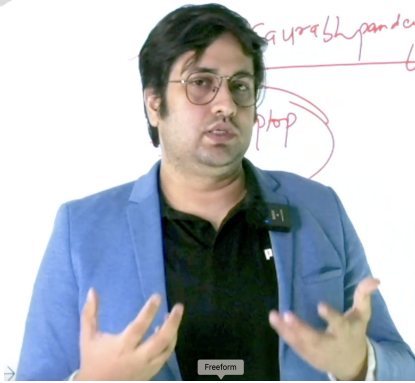
Topics - MINDS MAPS included (Daily current affairs 13th & 12th January 2025

- Target UPSC CSE Prelims 2025

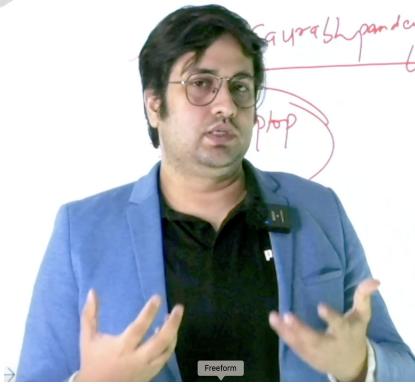
- **Plasticizers and Health:**
- **Dinosaur Discovery: Ahvaytum bahndooiveche**
- **Gene Editing and CRISPR-Cas9**
- **Glioblastoma Treatment Strategy:**
- **Fossilised Chewing Lice Eggs.**
- **IFALPA Raises Alarm on Lithium-Ion Battery Fire**
- **An Assessment of India's Groundwater Contamination**
- **India Meteorological Department:**
- **African Tiger Fish Overview**



By saurabh Pandey

THE HINDU

- India's Draft Digital Personal Data Protection Rules, 2025
- National Electoral Rolls Purification and Authentication Program (NERPAP).
- Small language models
- Mains



By saurabh Pandey

THE HINDU

Target Mains -2025/26 -

Q Explain technological evolution in weather forecasting in india .

(JOIN AAKLAN PLUS TO GET ANSWERS EVALUATED) Download saurabh pandey cse app

Connect with sir
9057921649

send your answer - Saurabh pandey upsc telegram channel

Q. The buffalo and bulbul fights are part of the folk culture associated with the winter harvest of which among the following State. (IE)

A) Arunachal Pradesh

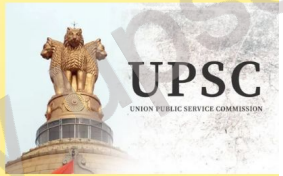
B) Assam

C) Nagaland

D) Mizoram

LOHRI AND MAKARSAKRANTI OFFER

LAST YEAR 50 + QS In prelims 2024 from our course



50 PER OFF IN ALL IAS COURSES

Connect with sir
9057921649(only Message)

Download saurabh pandey cse app

visit - saurabhpandeyupsc.com

Schedule CRASH COURSE ON UPSC CSE Prelims 2025

Upcoming week, 13th to 18th January

Monday	13th January 2025	Indian Geography through Mapping of INDIA (Mountain)
Wednesday	15th January 2025	Indian GEOGRAPHY old ncert-Class XI
Friday	17th January 2025	Indian Geography through Mapping of INDIA
Saturday	18th January 2025	Indian GEOGRAPHY old ncert-Class XI

Download Saurabh pandey cse app

For any Query 9057921649—Only Message

COMPLETE CRASH COURSE ON UPSC CSE PRELIMS 2025

(SUCCESS Batch)

-->Complete coverage of all static subjects.
NCERTs + Mapping + Advance books + PYQS
--> Developing elimination Tricks.
2 yrs coverage of prelims specific current affairs

