, endangering seafarers.

Addressing piracy requires a comprehensive land-based solution. While private guards on merchant navy ships can deter piracy, the volatile nature of piracy-prone oceans poses challenges, as highlighted by Bjorn Hojgaard, CEO of Anglo-Eastern Univan Group, a major employer of Indian seafarers.

Further, reports suggest that Iranian shipping companies, in collaboration with international recruiters, exploit Indian seafarers by luring them with false promises of high salaries and opportunities in the Middle East. These seafarers often face overwork, are provided insufficient food, and are forced into transporting illegal cargo, despite paying hefty fees to secure overseas jobs.

Seafarers need support

Despite these risks, many Indian seafarers remain committed to their careers at sea, which makes it imperative to have improved rights and protection. Currently representing 9.35% of the global seafaring population, India aims to increase its share to 20% in the next 10 to 20 years, with ship management companies playing a crucial role.

During the COVID-19 pandemic, Indian seafarers demonstrated their resilience and professionalism, enhancing India's standing in the global maritime market. The Ukraine-Russia conflict has also created opportunities for new players in the Indian maritime sector.

Recent attacks on commercial ships have heightened safety concerns among Indian seafarers, with some considering quitting their jobs due to security fears. This underlines the urgent need for government support and enhanced protection measures.



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On the National Clean Air Programme

Why has the implementation of Clean Air Action Plans been inconsistent? Why are cities not using the allocated funds set aside by the Ministry of Environment, Forest, and Climate Change? What are some of the tools which can improve our understanding of the origins of pollution?

EXPLAINER

Anirban Banerjee

The story so far:

When the Indian government launched the National Clean Air Programme (NCAP) in 2019, it was to cut the concentration of atmospheric Particulate Matter (PM) by 20-30% by 2024, from 2017 levels. This was later revised to 40% by 2026.

What is the NCAP?

Under NCAP, cities continuously violating annual PM levels in India need to prepare and implement annual Clean Air Action Plans (CAAPs). To facilitate this, the Ministry of Environment, Forest, and Climate Change has allocated ₹10,422.73 crore. Most cities proactively submitted their CAAPs yet their implementation has been inconsistent. On average, only 60% of the allocated funds have been used thus far, according to the Ministry, with 27% of cities spending less than 30% of their designated budgets. Visakhapatnam and Bengaluru have spent 0% and 1% of their NCAP funds, respectively. Implementation delays hinder NCAP's success, particularly delays in approvals from the competent authorities (for example, the technical specification of tendering processes or for procuring products such as mechanical sweepers and electric buses).

There is also a lack of standard operating procedures for the implementation process. Time-consuming tasks required to implement control measures and the absence of well-defined timelines create further delays. Yet other reasons include bureaucratic red-tape and lingering doubts regarding the effectiveness of proposed mitigation measures. After the recent findings over the ineffectiveness of outdoor smog towers, decision-makers' hesitation is justified. But overcoming this also requires a systemic approach based



Clearing the air: An anti-smog gun spraying water in New Delhi on January 12. FILE PHOTO

on Emissions Inventory (EI), Air Quality (AQ) modelling, and Source Apportionment (SA).

How can scientific tools help?

EI and SA studies are critical to identify and understand the origins of pollution. EIs provide insights into local pollution sources and their contributions, allowing experts to forecast future emissions based on demographic shifts and technological advancements across sectors, among other factors. EIs also help shape targeted pollution control strategies. They have their limitations, too, particularly in assessing the impact of transboundary pollution sources – such as when determining the effect of stubble-burning outside Delhi on the city's air quality.

SA studies offer a detailed analysis of contributions from various pollution sources, including those located afar.

However, they aren't suited for predictive analysis and require substantial resources, including specialised personnel and equipment for chemical analysis. SA studies also can't distinguish between the origins of pollution, like, say, emissions from diesel trucks 200 m away and 20 km away, because diesel emissions have similar chemical signatures.

These gaps can be bridged through AQ modelling, which informs our understanding of pollution dispersion, including from distant sources.

How are these being used?

Ideally, the cities should look into EI and SA data to pinpoint air pollutants and prepare mitigation measures targeting each polluting activity. According to the Portal for Regulation of Air-pollution in Non-Attainment cities, only 37% of cities have completed EI and SA studies,

meaning the remaining 63% don't have a clear idea about what is polluting their air. Thus, the effectiveness of CAAPs is questioned if the cities don't know the individual emissions reduction potentials of their proposed mitigation measures. Based on the potential and infrastructure requirements, cities need to set proper yearly targets and fund them.

Moreover, the NCAP's reliance on concentration data – a measure of population exposure to harmful pollution – further complicates the situation. Pollution from high-emitting industries and other sources outside city limits, carried into urban areas by winds complicates urban air-quality management. Many existing control measures focus only on primary PM emissions, neglecting their secondary precursors. A shift towards comprehensive strategies addressing both primary and secondary pollutants is thus important. Further, although one of the NCAP goals is to set up infrastructure to forecast AQ, no city barring Delhi, Pune, Mumbai, and Ahmedabad has a decision-support system.

What does NCAP need to succeed?

Beyond the need for data and models, swift implementation on the ground is essential. For this, implementation agencies should seek to reduce bureaucratic red tape by utilising shared, standardised technical evaluations. As NCAP funding is linked with the performance of cities (based on the annual average PM concentration reduction), prior budgeting and time management play crucial roles. Technical feasibility, budgeting, and time estimates need to be part of the initial plans.

The journey towards cleaner air in India, as charted by NCAP, will be difficult but is necessary. NCAP's success hinges on a multifaceted approach that combines rigorous scientific studies, strategic funds, and swift and effective implementation of mitigation measures.

Author works in Air Quality at Center for Study of Science, Technology and Policy.

THE GIST

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NCAP



- Ministry of Environment, Forest and Climate Change (MoEFCC) launched National Clean Air Programme (NCAP) in January, 2019 with an aim to improve air quality in 131 cities (non-attainment cities and Million Plus Cities) in 24 States/UTs by engaging all stakeholders.
- The programme envisages to achieve reductions up to 40% or achievement of National Ambient Air Quality Standards for Particulate Matter₁₀ (PM₁₀) concentrations by 2025-26.

The Hindu analysis by saurabh.pandey sir



BY 2024, POLLUTION CUT BY 30%

NATIONAL CLEAN AIR PROGRAMME (NCAP)

Cities to be covered: 102

GOAL: To meet annual average ambient air quality standards

MID-TERM (5 YEARS) TARGET:
Reducing air pollution by 20-30% by 2024, taking 2017 as base year

HOW: Through city-specific air pollution abatement action plan

BUILD CAPACITY BY SETTING UP:

- 1 National emission inventory
- 2 Air Information Centre for data analysis
- 3 Source apportionment studies
- 4 Guidelines for indoor air pollution
- 5 Rural monitoring stations

CLEARING THE AIR

AIM OF NATIONAL CLEAN AIR PROGRAMME

To meet prescribed annual average ambient air quality standards at all locations in the country

How it will work

A NEW INSTITUTIONAL FRAMEWORK FINALISED

Apex committee
under environment minister

Steering committee
under secy (environment)

Monitoring committee under joint secretary

National project implementation unit at CPCB (5-6 scientific personnel)

State-level project monitoring units (3-4 scientific personnel)

National project monitoring unit in environment min (25 scientific personnel)

The Hindu analysis by saurabh.pandey sir

- 82 cities under NCAP have been provided annual target of 3-15% reduction of PM10 levels to achieve overall reduction of air quality up to 40% PM10 levels, and 49 cities under XVth Finance Commission air quality grant, have been given an annual target of 15% reduction in annual average Particulate Matter10 (PM10) concentrations and improvement of good air quality days (Air Quality Index less than 200)

- There is also a lack of standard operating procedures for the implementation process.
- Time-consuming tasks required to implement control measures and the absence of well-defined timelines create further delays. Yet other reasons include bureaucratic red-tape and lingering doubts regarding the effectiveness of proposed mitigation measures.

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The Hindu analysis by saurabh.pandey sir



Why was the BJP candidate declared winner in Surat?

Why was the Congress candidate's nomination paper not accepted? What does the Representation of the People Act, 1951 state with respect to requirements for valid nomination?

Rangarajan.R

The story so far:

The BJP's candidate from the Surat Lok Sabha constituency in Gujarat has been declared elected unopposed. This follows the rejection of the nomination paper of the candidate set up by the Congress party and the withdrawal of nominations by other candidates.

What is the law for nomination?

Section 33 of the Representation of the People Act, 1951 (RP Act) contains the requirements for a valid nomination. As per the RP Act, an elector above 25 years of age can contest Lok Sabha election from any constituency in India. The proposer(s) of the candidate should however be elector(s) from that respective constituency where the nomination is being filed. In case of a recognised party (national or State), the candidate needs to have one proposer. Candidates set up by

unrecognised parties and independents need to be subscribed by ten proposers. A candidate can file up to four nomination papers with different set of proposers. This is to enable the acceptance of nomination of a candidate even if one set of nomination paper is in order.

Section 36 of the RP Act sets out the law with respect to the scrutiny of nomination papers by the Returning Officer (RO). It provides that the RO shall not reject any nomination for a defect that is not of a substantial character. However, it specifies that signature of the candidate or proposer found not genuine is grounds for rejection.

What is the current issue?

In the present case, the candidate of the Congress party for the Surat constituency, Nilesh Kumbhani had filed three sets of nomination papers. The proposers for these three nomination papers were his brother-in-law, nephew and business partner. A BJP worker objected to Mr.

Kumbhani's nomination alleging that the signatures of his proposers were not genuine. The RO also received affidavits from the proposers claiming that they had not signed the nomination papers of the candidate. He sought reply/clarification from the candidate within a day on the objections raised. As the proposers could not be produced before the RO within the stipulated time for scrutiny, all three sets of nomination papers were rejected.

The election rules allow for a substitute candidate to be fielded by a political party. The nomination of this substitute candidate would be accepted if the nomination of the original candidate is rejected. In this case, the Congress party had fielded Suresh Padsala as its substitute candidate. However, the nomination paper of the substitute candidate was also rejected for the same reason, that is of the proposer's signature not being genuine. The other nominations were either rejected or withdrawn paving the way for BJP candidate Mukesh Dalal to

be declared winner.

What is the legal recourse?

There have been at least 35 candidates who have been elected unopposed to the Lok Sabha. Majority of them were in the first two decades after independence with the last being in 2012.

In the instant case, however, the Congress party has alleged that the proposers were coerced to backtrack on their signatures. It has approached the Election Commission (EC) seeking to set aside the decision of the RO and restart the election process.

However, it is unlikely that the EC would act on this request as Article 329(b) of the Constitution read with RP Act provides that no election shall be called into question except by an election petition before the concerned High Court. One of the grounds on which such an election petition can be filed is improper rejection of nomination papers. Hence, the legal recourse available is to file an election petition in the Gujarat High Court.

The RP Act provides that High Courts shall endeavour to conclude such trials within six months, which has mostly not been followed in the past. Speedy disposal of election petitions would be a step in the right direction.

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

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The info is by saurabh.pandey sir



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The Hindu candidate is rejected by Saurabh Pandey sir

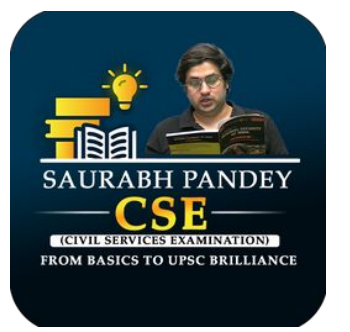


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The Hindu analysis by saurabh.pandey sir



Target Mains 2024/25



Q“ Human rights at sea can be protected with good maritime security and good ocean governance ” Discuss

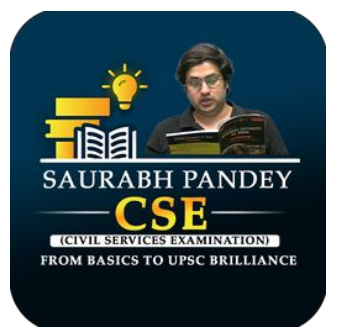
प्रश्न" अच्छी समुद्री सुरक्षा और अच्छे समुद्री प्रशासन से समुद्र में मानवाधिकारों की रक्षा की जा सकती है" चर्चा करें

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Topics

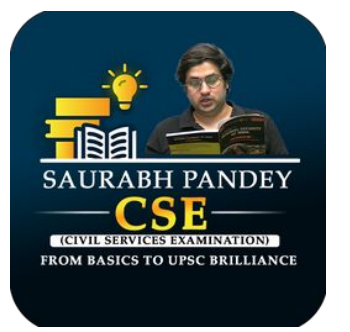


- bathymetry
- membranous nephropathy
- Inflammatory Bowel disease
- Payment aggregators
- New Telecom law
- India in the 'priority watch list'
- civilisation of Tartessos
- Mains

By saurabh pandey sir



Target Mains 2024/25



Q“ Ocean regulates the climate and climate shapes marine ecology” Discuss

प्रश्न" महासागर जलवायु को नियंत्रित करता है और जलवायु समुद्री पारिस्थितिकी को आकार देती है" चर्चा करें

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TOPERS FIRST FULL LENGTH TEST -2 (PRELIMS VIJAY SERIES)



1- Ankur

2- Puja yadav

3- Nikki Aggarwal

Prelims Vijay series TEST-2 (full length) X

Student leaderboard

Student name	Marks	Grade	Rank
Ankur	137.93/200	B	1
Puja Yadav	118.6/200	B	2
Nikki Aggarwal	101.92/200	B	3
MAYANK AWASTHI	101.26/200	B	4th
Renu	93.23/200	C	5th
Asmita	89.94/200	C	6th

Skin lightening creams laden with mercury take a toll on the kidney

Researchers from Kerala have reported a series of cases from Malappuram district where the regular use of fairness creams has been linked to nephrotic syndrome. Heavy metal screening of the blood and urine samples of these patients revealed high levels of mercury, the toxic effects of which are well-known

C. Maya

In the heels of recent news reports on how keratin-based hair-straightening products containing glycolic acid derivatives led to severe kidney injury in women, researchers from Kerala have reported a series of cases wherein the use of fairness creams has been linked to nephrotic syndrome.

In a study published in the latest issue of *Kidney International* ('NELL-1 associated membranous nephropathy linked to skin fairness cream use – insights from an Indian case series'), doctors describe a series of 15 cases of Membranous Nephropathy, reported by Aster MIMS Hospital, Kottakkal, Malappuram district, that were traced to the regular use of fairness creams. Heavy metal screening of the blood and urine samples of these patients revealed high levels of mercury, the toxic effects of which are well-known. An analysis of the fairness creams also showed that these contained high levels of mercury – in some instances, 10,000 times above the permissible limit of 1 ppm.

High proteinuria

Since 2021, Ranjith Narayanan, a nephrologist practising at two busy private hospitals in Kozhikode, had noticed a specific pattern in cases of membranous nephropathy diagnosed amongst his patients. They all had non-specific symptoms – fatigue, mild edema and frothy urine – but high levels of proteinuria, in the range of 6.5-22.2 g/day.

Membranous nephropathy (MN) is an autoimmune disease resulting in nephrotic syndrome, a condition when too much protein is released into the urine (proteinuria), ultimately resulting in renal failure. In approximately 70% to 80% of cases of MN, the target antigen has been phospholipase A2 (PLA2R). However, in early 2023, when four or five cases of MN with a similar profile turned up consecutively in OP clinics, Dr. Narayanan and his colleagues decided to dig deeper. In this instance, most of the MN cases turned out to be PLA2R negative.

Recently, another antigen, Neural epidermal growth factor-like protein 1 (NELL-1), has been linked to a rare form of MN. A lab in Chennai identified all these patients to be positive for NELL-1. "In Tamil Nadu, most cases of MN caused by NELL-1 have been traced to use of traditional medicines, most of which have high levels of mercury. But all our patients



A skin lightening procedure being done at a beauty salon. S. SIVA SARAVANAN

denied using any indigenous medicines. The link between face creams containing mercury and nephrotic syndrome is well-established worldwide, which naturally led us to probe the use of cosmetics," says Dr. Narayanan.

Fairness cream

The patients admitted to fairly regular usage of fairness creams before they began experiencing non-specific or subtle symptoms. The research team then began prospectively evaluating all cases of MN and they also revisited cases from the past two years. Their study reports 15 cases of MN linked to NELL-1 and in 13 cases, patients had a history of use of fairness creams, most of which were unregulated brands offering rapid results and sold rampantly in local shops and on online platforms.

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The obsession with fair skin and the use of skin lightening products extends well beyond India and is said to be widely prevalent in African and Asian countries. However, despite widespread use, the serious systemic health issues that toxic cosmetic creams can induce are yet to be perceived as a global public health issue.

Impact of mercury

Mercury is a highly toxic heavy metal which is used in fairness/anti-ageing creams as in its inorganic form (mercury salts) it can inhibit the formation of melanin resulting in a lighter skin tone. The higher the levels of mercury in face creams, the better the whitening effect. This is naturally perceived as the product's effectiveness by gullible consumers, who become loyal customers of the product.

Chronic mercury poisoning from cosmetics is often missed because different organs and tissues respond differently to mercury, resulting in

atypical clinical presentations. Physicians need to be made more aware of the possibility of mercury poisoning when patients present with non-specific symptoms like pain, fatigue, cognitive decline or systemic issues like membranous nephropathy. However, the concept of equating beauty with fair skin is so ingrained in the minds of people that even after abundant cautioning, they are reluctant to stop the use of fairness creams, doctors say.

The larger public is unaware that mercury in face creams can be absorbed through the sweat glands, sebaceous glands, and hair follicles and absorbed by all tissues. Repeated topical use results in systemic toxicity, manifesting as damage to the kidneys and nervous system. The other adverse effects listed by WHO include skin discolouration and scarring, reduction in the skin's resistance to bacterial and fungal infections, anxiety, depression, psychosis and peripheral neuropathy. "We find that there is little acceptance from people to stop the use of a particular face cream because as soon as they stop using it, the skin becomes dark again.

Changing the attitude of society about skin colour is thus the larger challenge," Dr. Narayanan says. The Minamata Convention on Mercury, to which India is a signatory, is a global treaty "to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds" and it has been in force since 2017.

According to a new Zero Mercury Working Group (ZMWG) report released in October 2023, despite being banned by a global treaty, mercury-containing skin lightening products are still sold by some of the world's biggest online retailers to unsuspecting consumers. It said that of the 213 fairness products from 12 countries purchased and tested by NGOs, 191 (90%) had mercury concentrations ranging from 1.18 to 74,800.00 ppm of mercury, way above the 1 ppm limit mandated for cosmetics by many governments as well as the Minamata Convention.

"The strength of the current study was that it could establish the temporal relationship between the use of fairness creams and the occurrence of nephrotic syndrome. However, larger, multi-centric systemic studies on chronic mercury poisoning are required not just to understand the extent of the problem but also to persuade policy makers and regulators to clamp down on all cosmetics containing mercury at all," the researchers say.