By saurabh pandey sir

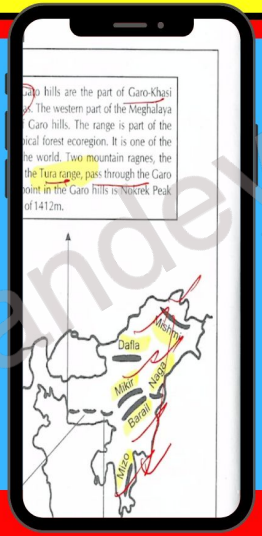
Download saurabh pandey cse app

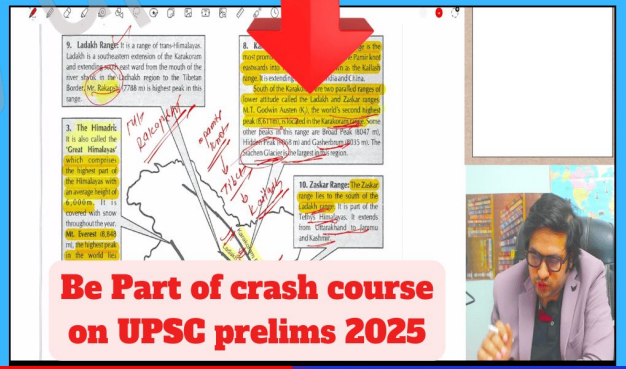
Visit - saurabhpandeyupsc.com

For Any Query Message
9057921649

EVERYTHING IN ONE COURSE !!

Are you missing These Mapping classes ??





Last year 50 + qs from sessions

Download - saurabh pandey cse app

For any query msg
9057921649

IIT Roorkee uses bacterial enzymes to degrade plasticizers

Once integrated into bacteria, the enzymes remain active for a longer time and the bacteria can be used continuously for degrading the plasticizers

R. Prasad

Besides plastics, the amount of carcinogenic plasticizers in the environment is increasing at an alarming rate. Plasticizers are chemicals added to plastics and personal care products to enhance flexibility and shine and are commonly found in items such as baby toys, shampoos, soaps, and food containers. Plasticizers can be absorbed through the skin, making them a direct threat to human health.

A team of researchers headed by Dr. Pravindra Kumar, Professor at the Department of Biosciences and Bioengineering, IIT Roorkee has successfully used an enzyme – esterase enzyme – produced by soil bacteria *Sulfobacillus acidophilus* to break down diethyl hexyl phthalate (DEHP) plasticizer. While a Chinese team had characterised this enzyme to degrade low molecular weight phthalate diester plasticizers, which can be degraded by several reported esterase enzymes, the IIT Roorkee team has identified its actual potential and used it for degrading difficult to degrade high molecular weight phthalate plasticizers. The research was funded by THDC India Limited, Rishikesh, and the results were published recently in the journal *Structure*. The group has also discovered that the esterase enzyme can bind to molecules similar to polypropylene used in plastics, making it a potential tool for extracting polypropylene from con-

Cleaning up using soil bacteria enzymes

Plasticizers, which are added to plastics and personal care products, can be absorbed through the skin

- The researchers have used esterase enzyme produced by soil bacteria Sulfobacillus acidophilus to break down diethyl hexyl phthalate (DEHP) plasticizer
- A Chinese team characterised the esterase enzyme to degrade low molecular weight phthalate diester plasticizers, while the IIT Roorkee team uses it to degrade high molecular weight phthalate plasticizers
- The esterase enzyme was structurally characterised using X-ray crystallography
- In 2017, the team isolated another soil bacteria which use three enzymes in sequence to break down phthalates into carbon-dioxide and water

Enzyme production: The esterase enzyme is produced in large-scale by cloning the enzyme genes into *E. coli* bacteria. REUTERS

- The researchers have used all five enzymes in sequence to break down DHEP plasticizer into water and carbon-dioxide
- The team is trying to insert the genes of all five enzymes into bacteria to directly convert DEHP plasticizer into water and carbon-dioxide
- Once integrated into bacteria, the enzymes remain active for a long time and the bacteria can be used continuously to degrade the plasticizer

The esterase enzyme was structurally characterised using X-ray crystallography. "This helped in identifying the active sites of the enzymes and in understanding the detailed mechanism by which this enzyme degrades the DEHP plasticizer," says Shalja Verma from IIT Roorkee and the first author of the paper. Other sophisticated biochemical and biophysical approaches were also used to understand the efficiency of the enzyme to degrade the plasticizer.

The esterase enzyme remains active for about a month and catalyzes the degradation of DEHP plasticizer with significant efficiency. For large-scale production of this enzyme, the researchers cloned the enzyme into *E. coli* bacteria and the enzyme was produced on a large-scale through aerobic culture.

The enzyme breaks down the DEHP plasticizer into two products – mono-(2-ethylhexyl) phthalate (MEHP) and 2-ethyl hexanol. According to Prof. Kumar, this esterase enzyme, along with other enzymes identified by their group previously can convert high molecular weight phthalate plasticizers into water and carbon-dioxide. And this is where the IIT Roorkee team appears to have an edge. "The results of our research mark a significant advancement in addressing one of the most pressing environmental challenges – providing a promising path toward a plastic and plasticizer-free

Other researchers involved in the work include Shweta Choudhary, Kamble Amith Kumar, Jai Krishna Mahto, Ishani Mishra, Dr. Ashwani Kumar Sharma, Dr. Shailly Tomar, Dr. Debabrata Sircar and Dr. Jitin Singla.

In 2017, the team isolated another soil bacteria *Comamonas testosteroni* that breaks down the phthalates produced by DEHP degradation into carbon-dioxide and water. In the lab, the researchers used the enzymes in sequence to first break down DEHP to MEHP and 2-ethyl hexanol using esterase enzyme, which then was degraded to phthalate using another enzyme. The phthalate is then converted to intermediate compounds using a third enzyme (phthalate mediate compound produced after this step is converted into protocatechuate by the enzyme phthalate decarboxylase. Once protocatechuate is produced, the tricarboxylic acid cycle of the bacteria converts it to carbon-dioxide and water.

While the esterase enzyme used for breaking down DEHP into MEHP and 2-ethyl hexanol is from *Sulfobacillus acidophilus* bacteria, the three other enzymes used in sequence are from *Comamonas testosteroni* bacteria. "In the lab, we have tried using the enzymes in sequence to break down DEHP into water and carbon-dioxide," says Ms. Verma. "We are now trying to insert the genes of all the five enzymes into bacteria to directly convert the DEHP plasticizer into water and carbon-dioxide."

Putting all five enzymes into bacteria will speed up the degradation process not only because the enzymes will act sequentially but also because degradation of the enzymes becomes a non-issue once they are integrated into bacteria. Once integrated into bacteria, the enzymes remain active for a longer time and the bacteria can be used continuously for degrading the plasticizers. But when the enzymes are used without integrating into bacteria, a fresh batch of enzymes needs to be produced to continue the degradation process. "We are also undertaking enzyme engineering to speed up the degradation process inside the bacte-

Topic → Plasticizers and Health: A Breakthrough in Environmental Science

Key Insights

🧪 Plasticizers and Health: Plasticizers, which can be absorbed through the skin, pose significant health risks.

🔬 Research Team: The study was led by Dr. Pravindra Kumar at IIT Roorkee, focusing on an esterase enzyme from the soil bacterium Sulfobacillus acidophilus.

♻️ DEHP Breakdown: The enzyme efficiently degrades diethyl hexyl phthalate (DEHP), a challenging high molecular weight phthalate plasticizer.