(maya.c@thehindu.co.in)

THE GIST

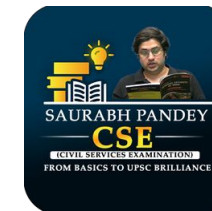
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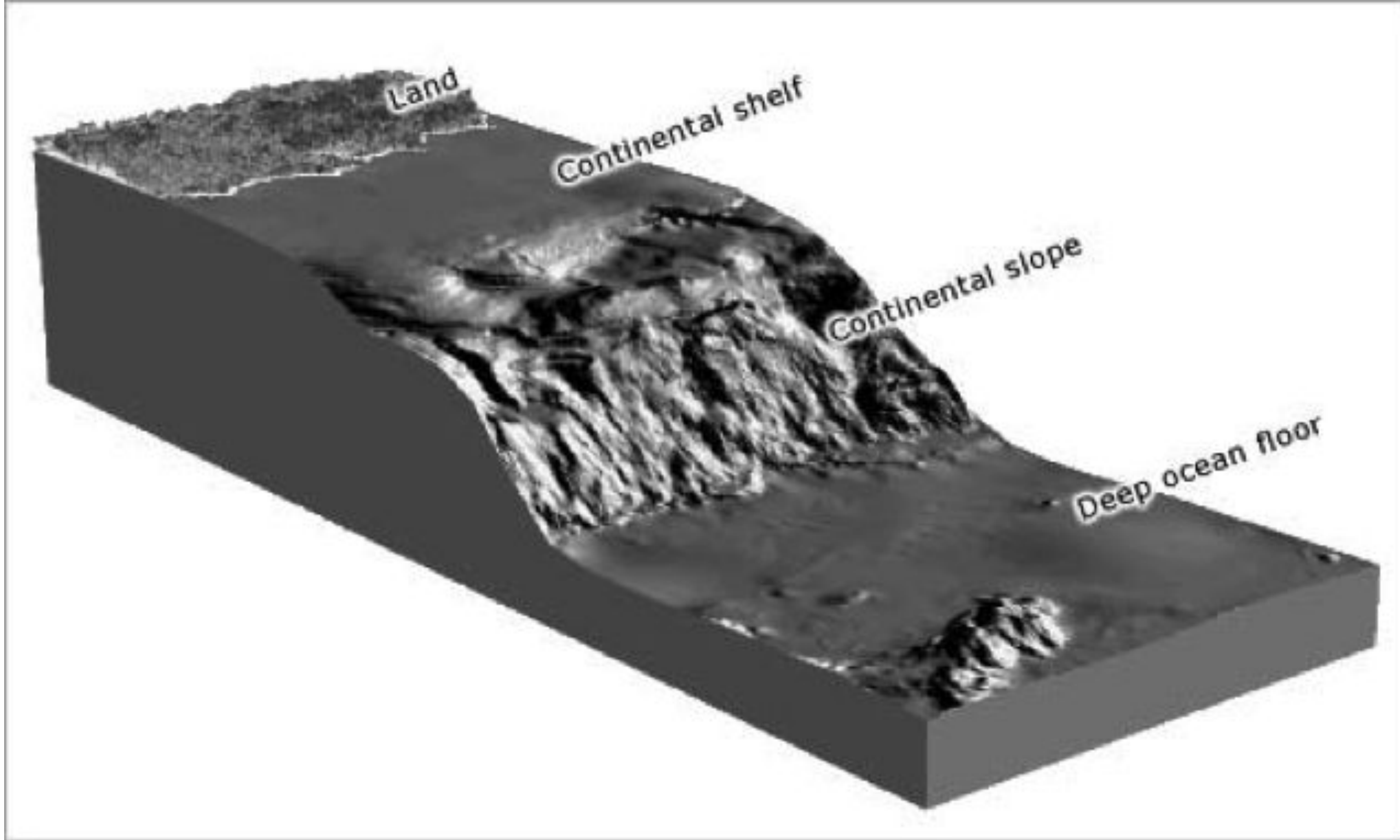
bathymetry



- A recent study of the Indian Ocean floor or the bathymetry.
- there is a significant improvement in the upper ocean salinity, temperature, and currents, particularly near the coast.
- “Oceans play a critical role in both weather and climate prediction and the maritime industry.
- Due to the vast economic benefits, it is essential to accurately forecast specific oceanographic parameters such as currents, temperature, and salinity of surface and subsurface on different time scales,

The Hindu analysis by saurabh.pandey sir





- the study has highlighted the importance of bathymetry in advancing the understanding of ocean dynamics to improve the ocean state forecast, weather, and climate forecast over the Indian rim countries and subcontinent.

The Hindu analysis by saurabh.pandey sir



Skin lightening creams laden with mercury take a toll on the kidney

Researchers from Kerala have reported a series of cases from Malappuram district where the regular use of fairness creams has been linked to nephrotic syndrome. Heavy metal screening of the blood and urine samples of these patients revealed high levels of mercury, the toxic effects of which are well-known

C. Maya

In the heels of recent news reports on how keratin-based hair-straightening products containing glycolic acid derivatives led to severe kidney injury in women, researchers from Kerala have reported a series of cases wherein the use of fairness creams has been linked to nephrotic syndrome.

In a study published in the latest issue of *Kidney International* ('NELL-1 associated membranous nephropathy linked to skin fairness cream use – insights from an Indian case series'), doctors describe a series of 15 cases of Membranous Nephropathy, reported by Aster MIMS Hospital, Kottakkal, Malappuram district, that were traced to the regular use of fairness creams. Heavy metal screening of the blood and urine samples of these patients revealed high levels of mercury, the toxic effects of which are well-known. An analysis of the fairness creams also showed that these contained high levels of mercury – in some instances, 10,000 times above the permissible limit of 1 ppm.

High proteinuria

Since 2021, Ranjith Narayanan, a nephrologist practising at two busy private hospitals in Kozhikode, had noticed a specific pattern in cases of membranous nephropathy diagnosed amongst his patients. They all had non-specific symptoms – fatigue, mild edema and frothy urine – but high levels of proteinuria, in the range of 6.5-22.2 g/day.

Membranous nephropathy (MN) is an autoimmune disease resulting in nephrotic syndrome, a condition when too much protein is released into the urine (proteinuria), ultimately resulting in renal failure. In approximately 70% to 80% of cases of MN, the target antigen has been phospholipase A2 (PLA2R). However, in early 2023, when four or five cases of MN with a similar profile turned up consecutively in OP clinics, Dr. Narayanan and his colleagues decided to dig deeper. In this instance, most of the MN cases turned out to be PLA2R negative.

Recently, another antigen, Neural epidermal growth factor-like protein 1 (NELL-1), has been linked to a rare form of MN. A lab in Chennai identified all these patients to be positive for NELL-1. "In Tamil Nadu, most cases of MN caused by NELL-1 have been traced to use of traditional medicines, most of which have high levels of mercury. But all our patients



A skin lightening procedure being done at a beauty salon. S. SIVA SARAVANAN

denied using any indigenous medicines. The link between face creams containing mercury and nephrotic syndrome is well-established worldwide, which naturally led us to probe the use of cosmetics," says Dr. Narayanan.

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THE GIST

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Rising incidence of IBD cases across the globe is a cause for concern, say experts

Serena Josephine M.

The rising incidence of Inflammatory Bowel Disease (IBD) across the globe has become a concern for doctors. While early diagnosis is lacking, diagnosis in itself is challenging considering that other conditions could mimic IBD.

"IBD is a significant problem. It comprises Ulcerative Colitis and Crohn's Disease and is characterised by inflammation. It is different from Irritable Bowel Syndrome which is predominantly non-inflammatory," Jonathan Leighton, president, American College of Gastroenterology, USA, said.

"Both Ulcerative Colitis and Crohn's Disease are complex immune-mediated diseases; there is a dysregulated immune response. We do believe there are genetic markers that contribute to the disease but not in isolation. There is a synergy between the external environment and gut bacteria," he added. There is an increasing incidence of IBD across the globe, including in North America and western Europe. "The prevalence is also rising... From 0.5% right now, the prevalence will increase to 0.6% in America," he said.

Early onset

There is also a rise in early onset cases among those under 18. For the Indian perspective, Vineet Ahuja, Professor of Gastroenterology, All India Institute of Medical Sciences, New Delhi, has pinpointed a challenge in diagnosing Crohn's disease. "We have peculiar issues such as intestinal tuberculosis, which is common in India and resembles Crohn's disease. The phenotype is very similar, and so is the clinical presentation. As a result, the challenge is greater,"

he said.

On incidence in India, Dr. Ahuja observed that lifestyle changes have contributed. "What was an uncommon condition three decades ago has become more common. Changes in lifestyle, a Westernised diet with high fat and high sugar, processed and packaged food cause an insult to the gut epithelium, precipitating inflammation."

T. S. Chandrasekar, founder and chief gastroenterologist, MedIndia Hospitals and Academy, and the Governor of American College of Gastroenterology, India region, said the incidence of IBD has almost doubled in India from 1990 to 2019, with a rise in the death rate as well.

A study in Tamil Nadu showed that there were more cases of Crohn's Disease than Ulcerative Colitis. Nearly 50% of IBD were Crohn's Disease and 40% were Ulcerative Colitis. It is important to catch patients early so treatment is better, he said.

Dr. Leighton noted that there is still a delay in diagnosis, particularly among the young. "The symptoms of IBD overlap with Irritable Bowel Syndrome. This does delay diagnosis. Individuals with alarming symptoms such as bleeding and severe abdominal pain need a complete evaluation," he said.

Delay in diagnosis

There are other diseases that mimic IBD, and there is a need to rule out infections. "There is no single diagnostic test for Ulcerative Colitis or Crohn's Disease. It is a combination of a physical, laboratory, and endoscopy. We have come a long way in the treatment of IBD. Over the last 25 years, biological therapy has emerged that

uses monoclonal antibodies directed at inflammatory pathways. Biologics have been developed to target different parts of the inflammatory pathways to control the disease thereby decreasing hospital stays and surgeries. In addition, we have developed small molecules that can be given orally that have had a significant impact."

Both stressed that the cost was a challenge. "There is no cure. It is a lifelong disease. So, in India, we are looking at low cost therapy such as faecal microbiota transplantation along with regular medication," Dr. Ahuja added.

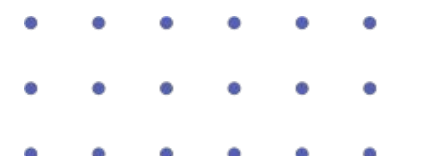
Environmental factors play a big role in IBD, Dr. Leighton said, adding: "This includes smoking and antibiotics. There are no human studies that have proved the role of diet, but we do think some foods such as super processed foods have the potential to be pro-inflammatory. A healthy diet avoiding highly processed food, and consuming wholesome food – for instance a Mediterranean diet – is recommended."

Dr. Ahuja said patients are advised to avoid being restrictive about their diet as they could become malnourished. "Avoid processed foods. We have an anti-inflammatory diet of curd and buttermilk, and less milk, more rice and millets, fruits, and vegetables. Avoid red meat and consume fish. This seems to be helpful," he said.

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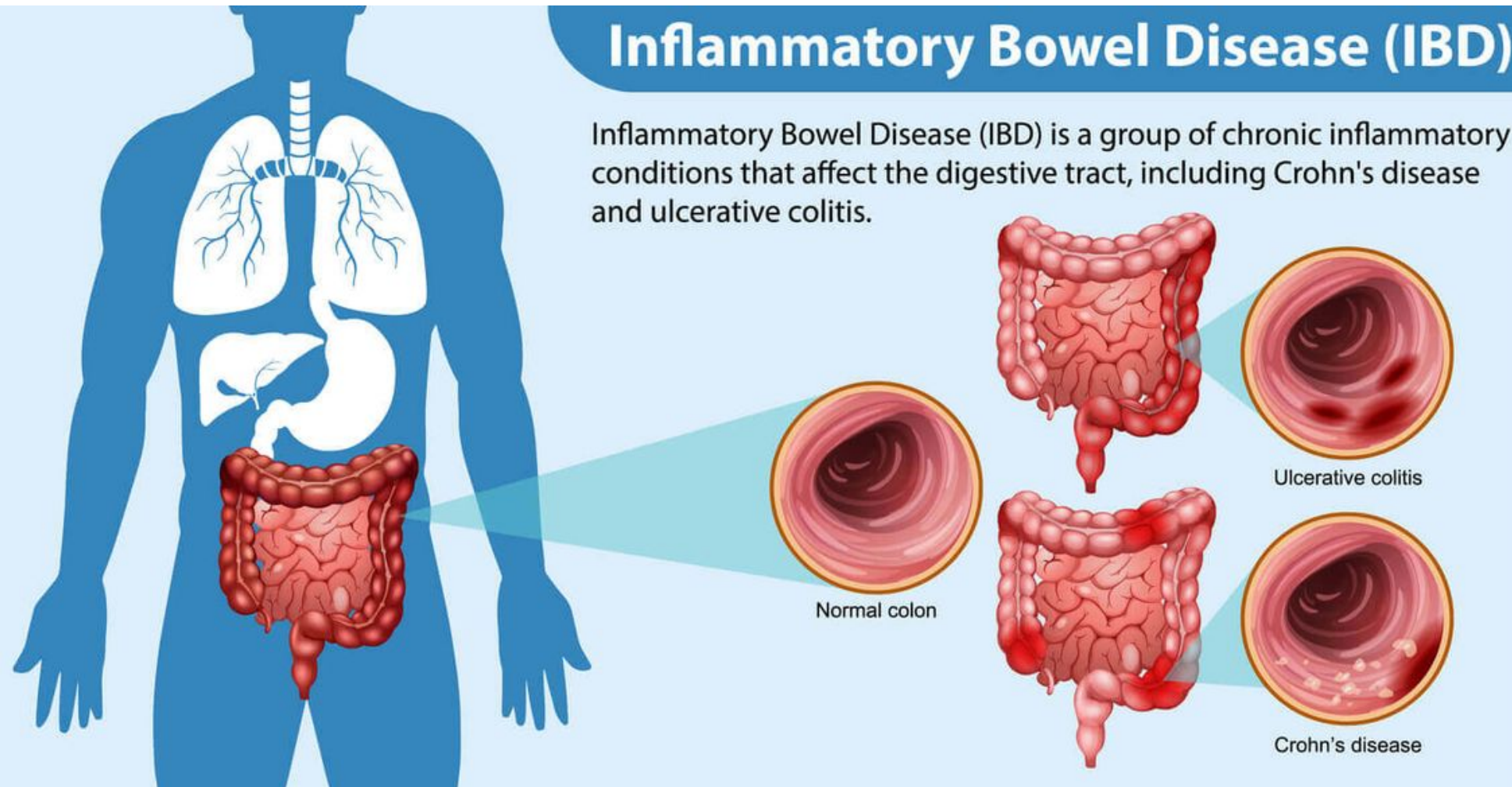
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Inflammatory Bowel disease

Inflammatory Bowel Disease (IBD)

Inflammatory Bowel Disease (IBD) is a group of chronic inflammatory conditions that affect the digestive tract, including Crohn's disease and ulcerative colitis.

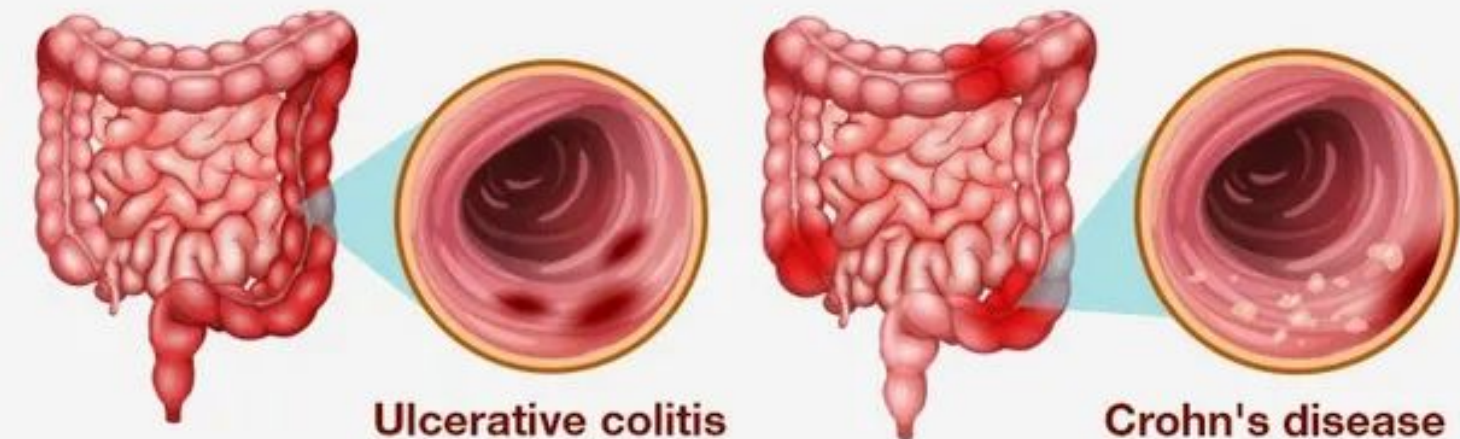


Types of Inflammatory Bowel Disease (IBD)

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.

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.



The Hindu analysis by saurabh.pandey sir

RBI's draft rules for payment aggregators

Will non-bank payment aggregators need separate authorisation from the RBI? What lessons did the RBI incorporate from the Paytm Payments Bank crisis? What will happen to non-banking entities currently engaged in point-of-sale activities if they fail to comply with the RBI's approval-seeking timeframe?

EXPLAINER

Saptaparno Ghosh

The story so far:

Following its announcement in June 2022 that it will seek better regulation of offline payment aggregators (PAs) facilitating proximity or face-to-face transactions, the Reserve Bank of India (RBI) floated two consultation papers earlier this month. The first deals with activities of offline PAs, while the second proposes to strengthen the ecosystem's safety by expanding instructions for Know Your Customer (KYC), due diligence of onboarded merchants and operations in Escrow accounts. The RBI has invited comments/feedback by May 31.

What exactly are the norms about?

Payment aggregators are entities that settle payments from customers to merchants – unbundling the latter from creating a payment integration system of their own. The existing guidelines cover their activities in e-commerce sites and other online avenues. The latest draft guidelines propose to extend these regulations to offline spaces, entailing proximity or face-to-face transactions. The RBI observed back in June 2022 that the nature of activities carried out by the PAs, both online and offline, is similar. It aspires to bring in “synergy in regulation covering activities and operations of PAs apart from convergence on standards of data collection and storage.”

The proposed norms incorporate lessons from what happened this year with Paytm Payments Bank (PPBL) – albeit in an unrelated space. With the expansion of the scope of operations of PAs, the RBI appears to be strengthening the ecosystem against any opacity. The PPBL crisis was triggered by, among other things, major irregularities in the bank's KYC adherence. The Financial Intelligence Unit (FIU-IND) had imposed a penalty of ₹5.49 crore having found that PPBL "engaged in a number of illegal acts,



Regulatory shift: To track transactions, entities would be allowed to store limited data. GETTY IMAGES

including organising and facilitating online gambling.” It added that the money generated from it was “routed and channelled through bank accounts maintained by these (illegal) entities” with the PPBL.

Is registration with the RBI being made compulsory?

The primary focus here is on non-bank PAs and within them, the offline extensions. Banks providing physical PA services would not require any separate authorisation from the RBI. They are only expected to comply with the revised instructions within three months after they are issued.

Non-banking entities providing PA services at the point of sale (PoS), that is, offline, would have to inform the RBI within 60 days (after the circular is issued), about their intent to seek authorisation.

The entities would, however, be allowed to continue their operations. As for non-banking entities providing PA services online – both those authorised and whose applications are pending – would be required to seek approval, about their existing offline PA activity, from the Department of Payment and Settlement Systems and the regulator within 60 days of the directions being mandated. This would also apply to any authorised non-banking entity aspiring to

enter the online and/or offline PA space in the future.

The RBI's directions also stipulate that entities currently engaged in PoS activities must ensure they adhere to guidelines on merchant on-boarding, customer grievance redressal and dispute management, baseline technology recommendations, security, fraud prevention and risk management framework as per the previous framework within 3 months. For entities that would require fresh registration, the RBI has said continued adherence to existing guidelines framed in 2020 would be viewed positively while processing the applications.

Does it talk about provisions for sustainability?

The RBI proposes that non-banking entities currently providing proximity/face-to-face transaction services have a minimum net worth of ₹15 crore when they apply. This would be extended to ₹25 crore by March 31, 2028. The requirements are the same for new applicants, the difference being that a ₹25 crore net worth requirement would apply at the end of third financial year from when the authorisation is granted.

The RBI has proposed that existing offline operators unable to comply with the approval-seeking timeframe wind up their operations by July 31, 2025. Banks will also be directed to close all accounts

by the end of October next year should they fail to produce evidence of their application seeking authorisation.