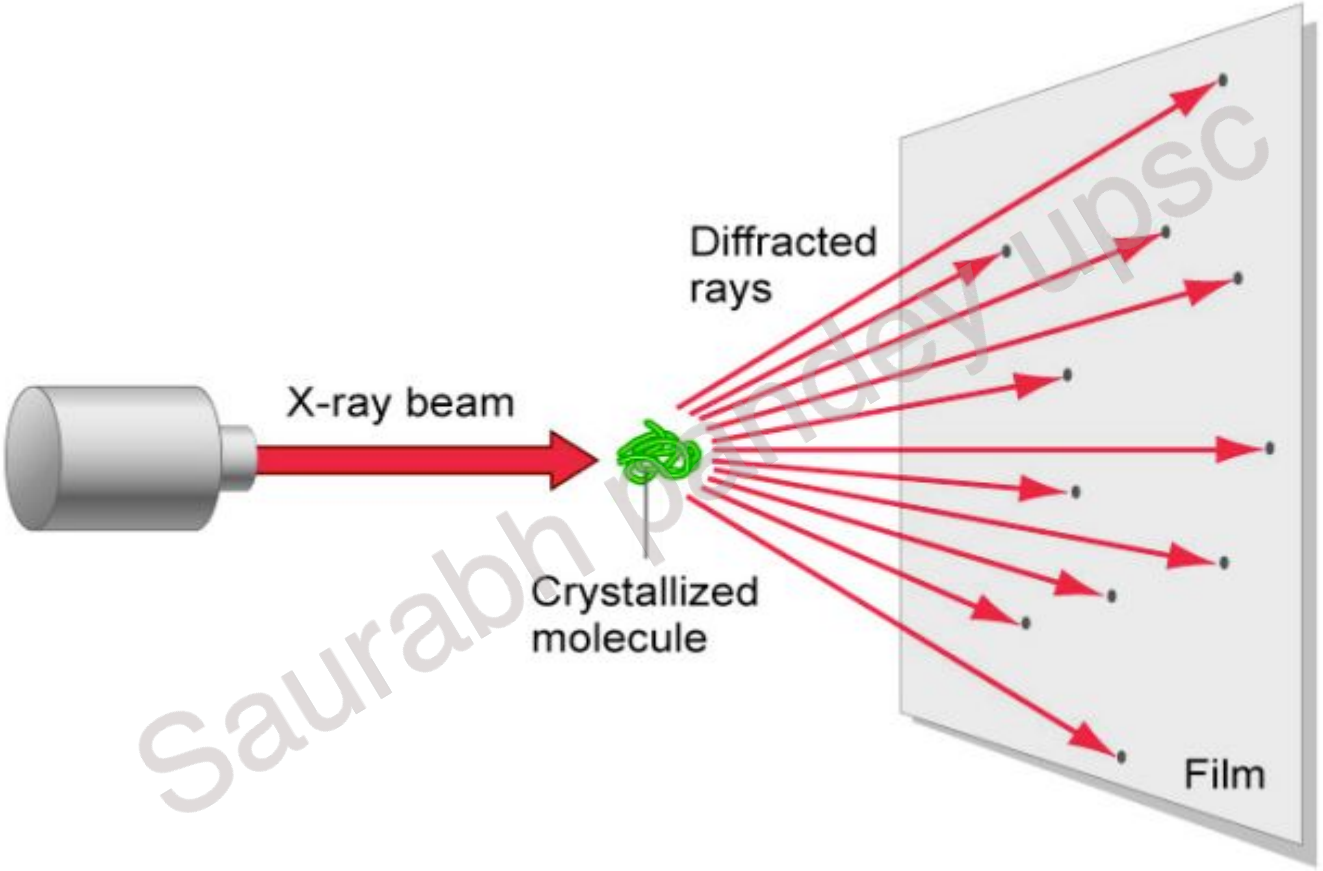
🇨🇳 Previous Research: Earlier studies by a Chinese team characterized this enzyme for low molecular weight phthalate diesters, while the IIT Roorkee team explored its potential for higher molecular weight variants.

💧 Polypropylene Extraction: The enzyme's ability to bind to polypropylene-like molecules suggests its use in extracting polypropylene from polluted water.

🧬 Structural Characterization: X-ray crystallography was used to structurally characterize the enzyme, identifying active sites and degradation mechanisms for DEHP.

🔍 Advanced Techniques: The research utilized advanced biochemical and biophysical methods to evaluate the enzyme's plasticizer degradation efficiency.

Summary: Researchers at IIT Roorkee have identified an esterase enzyme capable of degrading harmful plasticizers, offering promising applications for environmental remediation.



Oldest known dinosaur in northern hemisphere

It is generally thought that dinosaurs emerged on the southern portion of Pangea called Gondwana millions of years before spreading to the northern half named Laurasia. A newly described dinosaur whose fossils were uncovered in present-day Wyoming is challenging that narrative. The creature, named *Ahvaytum bahndooiveche*, is now the oldest known Laurasian dinosaur, and with fossils estimated to be around 230 million years old.

Topic → Dinosaur Discovery: Ahvaytum bahndooiveche

🦖 Dinosaurs are believed to have first emerged in Gondwana, the southern part of Pangea.

🌍 They later spread to the northern region known as Laurasia.

🦕 A newly discovered dinosaur, Ahvaytum bahndooiveche, has been found in Wyoming.

⏳ This dinosaur is estimated to be around 230 million years old.

📜 Ahvaytum bahndooiveche is now recognized as the oldest known dinosaur from Laurasia.

🔍 The discovery challenges the previously held narrative about the emergence and spread of dinosaurs.

🏞️ The fossils were uncovered in present-day Wyoming, indicating a significant paleontological find.

Summary: A newly discovered dinosaur, Ahvaytum bahndooiveche, is the oldest known Laurasian dinosaur, estimated to be 230 million years old, challenging previous beliefs about dinosaur emergence.

Putting the gene editing tool to use

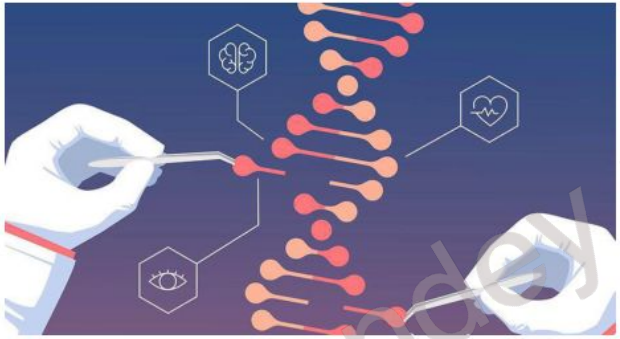
SPEAKING OF SCIENCE

D. Balasubramanian

When you edit a letter or a document, you make specific changes in the words and phrases to make the meaning clearer. Gene editing involves changing the sequence of DNA using specific enzymes which can cut DNA at a precise location, thus permitting the removal, addition, or replacement of genetic information within a gene. The process is akin to correcting a misspelled word in a sentence or replacing it with a more appropriate word. In organisms, this modification directly alters the genetic instructions encoded in the DNA.

In earlier days, if we wanted to modify the message in the DNA to a desired function, it involved two enzymes – one to cut the DNA at a specific site, and another to help insert the desired genetic change. While such twin-enzyme methods worked, they were laborious.

This was when Drs Jennifer Doudna of University of California, Berkeley, U.S., and Emmanuelle Charpentier of Humboldt University, Germany came out with a double action gene modification method, called CRISRP-Cas9. This is a mechanism that can edit the genomes of humans, pathogens, and plants. CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats, and Cas9 (which stands for CRISPR- associated Protein 9) cuts DNA strands at a specific location, creating a gap that can be filled with new DNA. Doudna and Charpentier shared the Nobel Prize in 2012.



Restrictive: Researchers in India can use CRISPR-Cas9 only for academic purposes. GETTY IMAGES

However, Prof. Feng Zang who was then at a Southern California University, published a paper wherein he showed genome engineering using the CRISPR-Cas9 system. But he was not included as the third scientist by the Nobel Committee. He then went ahead, obtained a patent, and moved to Boston, where he works and this patent is owned today by the MIT-Harvard University combine, called Broad Institute, which uses the CRISPR-Cas9 system for a variety of applications such as the mouse model for cancer, identifying genes that make cancer drugs ineffective, and modification of immune cells, plus training people in the technology.