THE GIST



The Reserve Bank of India is proposing new regulations for offline payment aggregators (PAs) to enhance safety.



The proposed norms aim to extend existing guidelines to cover offline transactions and strengthen Know Your Customer requirements for merchants.



The draft regulations instruct that no entity, other than the card issuer and/or card network, can store data for proximity/face-to-face payments from August 1, 2025.

The PA would be expected to establish their existence by verifying one official document each of the proprietor, beneficial owner or attorney holder, and of the stated business.

The PAs must ensure that transactions undertaken by their merchants are in line with their business profile. They must assign risk-based payment limits to the merchants. Based on their transaction pattern, the merchant could be migrated to a higher degree of due diligence.

Does it propose storage of card data?

The draft regulations instruct that no entity, other than the card issuer and/or card network, can store data for proximity/face-to-face payments from August 1, 2025, and direct them to purge data stored previously. To track transactions and reconcile them, entities would be allowed to store limited data, that is, the last four digits of the card number and the issuer's name.



Payment aggregators


- Payment aggregators are entities that settle payments from customers to merchants — unburdening the latter from creating a payment integration system of their own.
- The existing guidelines cover their activities in e-commerce sites and other online avenues.
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The Hindu analysis by saurabh.pandey sir



	Payment Gateway	Payment Aggregator
Role	<p>Payment gateways are software that process transactions</p> <p>Payment gateway can process only a specific mode of payment (e.g., a card PG can only process cards)</p>	<p>Payment aggregators are platforms that aggregate various payment modes and are also involved in fund movement</p> <p>PAs can process various payment modes (depending on the integration with banks, wallets etc.)</p>
Merchant Integration	A merchant has to integrate with an acquiring bank, which, in turn, uses the PG for transaction processing and fund settlement.	A merchant can integrate with a PA, which works with various acquiring banks, wallets, etc.
Examples	Cybersource, MPGS, FSS	Cashfree, PayU, RazorPay, Billdesk
Success Rate	<p>Depends on the PG's technical capabilities</p> <p>If a merchant's acquiring bank is dependent on a single PG, then that PG's performance impacts the success rate. Many acquiring banks use more than 1 PG to provide a higher success rate.</p>	<p>Payment aggregator works with various acquiring banks (ICICI, HDFC, Yes), who work with various PGs (CyberSource, MPGS, etc.)</p> <p>With routing logic, PA can deliver a higher SR if the PG of the acquiring bank has issues.</p>

List of new payment aggregators



Name of company	Existing Business	Previous Status
Razorpay	Online/Offline merchant payments	Under embargo
Cashfree	Online merchant payments	Under embargo
Paymentz	White labelled payment gateway	New entity
Google India Digital Services	UPI Payments	Existing Payment Aggregator
Open Financial Technologies	Neo-banking for SMEs	Existing Payment Aggregator
Enkash	Expense management for corporations	New entity
Tata Digital	UPI payments, ecomm quick commerce	New entity
DigiO	Digital identity verification	New entity

Source: ET Research

The Hindu analysis by saurabh.pandey sir



Why does the Centre want to modify the 2G spectrum verdict?

Why does the Centre want the apex court to revisit its decade-old 2G spectrum scam verdict? Is the allocation of scarce natural resources like spectrum through auction the only way to ensure transparency?

Aaratrika Bhaumik

The story so far:

More than a decade after the Supreme Court cancelled 122 telecom licenses in the landmark 2G spectrum scam judgment, the Union government has moved an application to allocate spectrum administratively, bypassing auctions. An administrative allocation would give the government control over the selection of operators. On Monday, Attorney General R. Venkataramani, appearing for the Centre made a plea for urgent listing of the application before Chief Justice of India D.Y. Chandrachud. The development comes a month after the Delhi High Court admitted the CBI's appeal against the acquittal of former Union Telecom Minister A. Raja and other high-profile politicians in the scam.

What is the 2G spectrum scam?

The alleged 2G spectrum allocation scam is said to have originated in 2008 when the then Congress-led United Progressive Alliance (UPA) government sold 122 2G

basis to specific telecom operators. In its charge sheet filed in April 2011, the CBI alleged that there was a loss of ₹ 30,984 crore to the exchequer as a result of discrepancies in the allocation process.

In the meantime, the Centre for Public Interest Litigation and Subramanian Swamy filed petitions in the top Court alleging a ₹70,000 crore scam in the grant of telecom licenses in 2008. In February 2012, a division Bench of the Supreme Court cancelled the licenses while cautioning that an FCFS basis for the allocation of scarce natural resources can be prone to misuse.

Advocating for competitive auctions instead, the Court said, "In our view, a duly publicised auction conducted fairly and impartially is perhaps the best method for discharging this burden and the methods like first-come-first-served when used for alienation of natural resources/public property are likely to be misused by unscrupulous people who are only interested in garnering maximum financial benefit and have no respect for the constitutional ethos and values." It emphasised that the burden lies on the

"non-discriminatory method" of the auction is adopted "by giving wide publicity so that all eligible persons can participate in the process".

What is the Centre's plea?

In its plea, the Centre has pointed out that the assignment of spectrum is required to discharge sovereign and public interest functions such as security, safety, and disaster preparedness. The Centre elaborated that administrative allocation is required when demand is lower than supply or for space communication. In such cases, it would be "more optimal and efficient for spectrum to be shared by multiple players, rather than being broken up into smaller blocks for the sole purpose of exclusive assignment", it said.

The Court was apprised that following its 2012 ruling, the administrative assignment of non-commercial spectrum has been on a purely interim basis, subject to the government's final decision on pricing and policy. However, it was now time to "firm up a spectrum assignment framework in suitable cases to best subserve the common good", the

envisages the following prayer – "(a) Issue appropriate clarifications that the government may consider the assignment of spectrum through the administrative process if so determined through due process in accordance with the law, and if such assignment is in pursuit of governmental functions or the public interest so requires, or auction may not be preferred due to technical or economic reasons". The Union government has also placed reliance on the observations made by a Constitution Bench while deciding a Presidential reference concerning the February 2012 verdict. The Bench pointed out that the auction method prescribed in the verdict was not to be considered a "constitutional mandate" for the alienation of natural resources excluding spectrum.

What is the significance of the new telecom law?

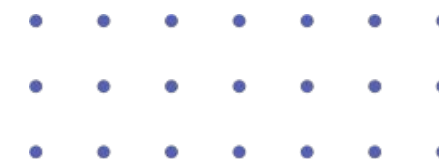
The Telecommunications Act, 2023, passed by the Parliament last year empowers the government to assign spectrum for telecommunication through administrative processes other than auction for entities listed in the First Schedule. These include entities engaged in national security, defence, and law enforcement as well as Global Mobile Personal Communication by Satellites such as Space X, and Bharti Airtel-backed OneWeb. The government can also assign part of a spectrum that has already been assigned to one or more additional entities, known as secondary assignees, and even terminate assignments where a spectrum or a part of it has remained

THE GIST

More than a decade after the Supreme Court cancelled 122 telecom licenses in the landmark 2G spectrum scam judgment, the Union government has moved an application for a "certain class" of spectrum to be allocated through administrative processes.

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The law passed by the Parliament last year empowers the government to assign spectrum for telecommunication through administrative processes other than auction for entities listed in the First Schedule.



New Telecom Law



- More than a decade after the Supreme Court cancelled 122 telecom licenses in the landmark 2G spectrum scam judgment, the Union government has moved an application for a “certain class” of spectrum to be allocated through administrative processes. ?
- The alleged 2G spectrum allocation scam is said to have originated in 2008 when the then Congress-led United Progressive Alliance (UPA) government sold 122 2G licences on a first-come-first-serve (FCFS) basis to specific telecom operators. ?

The Hindu analysis by saurabh.pandey sir



- The law passed by the Parliament last year empowers the government to assign spectrum for telecommunication through administrative processes other than auction for entities listed in the First Schedule.

The Hindu analysis by saurabh.pandey sir



What is the significance of the new telecom law?

- The Telecommunications Act, 2023, passed by the Parliament last year empowers the government to assign spectrum for telecommunication through administrative processes other than auction for entities listed in the First Schedule.
- These include entities engaged in national security, defence, and law enforcement as well as Global Mobile Personal Communication by Satellites such as Space X, and Bharti Airtel-backed OneWeb.
- The government can also assign part of a spectrum that has already been assigned to one or more additional entities, known as secondary assignees, and even terminate assignments where a spectrum or a part of it has

The Hindu analysis by saurabh pandey sir

Intellectual property: India features yet again on U.S. 'priority watch list'

Amiti Sen
NEW DELHI

The U.S. has once again included India in the 'priority watch list' of countries, along with China, Russia, Venezuela, and three others, for alleged problems related to IP protection and enforcement, and has said there will be particularly intense bilateral engagement on the matter during the coming year.

There has been progress under the U.S.-India Trade Policy Forum in addressing issues of trademark infringement investigations and pre-grant opposition proceedings, but numerous long-standing concerns remain, per the U.S. Trade Representative's 2024 Special 301 report released on Thursday.

'High online piracy'

"These include inadequate IP enforcement, including high rates of online piracy, an extensive trademark opposition backlog, and insufficient legal means to



Under the radar: India has been on the 'priority watch' list of countries for many years. REUTERS

protect trade secrets," it said.

Among other things, India still needs to fully implement the WIPO Internet Treaties and ensure that copyright statutory licences do not extend to interactive transmissions," the report added.

The USTR releases the Special 301 Report annually, highlighting the state of IP protection and enforcement regimes in various countries it trades with.

India has been on the 'priority watch' list of

countries for many years, which, according to the USTR office, indicates that serious problems exist in the country concerning IP protection, enforcement, or market access for Americans relying on IP.

India's stance

New Delhi, however, has always maintained that its intellectual property laws were in strict adherence to the WTO's Trade Related Intellectual Property Rights (TRIPS) Agreement and that it was not bound

by any global rules to make changes in its laws.

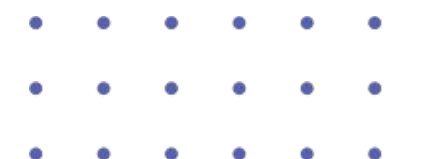
No action is threatened by the U.S. against countries on the 'priority watch list', but if a country slips further and is categorised a 'priority country', Washington may impose 'retaliatory' measures. Indonesia, Chile, and Argentina are the other countries on the 'priority watch list'.

Other trading partners

Twenty trading partners are on the 'watch list', including countries that the U.S. believes merit bilateral attention to address underlying IP problems but are better than the 'priority watch list' countries.

Algeria, Barbados, Belarus, Bolivia, Brazil, Bulgaria, Canada, Colombia, Ecuador, Egypt, Guatemala, Mexico, Pakistan, Paraguay, Peru, Thailand, Trinidad and Tobago, Türkiye, Turkmenistan, and Vietnam are on the 'watch list'.

(The writer is with The Hindu businessline)



India in the 'priority watch list'

- The U.S. has once again included India in the 'priority watch list' of countries, along with China, Russia, Venezuela, and three others, for alleged problems related to IP protection and enforcement, and has said there will be particularly intense bilateral engagement on the matter during the coming year.
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United States Trade Representative (USTR)



- The Office of the United States Trade Representative (USTR) was created in 1962 to advise the President on trade issues, lead international trade negotiations, and oversee the resolution of disputes, enforcement actions and other matters before global trade policy organizations such as the World Trade Organization.
- With more than 200 committed public servants, USTR meets with governments, business groups, legislators and the general public to gather input on trade issues and discuss the President's trade policy positions.
- With offices in Washington, Geneva, and Brussels, USTR is also part of the Executive Office of the President.

The Hindu analysis by saurabh pandey sir





Trying too hard: Archaeologists work at the Casas de Turunuelo Tartessian archaeological site in Guarena. AFP

In Spain, searching for lost civilisation of Tartessos

Agence France-Presse
GUARENÀ

For centuries, the lost civilisation of Tartessos has been shrouded in mystery. But 3,000 years after flourishing in the Iberian peninsula, its secrets are slowly emerging thanks to the meticulous work of archaeologists.

Viewed by historians as Western Europe’s oldest civilisation, Tartessos has long been considered a “mysterious” puzzle, but little by little the pieces “are falling into place”, archaeologist Sebastian Celestino Perez said.

A member of the Spanish National Research Council, he has led the excavation team since it began working at the site in 2015 where last year they discovered five stone faces.

Mr. Celestino Perez said at the time it represented a “profound paradigm shift” in their understanding of this ancient civilisation and why it suddenly disappeared after 400 years.

“It was the first time that human figures from the Tartessian world had been found,” said the bespectacled 66-year-old, who described the site as being in “excellent condition”.

A society that emerged out of the contact between the indigenous Iberian population and traders either from Phoenicia or Greece, Tartessos flourished from the ninth to the fifth century BCE in an area extending from Extremadura to the southern Andalusia region and an adjoining area in Portugal.

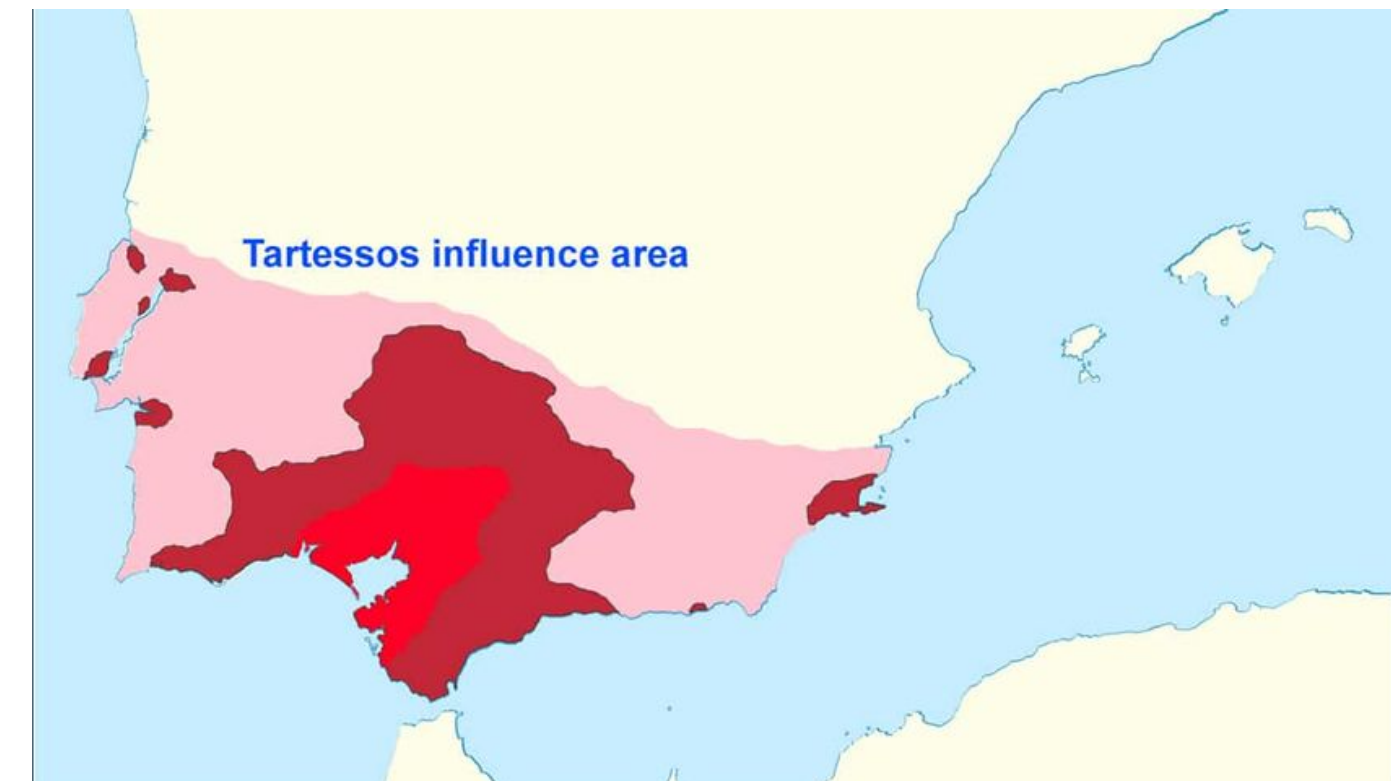
In recent years many theories have been put forward to explain the disappearance of Tartessian civilisation, including severe drought or recurrent flooding, both of which would have left the land unworkable, forcing the inhabitants to leave.



civilisation

of Tartessos

- The Tartessos were a Bronze Age society that flourished in the Iberian Peninsula in southern Spain some 3,000 years ago.
- They were a near-mythic civilisation, rich in resources and technologies. But the advanced society vanished mysteriously some 2,500 years ago.



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Topics



- Solar radiation decreasing
- Curative petition
- DOOARS
- Pataxó
- Mapping
- Carnation Revolution
- SC ON EVM
- Essay topic

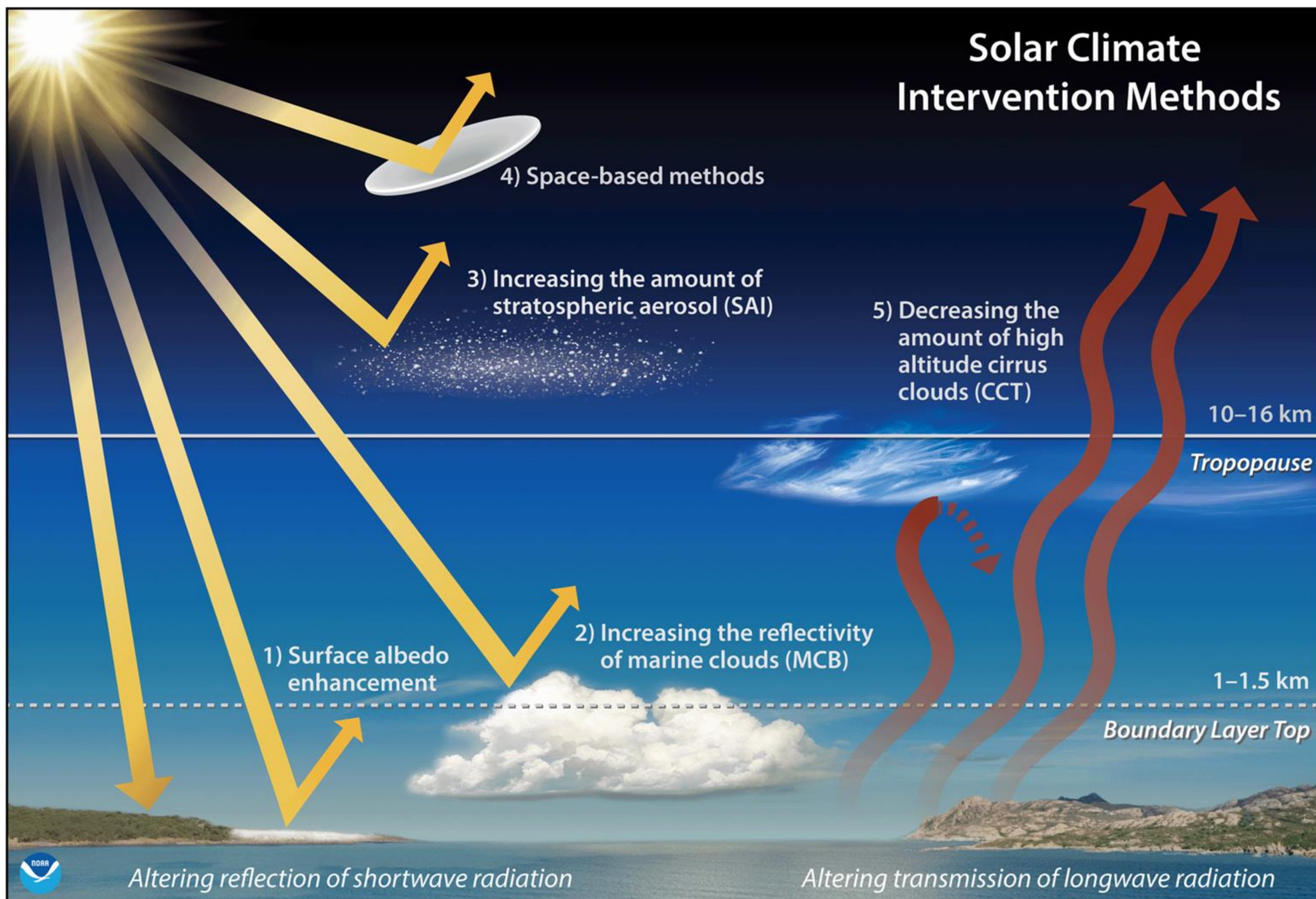
By saurabh pandey sir



Solar radiation decreasing

- The quantity of solar radiation available that can be economically converted by solar panels to electricity is showing an “alarming decreasing trend” in several locations in India, says an analysis by scientists at the India Meteorological Department (IMD).