While CRISPR-Cas9 patented technology has been used for the above-mentioned diagnostic and genetic uses, agricultural scientists and botanical researchers have been using this method to genome engineer plants. The group of Dr. Holger Puchta of the Karlsruhe Botanical Institute, Germany has published several papers, notably on how to use Cas9, Cas 12, and Cas13, for targeting plant genomes. Most recently, CRISPR-Cas9 based 'knock-out' of two genes in tomato plants increased their sweetness with no loss in weight. Similar studies on other plants and fruits will surely follow.

However, a recent report by Dr. Anurag Chaurasia, titled "How CRISPR patent issues block Indian farmers from accessing biotech benefits", points out that the IPO has granted a local patent to ERS Genomics of Dublin, which allows Indian researchers to use CRISPR-Cas9 only for academic purposes. Our rural farmers are thus still left 'classical'.

Visually handicapped

For people afflicted with eye disorders, scientists and clinicians at LV Prasad Eye Institute, Hyderabad, in collaboration with a group in IGIB, have used one of these high precision methods to correct inherited mutations in patient-specific stem cells (*Nature Communications*, June 2024). These mutation-corrected stem cells could then make retinal cells, which showed restored expression of the missing protein.

This has opened the possibility of developing autologous cell therapies for certain inherited eye disorders. A similar approach can be adapted for other diseases affecting other tissues and cell types of the body.

Topic → Gene Editing and CRISPR-Cas9 Overview

Gene Editing Basics

✍️ Gene Editing: Involves altering DNA sequences using specific enzymes, akin to editing text for clarity.

CRISPR-Cas9 Development

🧬 Pioneers: Drs. Jennifer Doudna and Emmanuelle Charpentier developed the CRISPR-Cas9 method.
🏆 Recognition: Awarded the Nobel Prize in 2012 for precise genome editing.

Patent Controversy

📜 Exclusion: Prof. Feng Zhang, a contributor, was excluded from the Nobel Prize.
🏢 Patent Holder: The Broad Institute holds the patent for various applications.

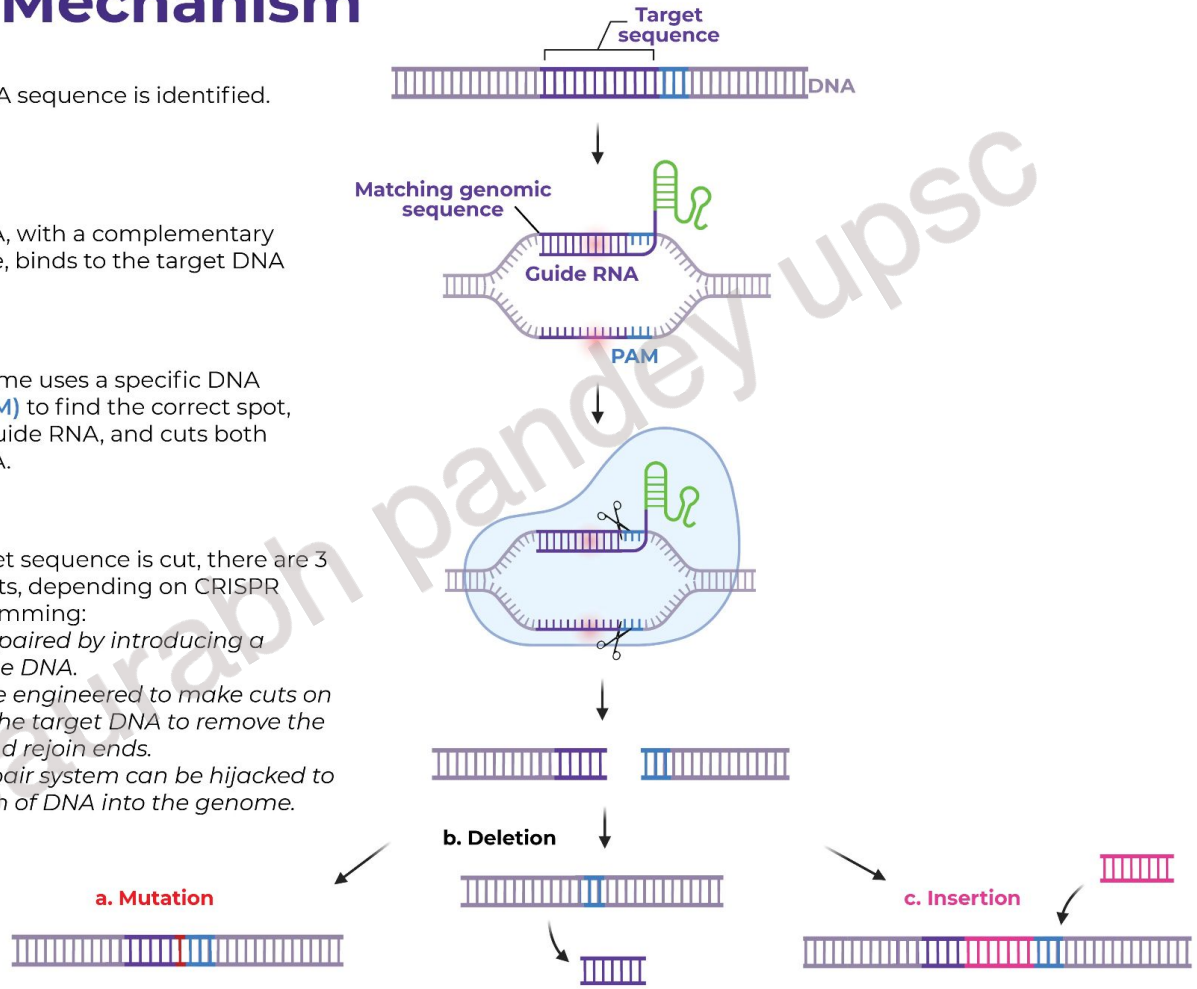
CRISPR Mechanism

1. The target DNA sequence is identified.

2. The guide RNA, with a complementary DNA sequence, binds to the target DNA sequence.

3. The Cas9 enzyme uses a specific DNA sequence **(PAM)** to find the correct spot, binds to the guide RNA, and cuts both strands of DNA.

4. Once the target sequence is cut, there are 3 potential results, depending on CRISPR system programming:
   a. The cut is repaired by introducing a mutation in the DNA.
   b. Enzymes are engineered to make cuts on either side of the target DNA to remove the target DNA and rejoin ends.
   c. The DNA repair system can be hijacked to insert a section of DNA into the genome.



Agricultural Applications

🌱 Enhancements: Used to improve plant traits, like increasing tomato sweetness without affecting weight.

Access Issues in India

🌍 Limitations: Patent restrictions limit CRISPR-Cas9 use to academic purposes, affecting agricultural benefits.

Medical Advancements

👁️ Eye Disorders: LV Prasad Eye Institute uses CRISPR to correct inherited mutations in stem cells.

Future Potential

🔬 Broader Applications: Techniques for eye disorders could be adapted for other diseases affecting various tissues.

Tumor-secreted protein may be a key to treat brain tumor

Targeting a protein called endocan and its related signaling pathway could be a new approach for treating glioblastoma, an aggressive and lethal type of brain cancer. The researchers discovered that endocan, which is produced by endothelial cells lining blood vessels in the tumour, activates PDGFRA, a receptor on glioblastoma cells that drives tumour growth and makes the cancer resistant to standard therapies such as radiation. They suggest a path toward the development of therapies that specifically inhibit this interaction.

Topic → Glioblastoma Treatment Strategy: Targeting Endocan

🧬 Targeting endocan may offer a new treatment strategy for glioblastoma, a highly aggressive brain cancer.

🧠 Endocan is produced by endothelial cells that line the blood vessels within the tumor.

🔗 The protein activates PDGFRA, a receptor that promotes tumor growth in glioblastoma cells.

🚫 This activation contributes to the cancer's resistance to conventional treatments like radiation therapy.

💡 Researchers propose developing therapies that specifically inhibit the interaction between endocan and PDGFRA.

🔍 The findings highlight the potential for targeted therapies in treating glioblastoma.