- Aerosols absorb the sunlight and deflect it away from the ground and they can also precipitate the formation of dense clouds that again block sunlight.
- The efficiency of solar panels are significantly influenced by the amount of sunlight falling on them.

The right and the future of India's masjids

Prime Minister Narendra Modi's frequent attempts to allude to the Ram Mandir in the ongoing election campaign as his major achievement indicates the Bharatiya Janata Party's desire to seek electoral benefits from the subject. Seen in the wider context of the ongoing survey of the Gyanvapi Mosque in Varanasi and claims over the Shahi Idgah Masjid in Mathura, it is apparent that the mandir-masjid conflict may enter a new era in the post-2024 election period.

In June 2022, in the wake of the Gyanvapi controversy, Rashtriya Swayamsevak Sangh chief Mohan Bhagwat made an appeal in Nagpur – that the present generations of Muslims should not be held responsible for the wrongs committed in history by Muslim rulers. "Why look for Shiv linga in every Masjid?" Bhagwat asked. It was a sensible statement but nothing substantive has followed since then.

Instead, the Uttar Pradesh Chief Minister, Yogi Adityanath, has remained most vocal with regard to Kashi and Mathura. In a speech in the Uttar Pradesh Assembly in February 2024, while drawing parallel with the *Mahabharat*, he said, "Krishna asked for five villages, today's Hindu society asks for three centres: Ayodhya, Kashi and Mathura." He appealed to Indian Muslims to give up claim in Kashi and Mathura. During the Ayodhya movement of the 1980s and 1990s, there was a slogan '*Ayodhya to Jhanki Hei, Kashi Mathura Baaki Hei*'. It is now certain that the "*Kashi Mathura Baaki Hei*" part of that slogan has been politically activated.

History and the Jama Masjid

Though the oldest Masjid in India is located in Kerala, no other Masjid has been connected with Muslim history as closely as Delhi's Jama Masjid. During the 1857 Rebellion, it was a site of enormous activities and was defiled and desecrated by the colonial army. We learn that on



Shaikh Mujibur Rehman

is the author of a forthcoming book, 'Shikwa-e- Hind: The Political Future of Indian Muslims' and teaches at the Jamia Millia Central University, New Delhi

In the aggressive quest for electoral gains using the trump card of religion, there ought to be a quiet realisation that masjids are central to the religious lives of Muslims

September 20, 1857, the British sepoys danced around a victory fire inside the Masjid. It was transformed into a military barrack.

Unspeakable forms of defilement took place inside the Masjid premises during its military occupation. In numerous ways Muslims paid a disproportionate price with their lives and property. They were humiliated for their participation in what many historians call India's First War of Independence. Sadly, the Hindutva right barely recognises Muslim sacrifice. Many months later, the Jama Masjid was returned to Muslims. Ilyse R. Morgenstein Fuerst's book, *Indian Muslim Minorities and the 1857 Rebellion*, provides vivid details about various aspects of the uprising and how it has impacted Muslim identity.

Interestingly, there were discussions to demolish the Jama Masjid during the 1857 rebellion. It was revealed by William Howard Russell, who served as the Indian correspondent for *The Times* during 1857-59. In his diary titled *My Diary in India, in the Year 1858-9*, Russell wrote: "It has been warmly suggested that we should destroy the Jumma Masjid. The fact is that the Mohammedan element in India is that which causes us the most trouble...." Mr. Russell goes on to add, "if we could eradicate the traditions and destroy the temples of Mahomed by one vigorous effort, it would be well for the Christian faith and for the British rule."

The Jama Masjid still stands in Delhi and has been a witness to the challenges that Indian Muslims have faced ever since. On December 6, 1992 when the Babri Masjid was demolished, hundreds of Muslims gathered that evening at Delhi's Jama Masjid and were addressed by the Shahi Imam. Nothing much was reported on January 22, 2024, the inauguration of the Ram Mandir in Ayodhya.

Ever since the Supreme Court of India's verdict

in November 2019 on the Ayodhya dispute, Muslims all over India have conducted themselves with great dignity in the hope that it would close the mandir-masjid conflict chapter forever. But that does not seem to be the case given the way the issue is still raised in the Bharatiya Janata Party's campaign by its tallest leaders.

For the Jama Masjid's renovation, a request was made to the United Progressive Alliance government to approve financial assistance from abroad, which was turned down on the ground that it could have security concerns. No security concerns are seen in the global mobilisation of resources by the Hindutva right for its activities. In 2021, in response to a question raised in Parliament on the state of the Jama Masjid and its need for renovation, the Modi government declined to do so.

The danger of further polarisation

The fact remains that masjids are central to the religious lives of Muslims. The first Masjid of Islam was built in Madina called Quba during the Prophet's time. At this point, the Hindutva right has a template based on politics, mobilisation and judicial intervention to grapple with future mandir-masjid disputes based on what took place between December 6, 1992 and January 22, 2024 or even prior to it.

Standing in its way is the Places of Worship (Special Provisions) Act, 1991 that aims to maintain the religious character of places as they existed on August 15, 1947. Given that changing this Act of 1991 is far easier than the dilution of Article 370, it is not hard to imagine what its fate could be. Whatever it may be, the mandir-masjid controversy may take centre stage and go beyond Kashi and Mathura, deepening religious polarisation even further and undermining India's fledgling secularism.



Curative petition

- A curative petition is a petition that requests the court to review its own decision even after a review petition is dismissed.
- Curative Petition was first evolved by the Supreme Court of India in Rupa Ashok Hurra Vs. Ashok Hurra & another (2002).
- The question involved in this case was whether an aggrieved person was entitled to any relief against the final judgment of SC, even after the dismissal of the review petition.

- The Curative Petition concept is supported by Article 137 of the Indian Constitution which states "It says that, subject to the provisions of any law made by Parliament or any rules made under article 145, the Supreme Court shall have the power to review any judgment pronounced or order made by it".
- The limitation for filing a curative petition is 30 days from the date of judgment.

- A curative petition is usually decided by judges in the chamber but if a request for an open-court hearing is made, then such a hearing is allowed.
- If the petition lacks any grounds for reasonable consideration then the court could impose “exemplary costs” on the petitioner.
- Curative Petition will be entitled only after establishing that there is a violation of the principles of Natural Justice

DOOARS

- The Dooars or Duars are the alluvial floodplains in eastern-northeastern India and southern Bhutan that lie south of the outer foothills of the Himalayas and north of the Brahmaputra River basin.
- This region is about 30 km (19 mi) wide and stretches over about 350 km (220 mi) from the Teesta River in West Bengal to the Dhansiri River in Udalguri district of Assam.
- The region forms the gateway to Bhutan. It is part of the Terai-Duar savanna and grasslands ecoregion.



The Hindu analysis by saurabh pandey sir

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Continued struggles



Brazilian indigenous people from the Pataxo ethnic group march in Brasília as part of the Acampamento Terra Livre (Free Land Camp) on Thursday. Thousands of indigenous people take part in the largest annual demonstration, held since 2004, to demand their rights. AFP



Pataxó

- . ?The Pataxó are an indigenous people in Bahia, Brazil with a population of about 11,800 individuals.
- They once spoke the Pataxó language, but now speak Portuguese and a revitalized version of the Pataxó language called Patxohã.
- The Pataxó's territory is part of a wider region traditionally inhabited by the group.
- The region was mainly converted into private farms by settlers who persecuted the Pataxó, and in 1961, they were expelled from the largest remaining forest and integrated into the dominant society, losing their indigenous identity and settling in cities.

Sri Lanka leases its white elephant airport

Agence France-Presse
COLOMBO

Sri Lanka said on Friday it had leased Mattala Rajapaksa International Airport, a white elephant international airport built with Chinese loans, to a foreign joint venture, as the island nation's bankrupt government seeks to offload loss-making assets.

The small airport near a wildlife sanctuary on the southern coast opened in 2013 but was immediately plagued by problems, and has been a running sore on state coffers since.

Government spokesperson Bandula Gunawardana told presspersons that Cabinet had awarded a 30-year lease to a joint venture between India's Shaurya Aeronautics and Russia's Airports of Regions Management Company.

He did not give further financial details, but said only four other companies had shown an interest in managing the isolated airport, which currently has no scheduled flights.

The airport is named after former President Mahinda Rajapaksa.





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Guns and roses



Spirit of revolution: A child holding a red carnation on top of a military vehicle during the 50th anniversary of the Carnation Revolution, a military coup that put an end to Europe's longest dictatorship and 13 years of colonial wars, in Lisbon on Friday. AFP



Carnation Revolution

- The Carnation Revolution , also known as the 25 April , was a military coup by military officers that overthrew the authoritarian Estado Novo government on 25 April 1974 in Lisbon, producing major social, economic, territorial, demographic, and political changes in Portugal and its overseas colonies through the Processo Revolucionário Em Curso.
- It resulted in the Portuguese transition to democracy and the end of the Portuguese Colonial War.

SC backs EVMs, rules out revival of paper ballots

Court says ‘blind distrust’ not helpful, declines plea for cross-verification of VVPAT-EVM count

It tells the EC to explore possibility to devise an ‘electronic machine’ to count VVPAT slips

It also advocates provision where key losing candidates can request and pay for verification

Krishnadas Rajagopal
NEW DELHI

The Supreme Court on Friday upheld the electronic voting machine (EVM) system of polling and refused a plea to revive paper ballots.

“The weakness of the ballot paper system is well known and documented. Keeping in view the vast size of the Indian electorate of nearly 97 crore, the number of candidates who contest the elections, the number of polling booths where voting is held, and the problems faced with ballot papers, we would be undoing the electoral reforms by directing reintroduction of the ballot papers. EVMs offer significant advantages,” the Supreme Court reasoned.

EVMs were first used in 1982 in the Assembly constituency of Paravur in Kerala in 50 out of 123 booths.

The court said that “blind distrust” of an insti-

tution or a system breeds unwarranted scepticism and impedes progress.

“We acknowledge the right of voters to question the working of EVMs, which are but an electronic device that has a direct impact on election results. However, it is also necessary to exercise care and caution when we raise aspersions on the integrity of the electoral process. Repeated and persistent doubts and despair, even without supporting evidence, can have the contrarian impact of creating distrust. This can reduce citizen participation and confidence in elections, essential for a healthy and robust democracy,” Justice Sanjiv Khanna observed.

The judgment of the Bench, also comprising Justice Dipankar Datta, who penned a separate but concurring opinion, coincided with the second phase of the ongoing Lok Sabha election.

The court refused the

Vote of trust

The Supreme Court has said that the EVM system has served the vast Indian electorate well. Other key observations:



■ Over 118 crore electors have cast their votes since EVMs were introduced in 1982

■ In the 2019 General Elections, about 61.4 crore people cast their votes; 23.3 lakh

ballot units, 16.35 lakh control units and 17.40 lakh VVPAT units were used

■ For 2024, 97 crore people are registered to vote; 21.60 lakh ballot units, 16.80 lakh control units and 17.7 lakh VVPAT units will be used

petitioners’ suggestion that paper slips from Voter Verifiable Paper Audit Trail (VVPAT) units be handed over to electors to take a leisurely look before inserting them into the ballot boxes.

It further dismissed the plea by the petitioners – the Association for Democratic Reforms and Arun Kumar Agarwal – for cross-verification of all EVMs and VVPATs across the country. Now, only 5% of EVM-VVPAT counts are random-

ly verified in any constituency.

“While we acknowledge the fundamental right of voters to ensure their vote is accurately recorded and counted, the same cannot be equated with the right to 100% counting of VVPAT slips or a right to physical access to the VVPAT slips,” Justice Khanna noted.

The court refused to strike down Rule 49 MA of the Conduct of Election Rules, which exposes a voter to penal proceedings

Campaign for VVPATs to continue: Cong.

NEW DELHI

The Opposition parties, including the Congress, on Friday said that they would continue with their political campaign on greater use of voter verifiable paper audit trail (VVPAT) to increase the public’s trust in the electoral process. » PAGE 3

SC’s judgment a tight slap to Opposition: Modi

NEW DELHI

Prime Minister Narendra Modi on Friday termed the Supreme Court judgment on EVMs as a “tight slap” to Opposition parties, including the Congress. He also demanded an apology from them for “committing the sin of creating distrust” over EVMs. » PAGE 3

under Section 177 of the Indian Penal Code for submission of false information if his complaint of mismatch between the votes cast and votes counted is not proved.

Key suggestions

The court suggested that the Election Commission (EC) explore the possibility of devising an “electronic machine” to count the VVPAT paper slips.

“Manual counting of VVPAT slips is cumber-

some at every step. The process cannot be expedited or hurried,” the EC had said in its affidavit.

The court also suggested that political parties could be identified with unique bar codes, along with their symbols.

In a separate direction to the EC, the top court ordered that, from May 1, 2024, Symbol Loading Units should be sealed and secured after the process of loading symbols into VVPATs is over.

The court directed that the ‘burnt’ or uploaded memory of the microcontrollers of 5% of EVMs can be checked and verified by a team of engineers from the EVM manufacturers in case of any suspicion of tampering.

Such an exercise would be initiated on the basis of a written request from candidates who have come second or third in the vote tally. The application for verification should be sent within seven days of the declaration of the election results. The District Election Officer concerned, in consultation with the team of engineers, should verify the authenticity of the burnt memory of the microcontrollers of the EVMs. The expenses of the verification will be undertaken by the applicant candidates or their representatives. They will be refunded in case it is found that the EVMs have been tampered with, the court directed.



SC ON EVM

- Supreme Court says it's has given two directions -- one direction is after the completion of the symbol loading process, the Symbol Loading Unit (SLU) should be sealed and they should be stored at least for a period of 45 days.
- The burnt memory in the microcontroller EVM shall be checked by a team of engineers after the declaration of results on a request by candidates in serial numbers 2 and 3, such a request is to be made within 7 days after the declaration of results.
- “The actual cost to be borne by the candidate making the request.
Expenses to be refunded in case the EVMs are found to be tampered with,



Topics



- China and pakistan climate
- Functional diversity
- Dengue
- Coconut palm
- Rule 49 -0
- Essay topic



By saurabh pandey sir.



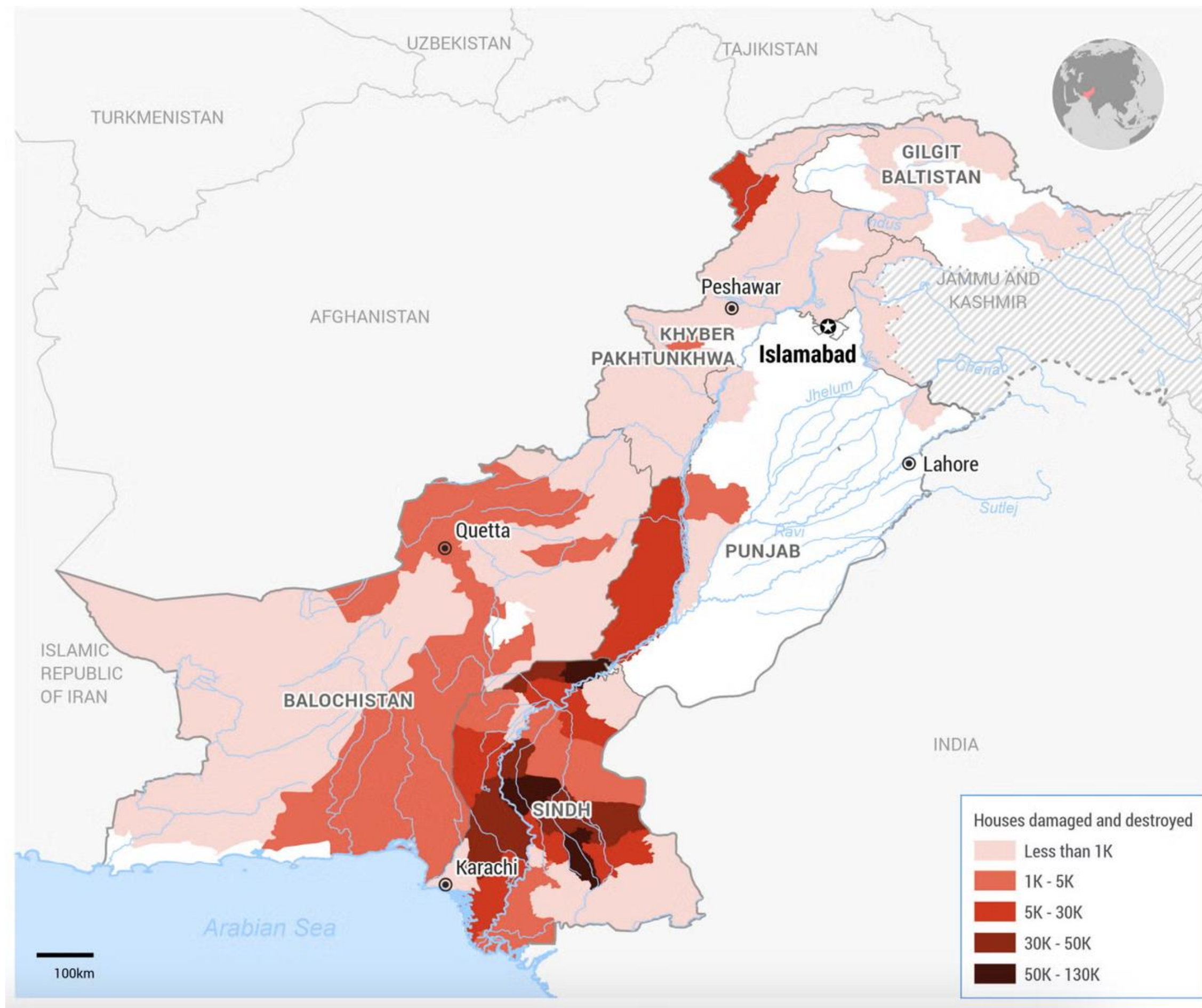
China and pakistan climate

- **.Extreme heatwaves in China follow floods in Pakistan because of an upper tropospheric pathway tied to the Asian summer monsoon system, according to an analysis of more than 40 years of atmospheric data.**
- **This pathway emerges due to the system's internal variability and occurs independent of sea surface temperature forcing patterns.**
- **In the summer of 2022, Pakistan experienced catastrophic flooding.**
- **Right afterward, China was struck by long-running heatwaves followed by severe drought.**

The Hindu analysis by saurabh pandey sir









Diversity can help Canadian drylands endure drought

A new study demonstrates how a diversity of functional plant traits can bolster dryland forest ecosystem productivity in Canada as the climate warms. Based on 57 years of data, the research suggests that dryland biomes with more of this functional plant diversity are far more productive than their monoculture counterparts even during drought intensification. Functional diversity can thus boost ecosystem resiliency over the long term and are unique as Canadian drylands offer a well-preserved forest ecosystem for research.



Functional diversity

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- Functional diversity can thus boost ecosystem resiliency over the long term and are unique as Canadian drylands offer a well-preserved forest ecosystem for research.

The Hindu analysis by saurabh pandey sir



What is Functional diversity ??

- **Functional diversity refers to those components of biodiversity that influence how an ecosystem operates or functions.**
- **The biological diversity, or biodiversity, of a habitat is much broader and includes all the species living in a site, all of the genotypic and phenotypic variation within each species, and all the spatial and temporal variability in the communities and ecosystems that these species form.**

- **Functional diversity, which is a subset of this, is measured by the values and range in the values, for the species present in an ecosystem, of those organismal traits that influence one or more aspects of the functioning of an ecosystem.**
- **Functional diversity is of ecological importance because it, by definition, is the component of diversity that influences ecosystem dynamics, stability, productivity, nutrient balance, and other aspects of ecosystem functioning**



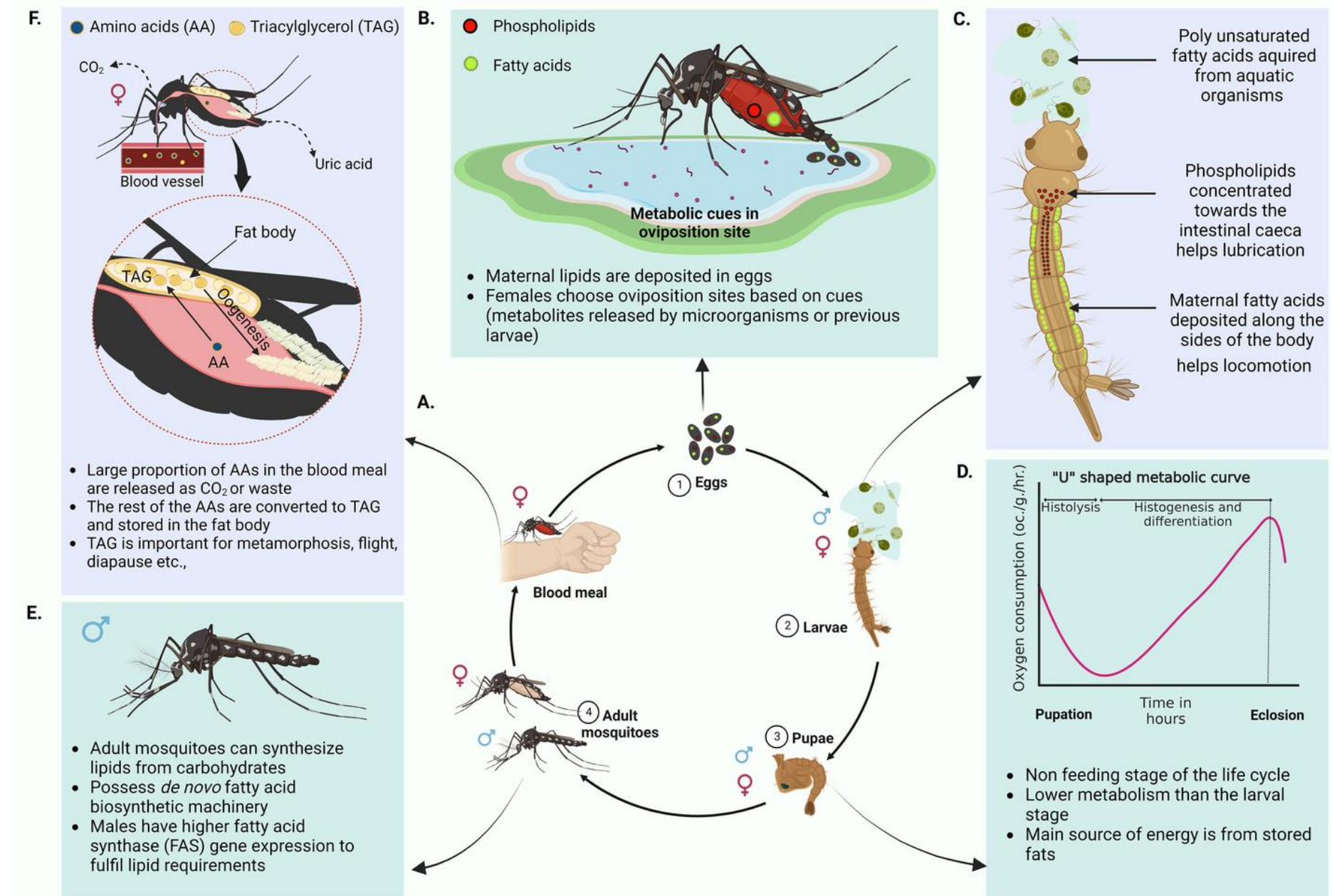
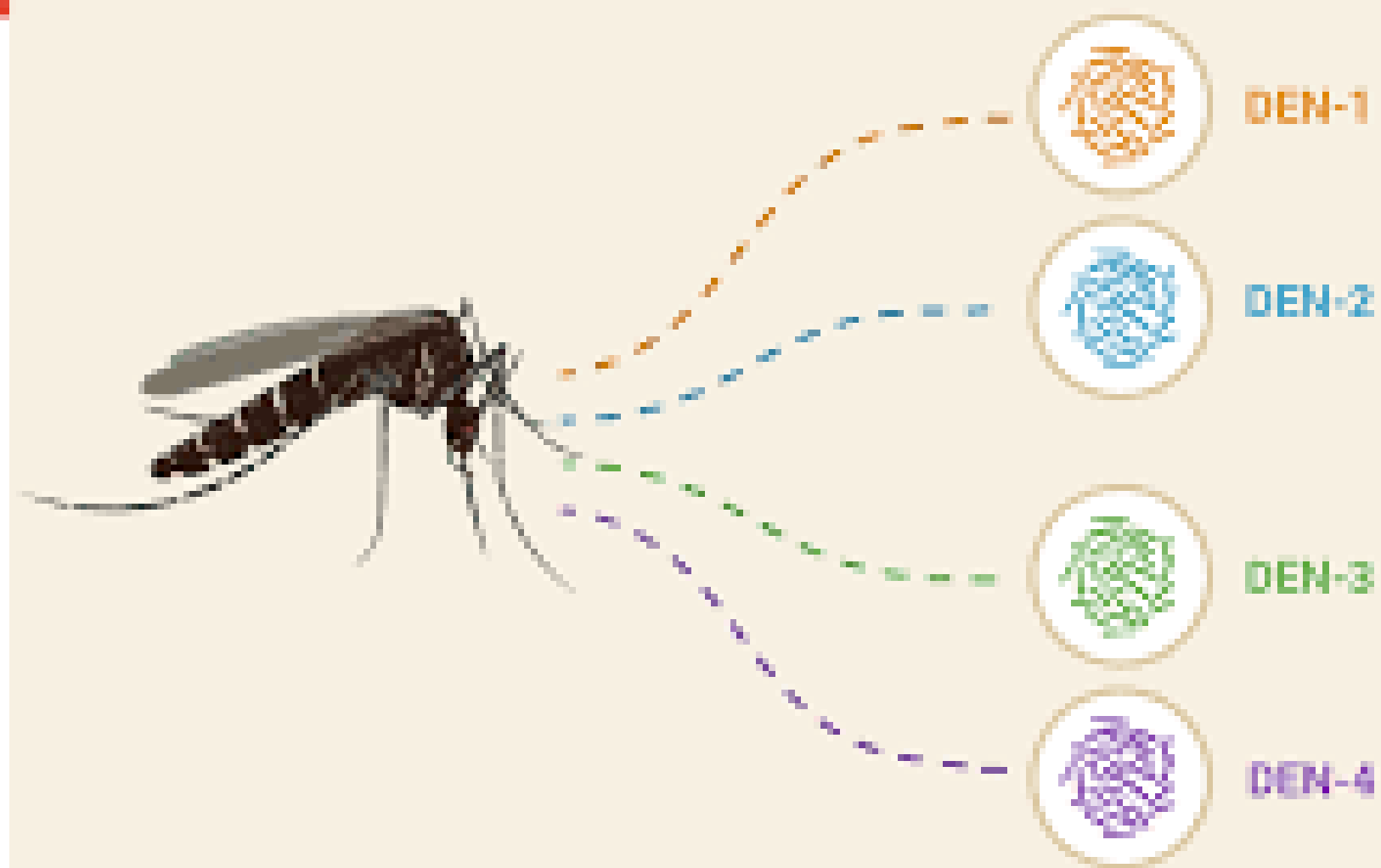
Dengue surveillance reveals how viral types shape risk

A study that combines genetic analysis of the dengue virus with surveillance data teases apart how different subtypes of the virus can shape the risk of having severe repeated infections. The antigenic data on the viruses was combined with a catalog of details on hospitalised cases. When infected for a second time with serotypes that were very similar or very different the disease risk is lower than those when infected with moderately different serotypes.



CAN A PERSON BE INFECTED WITH DENGUE TWICE?

Yes. Infection with one serotype of the dengue virus will only provide immunity to that particular serotype.



The Hindu analysis by saurabh pandey sir

The many benefits of coconut



**SPEAKING OF
SCIENCE**

D. Balasubramanian

A paper published in 2014 by Uma Ahuja *et al.*, in the journal *Asian Agri-History*, points out that the coconut palm is considered as a native of Malesia, a bio-geographical region that includes Southeast Asia (notably India), Indonesia, Australia, New Guinea, and several Pacific Island groups. This paper deals with the history through archaeological, epigraphic, and historical records and its uses and related folklore. Coconut has been recorded in archaeological excavations and epigraphic inscriptions in India – in scriptures of religious, agricultural, and Ayurved-

ic importance. Its multiplicity of uses has earned it epithets like the Tree of life, Tree of abundance, and Kalpavriksha (a tree that provides all necessities of life). The authors point out that in addition to its food value, it has health, medicinal, and cosmetic benefits.

In India, coconut is mainly grown in southern States – Kerala, Karnataka, Tamil Nadu, Telangana, and Andhra Pradesh. These states produce over 90% of coconuts. This is because these trees need a warm and sandy soil which is well-drained and nutrient-rich, a warm and humid climate, and abundant rainfall. North India, on the other hand, has a predominantly temperate climate, with cold winters and hot summers. The region also experiences distinct seasons with uneven



Kalpavriksha: In addition to its food value, coconut has health, medicinal, and cosmetic benefits. GETTY IMAGES

rainfall, which are not conducive to the growth of coconut trees. However, some Northeastern States, with their appropriate temperatures and rainfall, also produce coconuts, but they have a clayey soil, not ideal for the trees to grow.

Coconut occupies a spe-

cial and a higher place among the many articles used in religious offerings to god. It is used in religious and social ceremonies even in areas where it is not grown. Not an inch of the tree goes waste, and all parts are put to some use. Through its innumera-

ble working utilities and direct uses as food, feed, and drink, coconut has penetrated the cultural, social, religious, and lingual matrix of people of various communities. Coconut plays an important role in our daily life in South India. Every temple is decorated with coconut palm trees, its whole nuts are offered to the deity and the devotees are offered a bit of the nut and some coconut water given as 'prasadam'. No drink matches the coconut water in freshness and health; it is just nectar! And no sweet can match the 'kozhukkatai' (or 'modak'), which is made from the 'meat' of the broken coconut! (It is the favourite of Lord Ganesha). Also, as a child grown in Tamil Nadu, I was forced by my grandmother to take an oil-bath every month, using castor oil, or

coconut oil (much against my wishes)!

There are many benefits to coconut. The website Healthline.com lists the many nutrients contained in the 'meat': high in fat, rich in fibre, and in vitamins A, D, E and K, which control overeating and help regular bowel movement. When we turn from the 'meat' to the oil, some groups have suggested that coconut oil appears to benefit the flow of arteries and veins in the body, thus more beneficial for our cardiovascular health. Some groups even suggest that it may delay Alzheimer's disease, though this may need more evidence. I, as a senior citizen, use coconut oil, hoping to avert these conditions. I often use it instead of butter in my daily breakfast of toast. This would have pleased my grandmother!



CM
YK



coconut palm

- coconut palm is considered as a native of Malesia, a bio-geographical region that includes Southeast Asia (notably India), Indonesia, Australia, New Guinea, and several Pacific Island groups.
- In India, coconut is mainly grown in southern States — Kerala, Karnataka, Tamil Nadu, Telangana, and Andhra Pradesh.
- These states produce over 90% of coconuts. This is because these trees need a warm and sandy soil which is well- drained and nutrient-rich, a warm and humid climate, and abundant rainfall.

- **North India, on the other hand, has a predominantly temperate climate, with cold winters and hot summers.**
- **The region also experiences distinct seasons with uneven rainfall, which are not conducive to the growth of coconut trees.**
- **However, some Northeastern States, with their appropriate temperatures and rainfall, also produce coconuts, but they have a clayey soil, not ideal for the trees to grow**

When is a candidate elected unopposed?

What are the rules under the Representation of the People Act? What happened in the Surat Lok Sabha constituency? What has the Supreme Court asked the Election Commission about a petitioner's plea seeking fresh elections in constituencies where NOTA votes are in a majority?

T. Ramakrishnan

The story so far:

In April 22, the ruling Bharatiya Janata Party opened its tally in the Lok Sabha when its nominee for the Surat constituency in the western State of Gujarat, Mukesh Dalal, was elected unopposed. This followed the rejection of the nomination papers of the Congress candidates (main and substitute nominees) the previous day and the withdrawal of other nominees. This means Gujarat's second largest city will not go to the polls on May 7.

How is a candidate declared elected before polling?

Section 53 (3) of the Representation of the People Act, 1951 deals with the procedure in uncontested elections. According to this proviso, if the number of such candidates is less than the number of seats to be filled, the returning officer (RO) shall forthwith declare all such candidates to be elected. In this regard, the RO's actions are governed by Section 33 of the Act which pertains to the presentation of nomination papers and requirements for a valid nomination.

Sub-section 4 says: "On the presentation of a nomination paper, the returning officer shall

Section 53 (3) of the Representation of the People Act, 1951 deals with the procedure in uncontested elections

satisfy himself that the names and electoral roll numbers of the candidate and his proposer as entered in the nomination paper are the same as those entered in the electoral rolls..." In the given instance, three proposers of the Congress' candidate for Surat, Nilesh Kumbhani, claimed in an affidavit to the district election officer (DEO), Sourabh Pardhi, that they had not signed his nomination form. They did not also turn up before the DEO on April 21 to support the candidate's nomination form.

Besides, the Handbook for Returning Officers (Edition 2) issued by the Election Commission (EC) in August 2023, in the chapter titled uncontested election, states that "if in any constituency, there is only one contesting candidate, that candidate should be declared to have been duly elected immediately after the last hour for withdrawal of candidature. In that event, a poll is not necessary." It also says that "all those candidates, who are returned as uncontested and [who] have criminal antecedents, must publicise the details in the prescribed format as per timeline."

What is the scope for negative voting in the election system?

There is ample scope in the system. While the NOTA (none of the above) option has been in force since 2013, the Conduct of Election Rules, 1961, allows electors to decide not to vote through Rule 49-O. A remark to the effect that the elector has decided not to record his or her vote would have to be made in the "remarks column" against the entry relating to the elector in the Register of Voters by the presiding officer, after which the signature or thumb impression of the elector would have to be obtained against such a remark.

The option of NOTA, introduced through the Supreme Court's intervention, has been available on electronic voting machines (EVMs) since November 2013. This became a reality in the wake of a verdict given by a Bench of the Supreme Court comprising Chief Justice P. Sathasivam and Justices Ranjana Desai and Ranjan Gogoi in September 2013, while allowing a petition filed by the People's Union for Civil Liberties. The then CJI, who wrote the

judgment, said: "Giving right to a voter not to vote for any candidate while protecting his right of secrecy is extremely important in a democracy. Such an option gives the voter the right to express his disapproval of the kind of candidates being put up by the parties." He expressed the hope that "gradually, there will be a systemic change and the parties will be forced to accept the will of the people and field candidates who are known for their integrity."

There is a difference between an elector exercising Rule 49-O and one using the NOTA option. In the case of the former, the likelihood of such an elector compromising his or her secrecy is high, as there is a procedure to be followed manually at a polling booth. However, in the case of the latter, there is no such issue.

But, according to the Handbook for ROs, the NOTA votes are not to be taken into account for calculating the total valid votes polled for the return of the security deposit. The EC's stand has been that the person getting the largest number of votes in any constituency will still be declared the winner, regardless of the number of NOTA votes.

But, with respect to local bodies' polls, the situation is different, at least in Maharashtra. Through an order in November 2018, the Maharashtra State Election Commission said that NOTA would be regarded as a fictional electoral candidate for the polls to urban local bodies, and wherever NOTA gets the highest votes, the Commission would go for re-poll.

What are the developments post NOTA?

There have been instances wherein votes obtained by political parties were lower than the NOTA votes. But, a section of activists and constitutional experts has been critical, calling NOTA a "toothless tiger" with no implications on the results, despite the fact that NOTA was reported to have netted over 1.29 crore votes in the State Assembly elections and the Lok Sabha elections combined in the last five years.

On April 26, the Supreme Court, which had in the past refused to direct the EC to hold fresh polls if the majority of the electorate exercised NOTA, asked the poll panel to respond to a plea seeking fresh elections to constituencies where NOTA votes were in majority. The prayer of the petitioner-author Shiv Kherra was that the court should direct the EC to frame rules, stating that candidates who polled fewer votes than NOTA should stand debarred from contesting elections for five years.



Easy entry: BJP leader Mukesh Dalal receives the 'certificate of election' after he was elected unopposed from Surat on April 22. PTI



Rule 49-O.

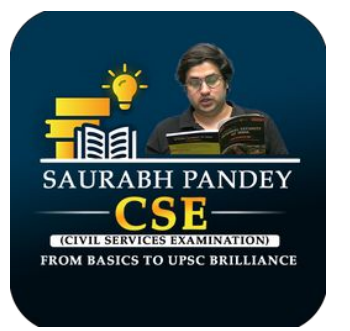
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Topics



- Anticyclonic condition and Heat waves
- Internal combustion engine
- Pantabangan
- INS VIKRANT
- East china sea
- Mains By saurabh pandey sir



Anticyclones, hanging even now over India, link warming to heat

The record warming of 2023 has so far not been fully explained since it was much warmer than expected just from the superposition of El Niño on global warming. But the impact of the El Niño during its pre-monsoon demise on the IEJ tends to produce a stronger and more persistent anticyclone and thus longer lasting and intense heat waves

Raghu Murtugudde

The complexities of the ways in which global warming manifests in local weather continue to underscore the need to model globally but predict locally.

The waning phase of the strong El Niño of 2023 brings the expected warm temperatures across the globe – while cooler temperatures spread from Pakistan across India to West Bengal during March. This band remained cool throughout 2023 even as record temperatures made relentless headlines.

What do the heat waves have to do with global warming?

Global warming also creates unique features locally that modulate heat waves on top of cool background temperatures. Heat waves over India have been of special concern this season because of the general elections. Some persistent circulation patterns have been creating heat waves and this pattern should serve as another focal point for improving predictions.

It was apparent in March that the anticyclonic circulations over the North Indian Ocean were the drivers of unusual rainfall over Odisha. An anticyclone has winds moving in a clockwise direction, with air sinking down in the middle of it. As this air hits the ground, it is compressed and warmed and can create a high pressure heat dome. An anticyclonic circulation could also explain the historic Dubai floods of April 17.

And these anticyclones exist over the North Indian Ocean and the Indian subcontinent even now.

What links anticyclones to heat?

The persistence of the anticyclones is not unusual in and of itself. During the pre-monsoon season, the upper-level Indian Easterly Jet (IEJ) begins to take shape in the upper atmosphere, at around the 10 degrees N latitude, across the Arabian Sea, peninsular India, and the Bay of Bengal. A strong westerly jet exists to the north around 30 degrees N, and the two together can generate an anticyclonic pattern over the Indian Ocean and the Indian subcontinent.

An easterly jet refers to strong winds coming from the east while westerly jets come from the west. These are natural seasonal features. The westerly jet is pushed north during the monsoon season and the IEJ dominates the Indian subcontinent. During the pre-monsoon season, a strong anticyclone can bring dry and hot weather over many parts of India while a weak anticyclone produces milder weather.

The key question then is whether the anticyclone is strong this year and if that



A man covers his head with cloth to protect himself during a heat wave in Bhubaneswar, BISWARANJAN ROUT

is related to global warming and, thus, the heat waves.

How are heat waves amplified?

The pre-monsoon season is India's summer and heat waves are to be expected. The focus is always on predicting them accurately and providing early warnings to save lives. The background drivers of the duration, intensity, and frequency of heat waves are helpful to identify the hotspots of heat waves at the timescales relevant to the evolution of the weather and the climate.

The record warming of 2023 has so far not been fully explained since it was much warmer than what we expected just from the superposition of El Niño on global warming. But the impact of the El Niño during its pre-monsoon demise on the IEJ tends to produce a stronger and more persistent anticyclone and thus longer lasting and more intense heat waves.

So, the heat wave season this year is consistent with the warmer temperatures due to the El Niño itself as well as the 'steroids' being added by the unexplained warming of 2023.

This background state of cool seasonal temperatures but a strong and persistent anticyclone is important. It can help the India Meteorological Department ensure predictions are done with accurate background conditions and build the early warnings accordingly.

Stages of early warnings

Returning to the local manifestation of



Some persistent circulation patterns have been creating heat waves and this pattern should serve as another focal point for improving predictions.

global warming: accurate early-warning systems take a three-step approach called the 'ready-set-go' system, under the so-called 'Subseasonal-to-Seasonal Predictions' project of the World Climate Research Program under the World Meteorological Organisation. India is part of this project, has invested heavily in S2S predictions, and has made impressive progress in improving the accuracy of predictions.

Preparing the system and guiding the National Disaster Management Agency (NDMA) requires this three-step approach to function efficiently and effectively. Considering there are more than 1.2 million polling stations for the general elections this year, the optimal use of resources to prepare for, mitigate, and recover from extreme events requires location-specific information at each step.

The 'ready' step provides a seasonal outlook – where the background state, or the external factors (such as global warming and the El Niño), are used to maximise the accuracy of longer-lead forecasts. The 'ready' step allows the NDMA, its local agencies, and all local governments to ready their disaster

response systems.

The subseasonal predictions refer to the extended range of weeks two to four, which contribute to the 'set' step. Resource allocations and identifying potential hotspots to move resources including personnel ensure disaster-preparedness is set to go.

The 'go' step is based on short- (days 1-3) and medium- (days 3-10) range forecasts. At this step, everything hits the road to manage a disaster, including rescue efforts, hydration centres, heat shelters, etc.

Preparedness and recovery

All evidence suggests India's prediction system and early warning systems continue to improve and the NDMA has worked these details well into its 'ready-set-go' system.

The remaining challenges are to build resilience for the future by better predicting the trajectory of the weather at every location over India. This is a significant challenge but budding efforts for predictions at 10-year timescales have shown promise.

The coordination from national to neighbourhood levels and early-warnings from days to a decade are taking shape. Governments, their departments, and the people at large need to be trained and engaged with to make this a sustained success. India's dream of sustained economic development depends on this.

(Raghu Murtugudde is a visiting professor at IIT Bombay and an emeritus professor at the University of Maryland.)

THE GIST

Anticyclonic circulations were the drivers of unusual rainfall over Odisha. An anticyclone has winds moving in a clockwise direction. An anticyclonic circulation could also explain the historic Dubai floods of April 17

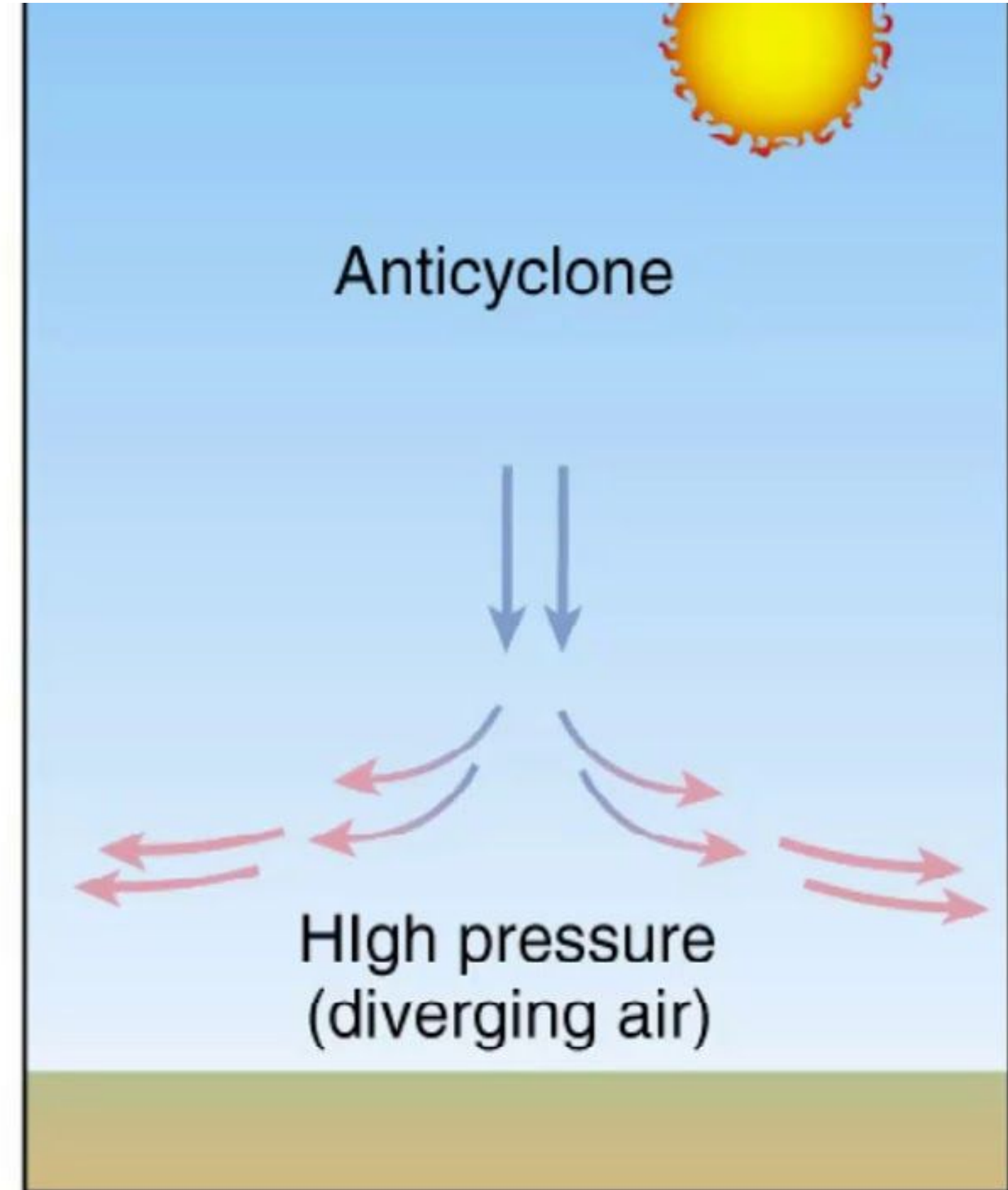
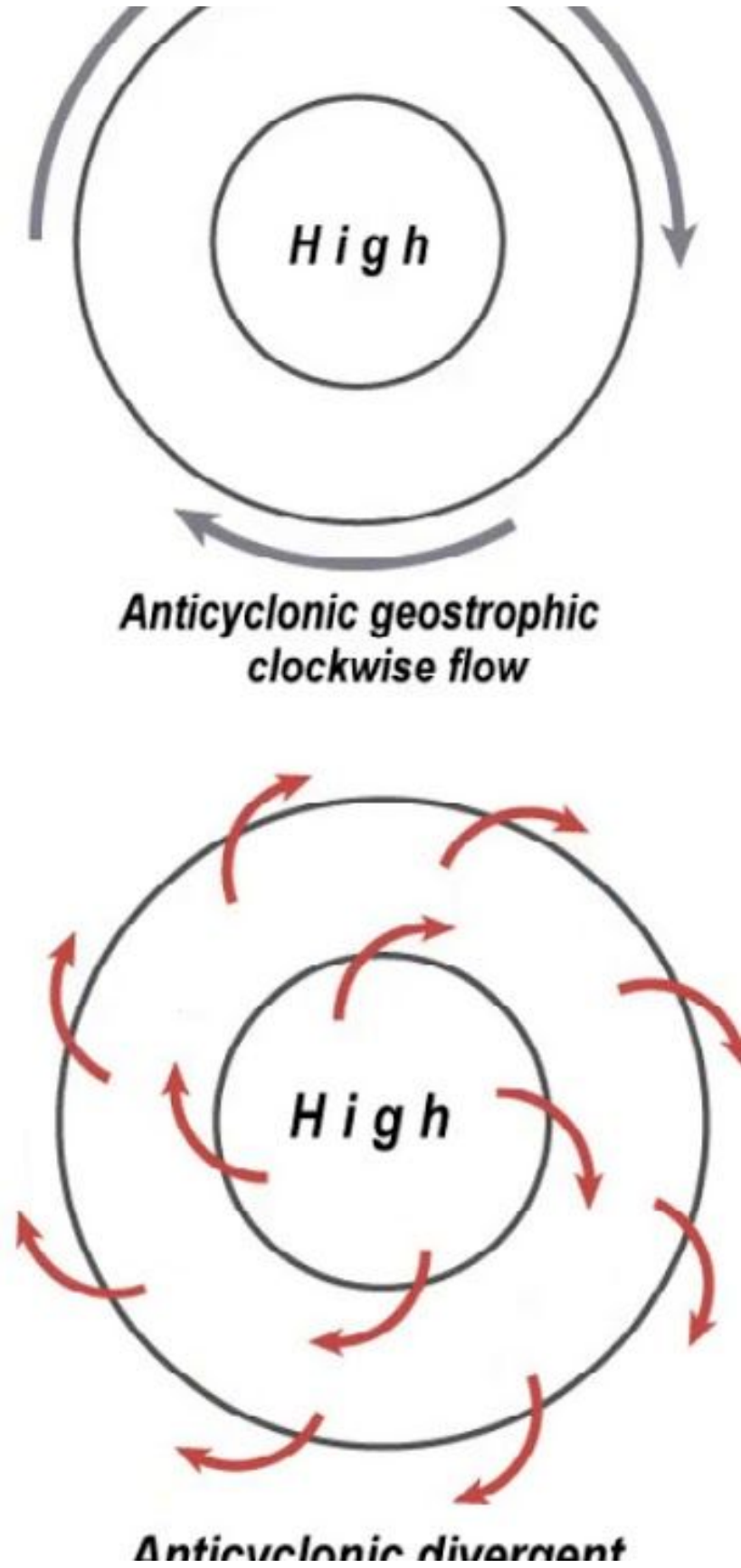
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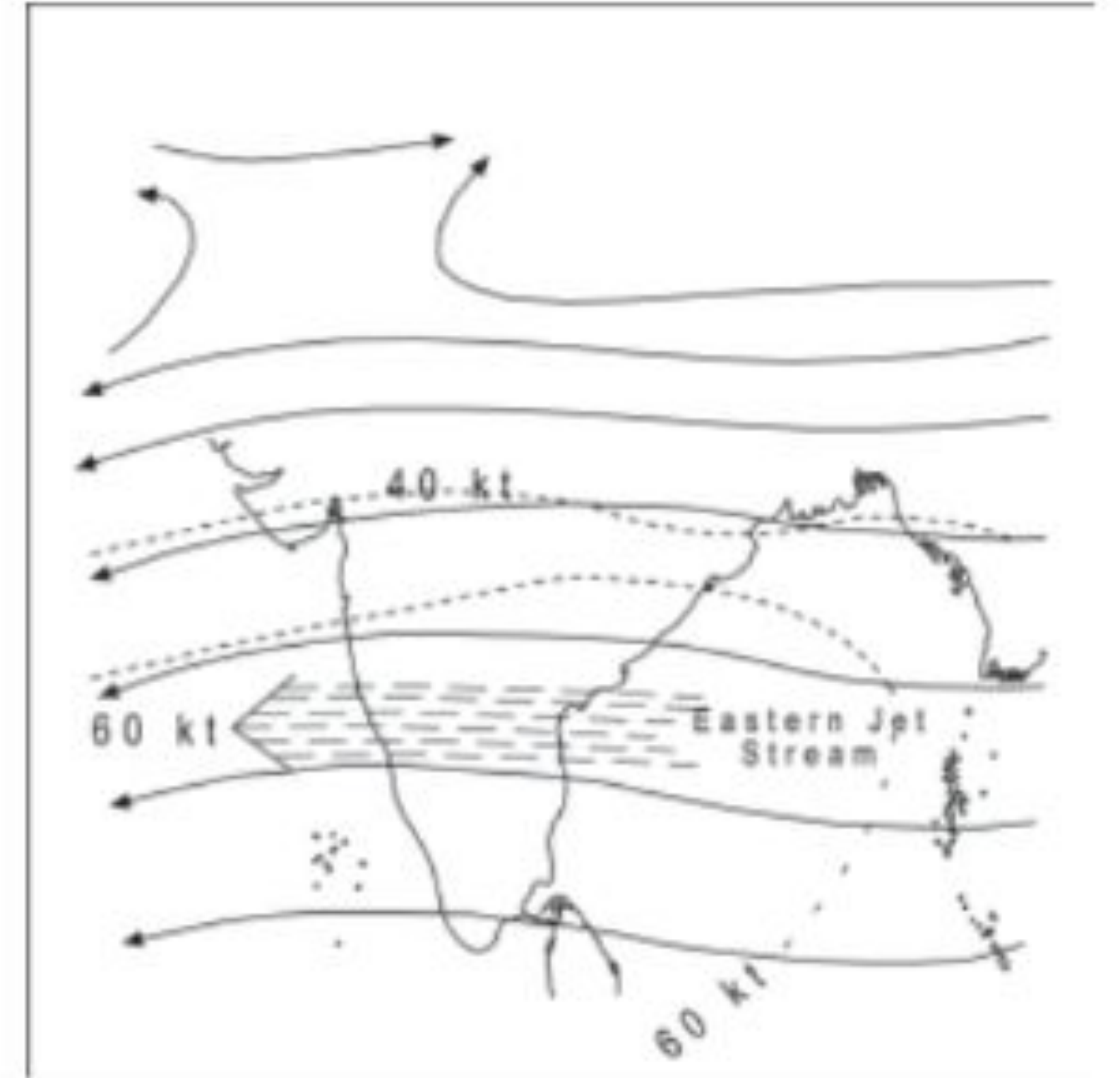
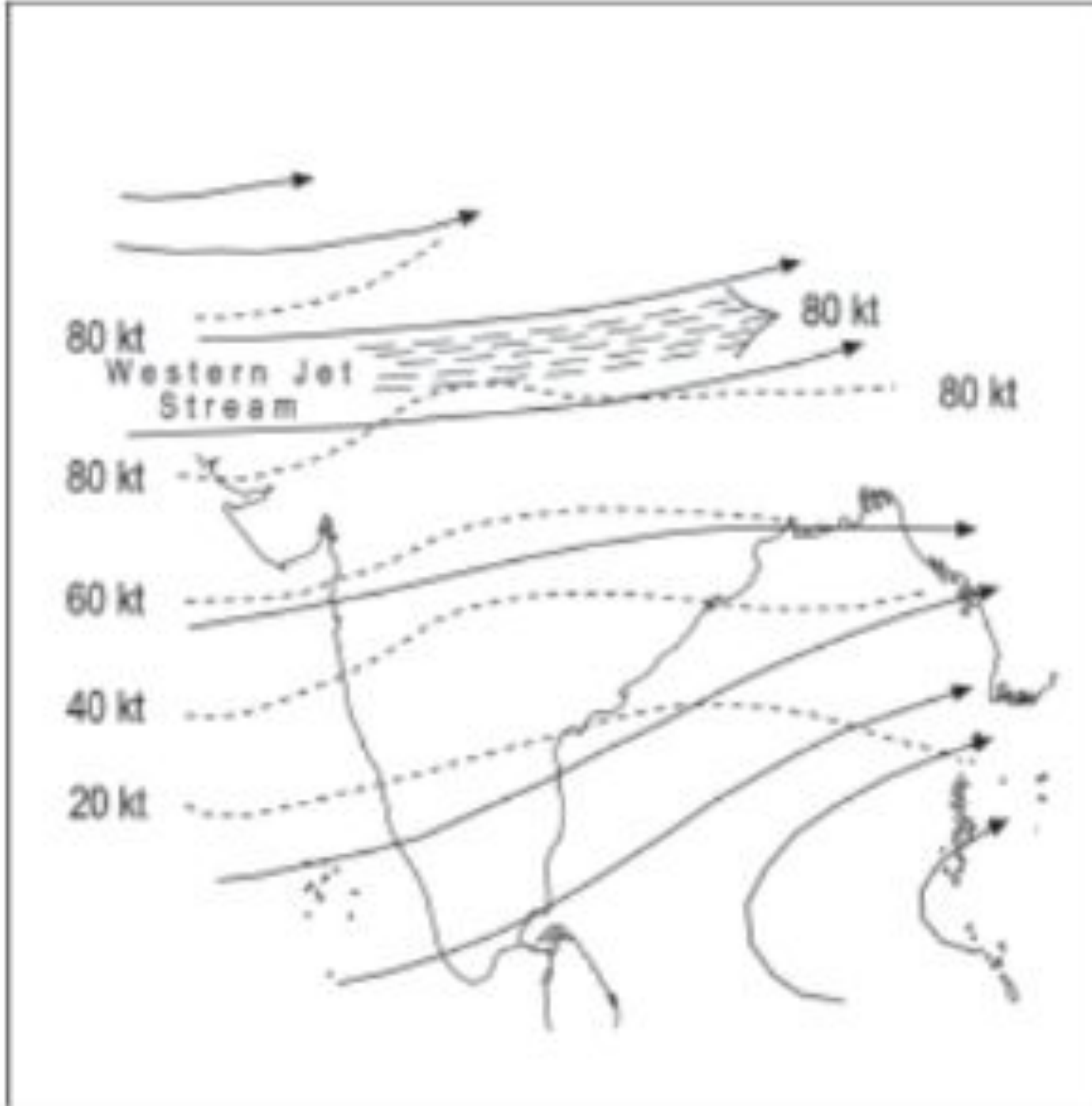
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Anticyclonic condition and Heat waves

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The Hindu analysis by saurabh.pandey sir



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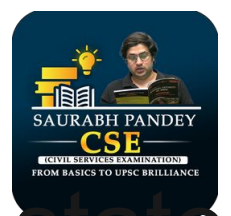
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WHAT IS IT?

Combustion: a question of fuel

Vasudevan Mukunth

Internal combustion engines are everywhere, yet they are not a common sight. They power most cars and motorcycles by combusting a fossil fuel like petroleum (although these vehicles are slowly being replaced by electric vehicles).

Combustion is a type of chemical reaction called a redox reaction, short for 'reduction-oxidation'.

Here, one substance loses electrons and the other gains them. The losing substance is called the oxidant. (Historically, the oxidant was a substance that provided oxygen atoms in a reaction. Over time chemists generalised the term to include all substances that participated in a chemical reaction the way oxygen did, by donating electrons.) The gaining substance is called the reductant. During combustion, the fuel is the reductant.

All combustion reactions release energy. Sometimes, the heat energy in this release will vaporise the fuel, producing a flame. The combustion reaction also releases a gaseous mix of highly oxidised matter called smoke. Combustion science is the branch of science devoted to studying combustion.

The combustion of fossil fuels in internal combustion engines and industrial processes is an

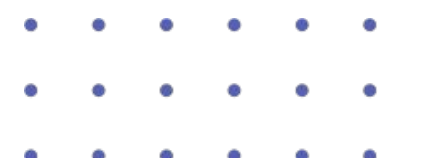


Combustion is a type of chemical reaction called a redox reaction. CULLAN SMITH/UNSPLASH

important cause of global warming. Combustion scientists study the reaction in different ways — including in space — to understand the different ways it can be controlled and the reaction products made cleaner.



For feedback and suggestions
for 'Science', please write to
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BIG SHOT



The old sunken town of Pantabangan in Nueva Ecija province, Philippines. Due to a severe drought in the Philippines, a settlement submerged since the 1970s has reemerged. This is the sixth appearance of the 300-year-old ruins, including parts of a church and tombstones, since the construction of a dam. The reservoir's water level has dropped nearly 50 meters below normal as the country faces extreme heat exacerbated by El Niño conditions, leading to official drought declarations in about half of the country's provinces.

GETTY IMAGES



Pantabangan

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The significance of carrier aviation

Why is the success of the INS Vikrant important? Who were involved in the development of DMR-249 steel? Is India on its way to get a 'third' aircraft carrier? Why is it important that the country should have a strong naval presence in the Indian Ocean Region (IOR)?

EXPLAINER

Dinakar Peri

The story so far:

In March 5, both aircraft carriers of the Indian Navy, INS Vikramaditya and INS Vikrant, showcased “twin carrier operations” with MiG-29K fighter jets taking off simultaneously from both and landing cross deck as Defence Minister Rajnath Singh looked on from onboard one of them. This demonstrated an ability that only a handful of nations can boast of. Further one of the carriers, INS Vikrant is indigenously designed and constructed. Commissioned in September 2022, INS Vikrant has been fully operationalised and integrated into the operational cycle in record time. As the two carriers sailed, they were joined by a flotilla of frontline warships of the Indian Navy, a combined tonnage of around 1,40,000 as well as aircraft.

What does INS Vikrant signify?

A carrier is a floating city. The design work on the Indigenous Aircraft Carrier (IAC)-I, later christened Vikrant, began in 1999; however 2005-2006 were probably the most crucial years for the carrier and for India's war shipbuilding. The crucial decision was on the warship grade steel, which till then was procured from Russia. After much brainstorming, it was decided that it would be developed and produced in India, a collaborative effort between the Steel Authority of India, the Defence Research Development Organisation (DRDO) and the Indian Navy. The decision on the development of DMR-249 steel was a commercial decision, Madhu S. Nair, Chairman and Managing Director (CMD), Cochin Shipyard Limited (CSL) said speaking to *The Hindu* shortly after the commissioning of Vikrant. DMR-249 steel is now being used for the construction of all warships in the country.

The construction also ushered in several new processes and spin-offs benefitting the shipbuilding industry at large. For instance, in 2002, 3-D modelling was introduced for the first time in India and a joint team of 200 personnel from the Navy's Warship Design Bureau and CSL began work. The keel of Vikrant was finally laid in 2009, launched into water in 2013 and went through extensive user acceptance trials between August 2021 and July 2022 before its eventual commissioning.

What is the composition of INS Vikrant?

Delays notwithstanding, Vikrant is an engineering marvel. It has a total area in excess of 12,450 m² which equals to about two and a half hockey fields. The 262m long and 62m wide ship is powered by four General Electric LM2500 engines generating 88 MW of power giving it a maximum speed of 28 knots and an endurance of 7,500 nautical miles. Built at an overall cost of around ₹20,000 crore and 76% indigenous content, the ship has around 2,200 compartments, for a crew of around 1,600 that include specialised cabins to accommodate women officers and sailors. Vikrant houses two galleys which cater to all onboard, preparing upto 4,500-5,000 meals every day. The galleys start operation at 3 am every morning and continue for almost 20 hours a day, an official said. “It is equipped with state of the art automatic chapati making machines, capable of making 6,000 chapatis per meal, large cooking boilers capable of preparing 4,00 kgs of rice, dal, vegetables and other dishes.” Additionally, in order to cater for



Ready for action: Aircraft carriers INS Vikramaditya and INS Vikrant in formation.

a variety of items on the menu, it is also fitted with combi-steamers, a dosa machine and ovens for preparing, idlis, dosa, breads and other bakery items.

Noting that among manufacturing activities, shipbuilding has one of the highest employment multipliers of 6.48, the economic Survey 2022-23 said that Vikrant alone engaged approximately 500 MSMEs, 12,000 employees from ancillary industries, and 2,000 CSL employees.

What are its capabilities?

Vikrant can operate an air wing of 30 aircraft comprising MiG-29K fighter jets, Kamov-31, MH-60R multi-role helicopters, in addition to indigenous Advanced Light Helicopters and Light Combat Aircraft (Navy). It uses the STOBAR (Short Take-Off but Arrested Recovery) method to launch and recover aircraft for which it is equipped with a ski-jump to launch aircraft, and three ‘arrestor wires’ for their recovery. About 200 men start the day by preparing the flight deck for flying operations. “First we clean the entire flight deck of any debris or left overs. Simultaneously, the pilots are briefed for the missions in the briefing room,” one official onboard explained. “After all the aircraft are started up, the entire deck vibrates and generates noise in excess of 200 decibels.”

The flight deck has an independent lighting system to assist for bad weather and night operations. Once the aircraft finishes the mission, they are safely vectored back to the ship and guided for a precision landing, the official stated. “The fighters which have a hook under the belly pick up one of the three arresting gear wires on flight deck. The aircraft with a speed of more than 250 kmph is stopped within a distance of just 90m in just 2-3 seconds.” Vikrant has larger deck space and visibly larger hallways compared to previous carriers including Vikramaditya, which is of similar size. India is currently negotiating with France for the purchase of 26 Rafale-M carrier jets as the MiG-29Ks are in short supply while an indigenous twin engine deck-based fighter is currently under

development. Navy Chief Admiral R. Hari Kumar had expressed confidence that they will receive it by 2034 or so.

While the present Vikrant was the first carrier built in the country, India has had a long history of operating carriers. The erstwhile 19,500 tonne Vikrant was India's first carrier purchased from the U.K., which arrived in 1961 and played a vital role in the 1971 war. Then came the 28,700 tonne INS Viraat commissioned in 1987, formerly HMS Hermes, also from the U.K. INS Vikramaditya procured from Russia and commissioned in 2013 is India's third carrier.

After Vikrant, what next?

An aircraft carrier is fundamental to command, control and coordination of operations from the sea and to project combat power ashore, over the seas or in the air, Adm Kumar told *The Hindu*, noting that the fragile maritime security situation across the Indian Ocean Region (IOR) and India's stature as the largest resident naval power necessitate a strong and robust Navy. “Aircraft carriers play a pivotal role in this and concurrent availability of two Carrier Battle Groups facilitate credible presence and preparedness on both Western and Eastern seaboard.” The Navy has already moved a case for a second Indigenous Aircraft Carrier (IAC-II), a repeat of a Vikrant-like carrier. The proposal was cleared by the Defence Procurement Board last September and has since been forwarded for approval by the Defence Acquisition Council, expected to be taken up once it meets after the elections.

The IAC-II displacing 45,000 tonnes will see some modifications and newer technologies incorporated in the original design of the Vikrant and will also be manufactured by CSL. It will take around eight to 10 years to build a new carrier, Mr. Nair said recently, as long as the basic design, engines and propulsion are kept intact. The Navy has shelved its earlier plans for a 65,000 tonne carrier given the whole new technology cycle involved and the resultant cost and timelines.

The proposed IAC-II has often been

referred to as India's third aircraft carrier. However, that is not entirely right. Design, construction and operationalisation of a carrier takes a long time and the IAC-II, if it comes in time, will be a timely replacement for INS Vikramaditya. Adm Kumar acknowledged this last year. “We are of the view that we will go for a repeat order with improved capabilities and in the meantime we will study whether we need to go for a larger carrier. Till a third aircraft carrier gets ready and is commissioned, the life of INS Vikramaditya may also come to the end of its lifetime. Then we would need to build another carrier,” he said on the sidelines of Aero India 2023. Therefore effectively, for the foreseeable future, the Indian Navy will have only two aircraft carriers in operation while it has long envisioned a force structure around three carriers, two at sea while one is in maintenance. Any delay in decision making could risk India losing its expertise of building and operating carriers, reminiscent of the submarine debacle of the 1980s.

While debate around carriers versus submarines continue, there is a renewed global interest with several countries now going for carriers of varying sizes. The U.S. is fielding new super carriers, and the U.K. has inducted new carriers while France and Russia have announced plans to build new ones. Japan has begun converting its helicopter carriers to operate F-35 fighter jets. Last month, China announced that it is building its fourth aircraft carrier, likely a nuclear-powered super carrier. From commissioning its first carrier, Liaoning, in 2012, launching second carrier Shandong in 2017, third carrier Fujian in 2022 and the fourth to be unveiled soon, China's pace is absolutely unprecedented.

It is not an either/or between carriers and submarines. Each has its merits in naval warfare with profound ability to influence wars. The current global trajectory shows that, the growing carrier targeting missiles and drones notwithstanding, the days of carrier aviation seem to be bright for the foreseeable future.

THE GIST



The design work on the Indigenous Aircraft Carrier (IAC)-I, later christened Vikrant, began in 1999. One of the crucial decisions with respect to Vikrant was on the warship grade steel, which till then was procured from Russia. After much brainstorming, it was decided that it would be developed and produced in India.



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INS VIKRANT



- The 45,000 metric tons vessel, 262 meters (~860 ft.) long and almost 60 meters (~197 ft) wide, is built at an estimated cost of INR 20,000 Cr. (~\$ 2.5 Bn) – almost one-fifth the cost of a regular aircraft carrier.
- Built by Cochin Shipyard Ltd., it is also the biggest ship ever built in India.
- The aircraft carrier is capable of handling 30 aircrafts & helicopters and has a maximum design speed of ~28 knots (52 km/hr). The ship has a 16-bed hospital with two operation theatres and two ICUs. Its flight deck size is nearly 12,500 sq. m – almost as big as two-and-a-half hockey fields – and can operate 12 fighter planes and 6 helicopters at once

The Hindu analysis by saurabh.pandey sir





The Hindu analysis by saurabh pandey sir

- This development has brought India in an elite league of powerful nations that can build an indigenous aircraft carrier by themselves.
- While around 24 countries have past or ongoing aircraft carrier operations, only 5 nations – USA, UK, France, Russia, and China – have the capability to build their own carriers. These nations are also the five permanent UNSC members!
- With the induction of INS Vikrant, the Indian Navy now has two aircraft carriers in its array – INS Vikramaditya being the other one.
- The Indian defense forces have certainly got a boost with the latest development

China confronts Japanese politicians in East China Sea

Reuters

BEIJING/TOKYO

China's coast guard confronted Japanese lawmakers in waters claimed by both countries in the East China Sea, China's embassy in Tokyo and Japanese media said on Sunday, the latest in a series of maritime disputes involving China and its neighbours.

Chinese vessels took unspecified law enforcement measures, the embassy said in a statement, adding that it had lodged solemn representations for what it called "infringement and provocation" by Japan near uninhabited islands that Beijing calls the Diaoyu and Tokyo calls the Senkaku.

The Japanese group, including former Defence Minister Tomomi Inada, was on an inspection mis-



Troubled waters: A China Coast Guard vessel sails near a Japan Coast Guard vessel in the East China Sea on Saturday. REUTERS

sion, according to the Chinese embassy and Japanese public broadcaster NHK. Mr. Inada's team spent three hours near the islands on Saturday, using drones to observe the area, and the Japanese coast guard vessel sought to fend off the Chinese coast guard, NHK said.

It was the first such inspection trip to the area in-

volving a member of Japan's parliament since 2013, NHK reported.

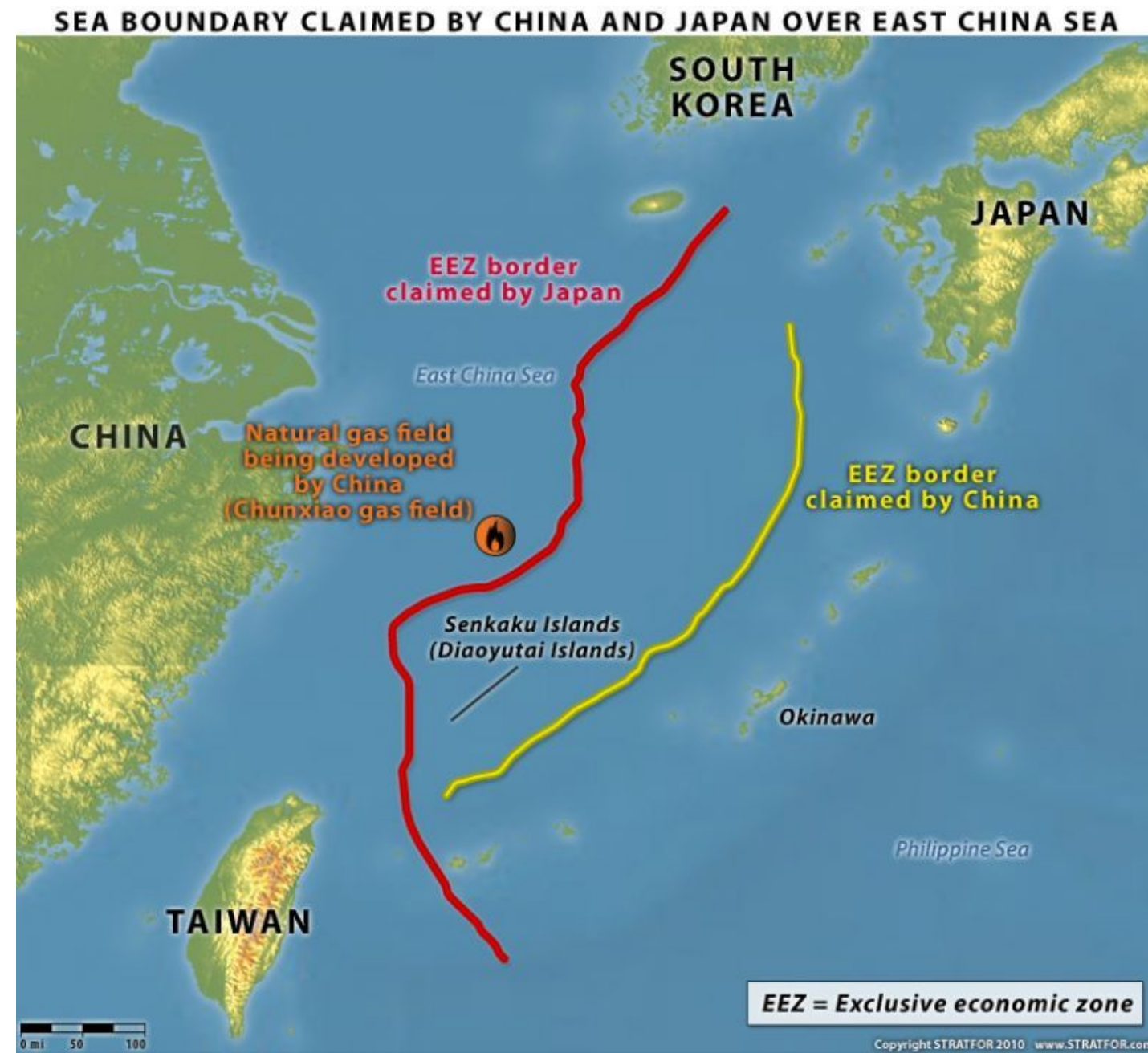
China strongly urged Japan to abide by what it called a consensus reached between the two countries and stop political provocations, the embassy said.

It asked Japan to "return to the right track... to avoid further escalation of the situation".





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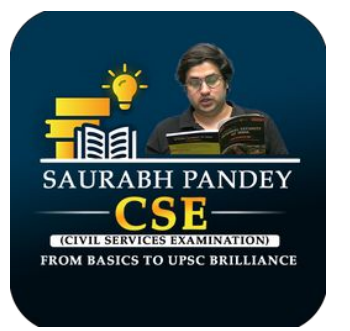


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Topics



- Marine heatwaves
- Moon far side -tidal locking ,
Lunar liberation
- Unclassed forest
- Mains



By saurabh pandey sir



Warming of Indian Ocean set to accelerate: study

Jacob Koshy

NEW DELHI

From 1950 to 2020, the Indian Ocean had become warmer by 1.2 degrees Celsius, and climate models expect it to heat up a further 1.7 degrees Celsius to 3.8 degrees Celsius from 2020 to 2100. While we are familiar with heatwaves on land, “marine heatwaves”, their counterparts in the sea and linked to the rapid formation of cyclones, are expected to increase ten-fold from the current average of 20 days per year to 220-250 days per year.

Mostly attributable to global warming, the tropical Indian Ocean will likely be in a “near-permanent heatwave state” and accelerate coral bleaching, sea-grass destruction, and loss of kelp forests, affecting the fisheries sector adversely, said an analysis led by scientists at the Indian Institute of Tropical Meteorology (IITM), Pune.



The tropical Indian Ocean will likely be in a ‘near-permanent heatwave state’. FILE PHOTO

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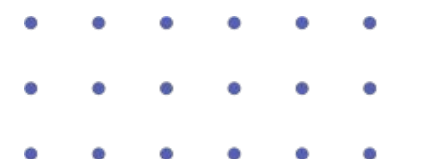
‘One Hiroshima bomb’

The heating of the ocean was not merely restricted to the surface but went deeper and increased the overall “heat content” of the ocean. The heat content of the Indian Ocean, when measured from surface to a depth of 2,000 metres, is currently increasing at the rate of 4.5 zetta-joules per decade, and is predicted to increase at a rate of 16-22 zet-

ta-joules per decade in the future. Joule is a unit of energy and one zetta-joule is equal to one billion-trillion joules (10^{21}). “The future increase in heat content is comparable to adding the energy equivalent of one Hiroshima atomic bomb detonation every second, all day, every day, for a decade,” said Roxy Mathew-Koll, scientist at IITM and lead author of the study.

The study constitutes a chapter in a forthcoming publication *The Indian Ocean and its role in the global climate system* by Elsevier.

Rising heat content contributes to sea-level rise also. Heat causes the volume of water to increase, called the thermal expansion of water, and this is responsible for more than half of the sea-level rise in the Indian Ocean – larger than the changes arising from glacier and sea-ice melting.



Marine heatwave

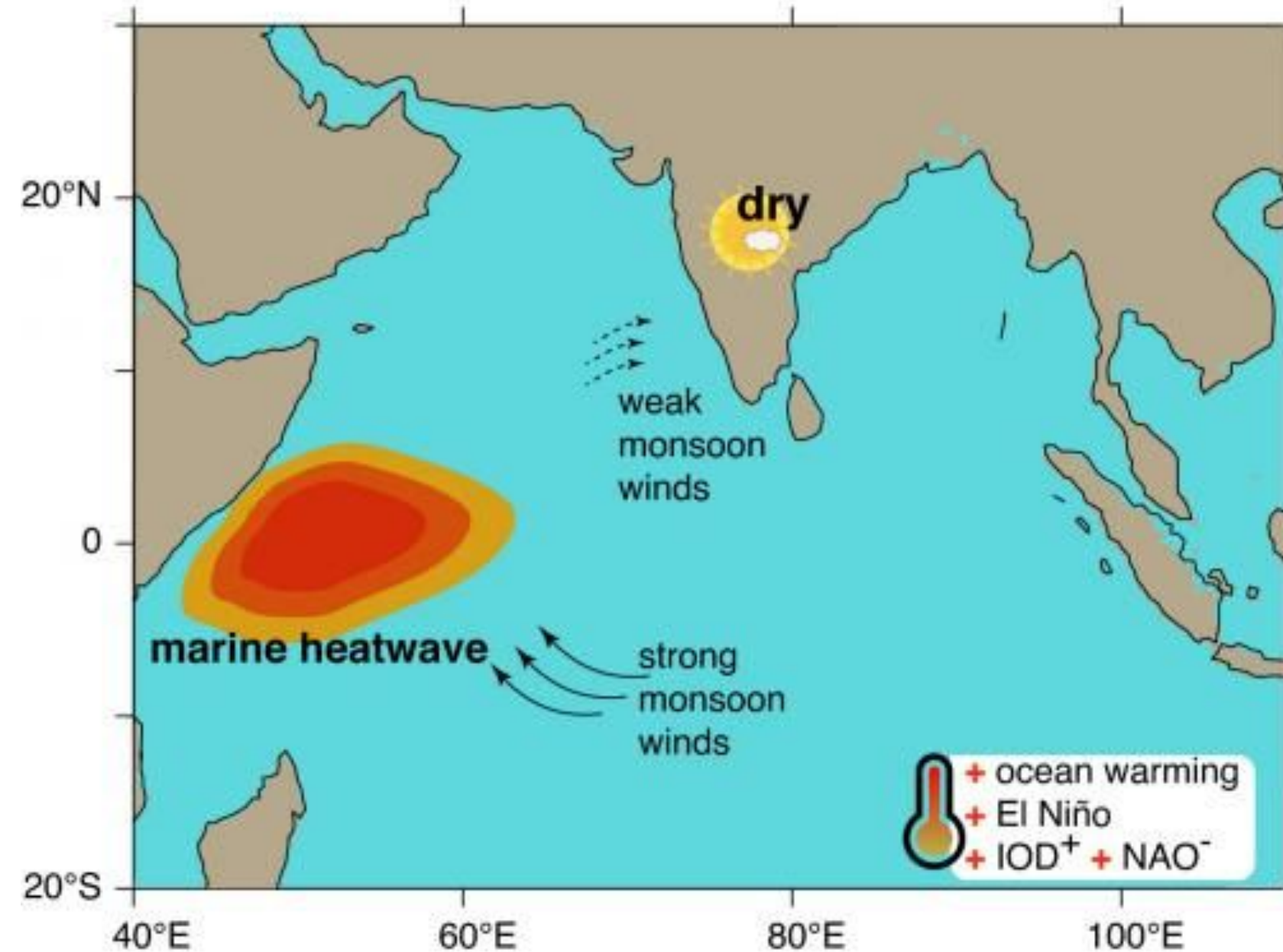
- From 1950 to 2020, the Indian Ocean had become warmer by 1.2 degrees Celsius, and climate models expect it to heat up a further 1.7 degrees Celsius to 3.8 degrees Celsius from 2020 to 2100.
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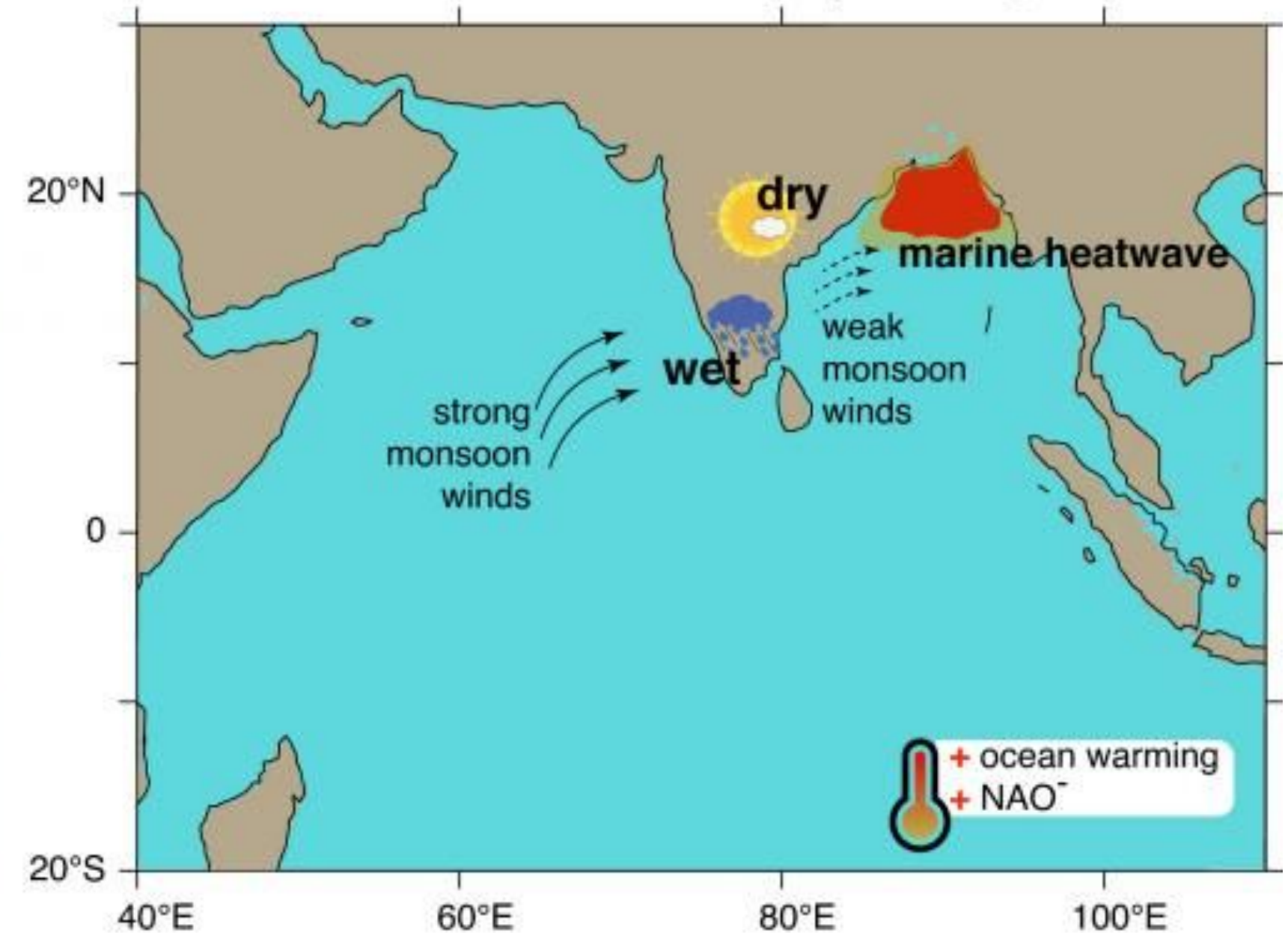


Marine heatwaves in the Indian Ocean and their impact on the monsoon

Marine heatwaves in the western Indian Ocean



Marine heatwaves in the north Bay of Bengal



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The Chang'e 6 lunar probe and the Long March-5 YB carrier rocket combination at the launch pad at the Wenchang Space Launch Site in Hainan province, China on Saturday. REUTERS

China all set for launch of mission to far side of moon

Reuters

China will send a robotic spacecraft in the coming days on a round trip to the moon's far side in the first of three technically demanding missions that will pave the way for an inaugural Chinese crewed landing and a base on the lunar south pole.

Since the first Chang'e mission in 2007, China has made big leaps in its lunar exploration programme, narrowing the technological chasm with the U.S.

In 2020, China brought back samples from the moon's near side in the first sample retrieval in more than four decades, confirming for the first time it could safely return an uncrewed spacecraft to the earth from the lunar surface.

This week, China is expected to launch Chang'e-6 using the backup spacecraft from the 2020 mission, and collect soil and rocks from the side of the moon that permanently faces away from the earth.

With no direct line of sight with the earth, Chang'e-6 must rely on a recently deployed relay satellite orbiting the moon during its 53-day mission, including a

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never-before attempted ascent from the moon's "hidden" side on its return journey home.

The same relay satellite will support the uncrewed Chang'e-7 and 8 missions in 2026 and 2028, respectively, when China starts to explore the south pole for water and build a rudimentary outpost with Russia. China aims to put its astronauts on the moon by 2030.

Beijing's polar plans have worried NASA, whose administrator, Bill Nelson, has repeatedly warned that China would claim any water resources as its own. Beijing says it remains committed to cooperation with all nations on building a "shared" future.

On Chang'e-6, China will carry payloads from France, Italy, Sweden and Pakistan, and on Chang'e-7, payloads from Russia, Switzerland and Thailand.

NASA is banned by U.S. law from any collaboration, direct or indirect, with China. Under the separate NASA-led Artemis programme, U.S. astronauts will land near the south pole in 2026, the first humans on the moon since 1972.

Chang'e 6 will attempt to land on the northeastern side of the vast South Pole-Aitken Basin, the oldest known impact crater in the solar system.

The southernmost landing ever was carried out in February by IM-1, a joint mission between NASA and the Texas-based private firm Intuitive Machines.

The south pole has been described by scientists as the "golden belt" for lunar exploration.

Polar ice could sustain long-term research bases without relying on expensive resources transported from the earth. India's Chandrayaan-1 launched in 2008 confirmed the existence of ice inside polar craters.

Chang'e-6's sample return could also shed more light on the early evolution of



Moon far side , tidal locking and Lunar liberation



- Chang'e-6 is set to blast off on May 3 aboard a Long March 5 rocket from the Wenchang Satellite Launch Center on Hainan Island.
- The spacecraft will embark on a 53-day journey to the far side of the Moon and back, returning lunar soil and rocks to Earth that will help us understand the Moon's history.
- The mission will target the Moon's South Pole-Aitken (SPA) basin, where an ancient impact may have blasted part of the Moon's mantle up to the surface.

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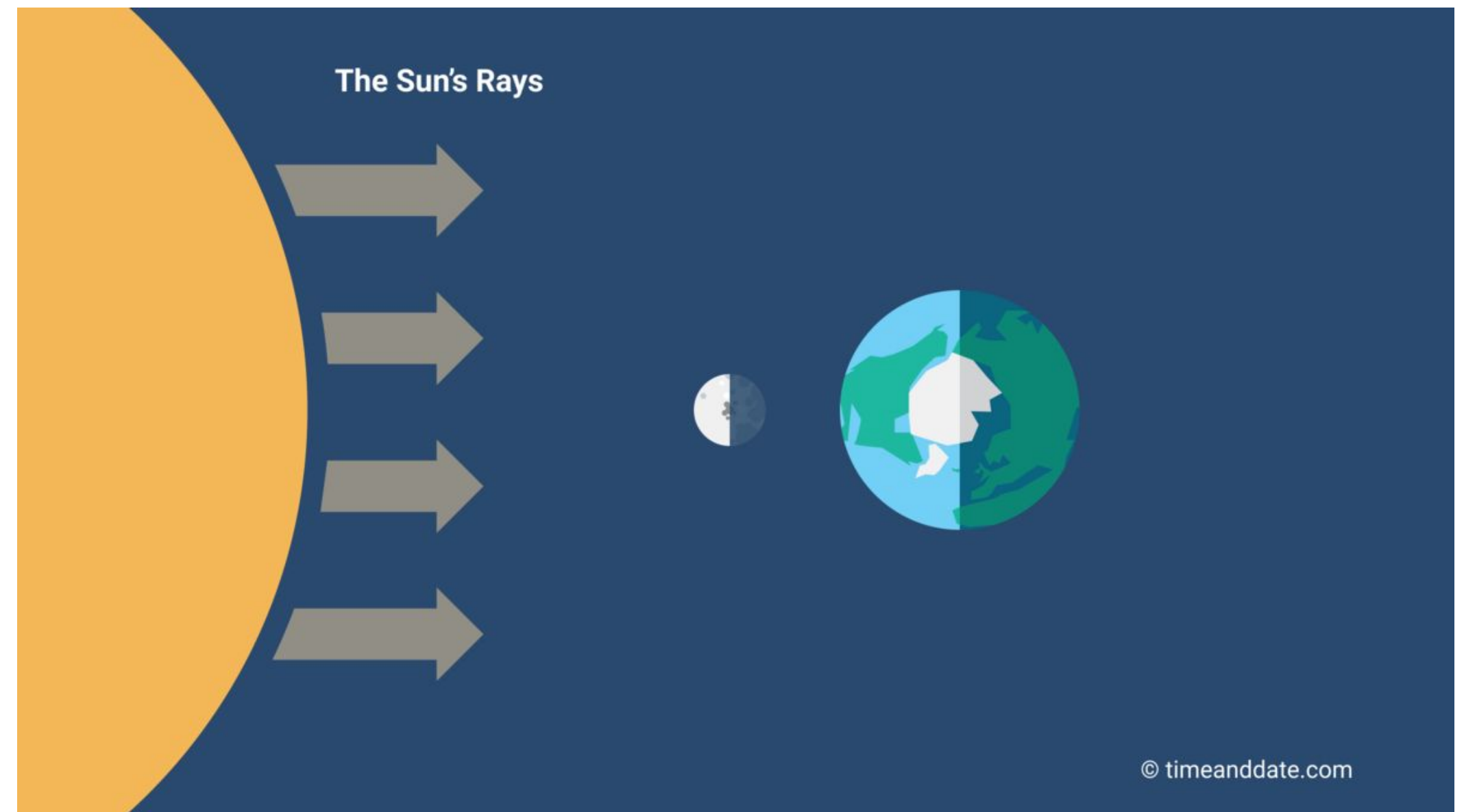
- The region has long been thought of as a keystone to understanding how and when massive objects pelted the Moon and Earth billions of years ago, and why the far side of the Moon is so different from the near side.
- Many missions have returned samples of the Moon to Earth over the years, most recently Chang'e-5 in 2020.
- But all have been from the near side, where line-of-sight communications with Earth simplify operations.
- Landing on the far side requires a communications relay satellite, of which China now has two.
- The country made the first successful lunar far-side landing in 2019 with Chang'e-4, and will follow that achievement with a sample return.

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Far side of moon and Tidal Locking

- From Earth, we always see the same side of the Moon. This side is known as the near side. We can never see the other side of the Moon—the far side—from Earth .



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Why Do We Never See the Far Side?

- The reason the same side of the Moon always faces Earth is that the Moon rotates around its axis at the same speed as it revolves around Earth. This effect is known as tidal locking, and it is caused by the tidal forces of our planet.
- In the same way as the Moon exerts tidal force on our planet, causing tides on Earth, our planet exerts tidal force on the Moon.

- Earth is larger than the Moon, so its tidal force is much more powerful. Over time, this force has slowed down the Moon's rotation until it reached a speed matching the speed of its orbit around Earth.
- All of the major moons in the solar system—including the Galilean moons of Jupiter, and Saturn's Titan—are tidally locked to their parent planet.

Lunar Libration

- However, there is a small variation to this rule. Since the Moon revolves around Earth on an elliptical path, the Moon's distance from Earth varies from day to day. The point of the orbit closest to Earth is called perigee, while the point farthest away is known as apogee.
- Like all celestial objects with elliptical orbits, the Moon's speed varies a little on its path around Earth.
- It speeds up when it is closest and slows down when it is farthest away from us.
- At perigee, the Moon's orbital speed is a little faster than its rotational speed.

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- This variation in speed, along with other factors, causes an effect called lunar libration.
- From Earth, the Moon seems to rock slightly from north to south and wobble a little from east to west.
- Over time, it is possible to see up to 59% of the Moon's surface, but only 50% at a time. In other words, over time, we can see up to 9% of the outskirts of the Moon's far side from Earth.

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Why are unclassified forests ‘missing’?

What does the Forest (Conservation) Act Amendment (FCAA) 2023 mandate with respect to unclassified forests? What was the criticism against the amended Act? Have all States submitted their State Expert Committee reports as per the Supreme Court directives?

EXPLAINER

Prakriti Srivastava
Krithika Sampath
Prerna Singh Bindra

The story so far:

In compliance with a February 19, 2024, Supreme Court order, the Ministry of Environment, Forests and Climate Change (MoEFCC) uploaded the various State Expert Committee (SEC) reports on its website earlier in April. This interim order was in response to a public interest litigation challenging the constitutionality of the Forest (Conservation) Act Amendment (FCAA) 2023. A key concern in the petition was that the status of unclassified forests, which were to be identified by the SEC reports, wasn't known or if they had been identified at all.

What does the FCAA stipulate?

With the enactment of FCAA, unclassified forests – which have legal protection under the landmark *T.N. Godavarman Thirumalpad* (1996) case – would lose this protection, leading to their inevitable diversion. The SEC reports were to be prepared in pursuance of the order, which specified that ‘forests’ as per their dictionary meaning and all categories of forests irrespective of ownership and notification status would be included under the ambit of the Forest (Conservation) Act, 1980. As a result, unclassified forests, also known as deemed forests, would require the Central government's approval in case a project proponent sought to divert that land for non-forest use. Unclassed or deemed forests may belong to forests, revenue, railways and other government entities, community forests or those under private ownership, but are not notified.

Have these forests been identified?

The status of the reports were unknown from 1996 until they shot back into prominence when the MoEFCC told a Joint Parliamentary Committee that the



Needs protection: Wild gaurs grazing in a forest area under Munnar wildlife division in Idukki. FILE PHOTO

SECs had identified unclassified forests that had been taken on record. This was in response to criticism that the proposed law undermined the *Godavarman* judgment and would exclude all unclassified forest land from its purview. The MoEFCC had assured the Committee that “the amended Act would be applicable” to the SEC-identified unclassified forests. However, in response to an RTI application filed on January 17, the MoEFCC said it “did not have the requisite reports”.

While the MoEFCC has now uploaded the SEC reports on its website, they reveal a grim picture: no State has provided verifiable data on the identification, status, and location of unclassified forests. In fact, seven States and Union Territories – Goa, Haryana, Jammu & Kashmir, Ladakh, Lakshadweep, Tamil Nadu, and West Bengal – appear not to have constituted the SEC at all. Twenty-three

States have shared their reports but only 17 are in line with the Court's directives.

Many States have said the one month provided by the top court was too short and “the nature of work voluminous”, and as a result haven't undertaken physical cadastral surveys nor demarcation of unclassified forest lands.

What do the reports say?

Only nine States have provided the extent of unclassified forests. Most states and UTs only shared the extent of different types of forest areas specified in the order: under government ownership, either with forest or revenue and in a few cases under other government departments.

Also, almost no State or UT specified the geographic locations of forests. Any identifying geographical information of forest land, where given, is only of reserve or protected forests, which isn't useful because this information is already

available with Forest Departments. The SEC reports also question the veracity of the reports of the Forest Survey of India, the only government agency to survey and assess forests. For example Gujarat, whose SEC report says its unclassified forests cover 192.24 sq. km while the Survey has reported it as significantly higher at 4,577 sq. km (1995-1999).

The treatment of SECs without on-ground verification is likely to have resulted in the large-scale destruction of forests – which ought to have been identified, demarcated, and protected 27 years ago. But with no baseline data from 1996-1997, we have no idea how much unclassified forest has been lost. For example, Kerala's SEC didn't include the Pallivasal unreserve, an ecologically fragile area in Munnar; this area was also devastated during the 2018 floods.

What would be the effects of FCAA?

The loss of such forests is likely to be a recurring theme in all States, and needs to be investigated. It is also clear the reports were hastily put together, using incomplete and unverified data collected from readily available records, and submitted to the Supreme Court in order to fulfil their obligations.

The *Godavarman* order of the SC was to be implemented in letter and spirit. The failure to do this is a lost opportunity to achieve the requirements of the Indian Forest Policy, which envisages 33.3% forest cover in plains and 66.6% in the hills. Promulgating the FCAA without examining the SEC reports displays a lack of diligence on the MoEFCC's part and will have consequences for India's ecosystems and ecological security. Those responsible need to be held to account, and the national government needs to take ameliorative action to re-identify, retrieve, and protect forest areas as per the 1996 judgment.

Prakriti Srivastava is an IFS (retd.) officer who has served as DIG (wildlife) in the MoEFCC. Prerna Singh Bindra is former member, National Board for Wildlife. Krithika Sampath is a researcher from the University of Michigan.

THE GIST



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