🏥 This approach could lead to more effective treatment options for patients suffering from this lethal cancer

Insights into coevolution of lice eggs with early bird hosts

Fossilised chewing lice eggs preserved in mid-Cretaceous Burmese amber have been discovered, marking the first direct evidence of ectoparasitic lice feeding on feathers of stem-group birds during the Mesozoic. This offers insights into the origins of lice and their early coevolution with vertebrate hosts. The discovery of the lice eggs in association with feather of enantiornithine, an extinct group, supports the hypothesis that Mesozoic bird lice were parasitic on early feathered vertebrates.

Topic → Fossilised Chewing Lice Eggs in Burmese Amber

Key Discoveries

🦠 Fossilised Evidence: Chewing lice eggs found in mid-Cretaceous Burmese amber, marking the first direct evidence of lice.

🐦 Ectoparasitic Activity: Indicates lice were feeding on feathers of stem-group birds during the Mesozoic era.

📜 Evolutionary Insights: Offers insights into the origins of lice and their early coevolution with vertebrate hosts.

🦚 Enantiornithine Birds: Lice eggs associated with feathers from this extinct bird group.

🔍 Parasitic Hypothesis: Supports the idea that Mesozoic bird lice were parasitic on early feathered vertebrates.

🌍 Ecological Understanding: Enhances knowledge of ecological interactions during the Mesozoic period.

🧬 Broader Knowledge: Contributes to understanding parasitism and host relationships in ancient ecosystems.

Summary

Fossilised chewing lice eggs in Burmese amber provide crucial evidence of lice feeding on Mesozoic birds, enhancing our understanding of their coevolution

Are lithium batteries on flights dangerous?

Why has the airline pilots' body called attention to fire risks? What causes lithium-ion batteries to catch fire? What are the fire-safety equipment and protocols that need to be in place? What happened when Hurricane Helene struck the U.S. in November last year?

Vasudevan Mukunth

The story so far:

On January 2, the International Federation of Air Line Pilots' Associations (IFALPA) issued three position papers on the fire risk due to the use of lithium-ion batteries in airport and aircraft settings. The papers are motivated by air operators' increasing use of electric vehicles (EVs) and lithium-ion batteries as well as the batteries becoming more energy-dense.

What is IFALPA?

The IFALPA is a global nonprofit representing the international community of professional pilots. After the Second World War, the UN established the International Civil Aviation Organisation (ICAO) in 1947 to coordinate air transport and its principles worldwide. A year later, ICAO organised a conference in London where pilots could interact with its leaders. The IFALPA was born at this event with 13 pilots' associations. According to a source on the ICAO website, IFALPA encompassed 104 member associations representing one lakh professional pilots worldwide around 2013. Per the same source, "The belief [is] that the unique perspective of pilots operating in scheduled flying would be of significant benefit to the creation and adaptation of ICAO Standards and Recommended Practices (SARPs) through which ICAO regulates international civil aviation." The IFALPA also provides inputs to the International Air Transport Association, the Airports Council International, and the International Federation of Air Traffic Controllers' Association.

New risks: A technician working on a lithium-ion battery. ISTOCKPHOTO

> Studies have found that existing fire kits have not been able to respond adequately to fires of lithium-ion batteries

Why are there fears about lithium batteries?

Almost every major industry in the world is mechanised to a significant degree, and the energy for these machines has traditionally been produced by burning fossil fuels. As climate mitigation has become more pressing, industries are under pressure to replace this thermal energy – the principal cause of global warming – with electric energy.

For example, EVs draw electric energy from a battery to drive an electric motor and supply kinetic energy to the wheels. In an internal combustion engine, heat energy released by burning fossil fuel moves pistons, whose motion is converted to rotary motion of the wheels.

Lithium-ion batteries have emerged as a popular solution to storing electric energy because they are energy-dense, rechargeable, and can be made in almost any shape, which is useful when there are space constraints as onboard an aircraft. But lithium-ion batteries have been known to catch fire when they are subjected to certain physical stresses.

The fire is the result of the stress creating a short-circuit inside the battery, leaving it to keep producing electric current, heat, and oxygen. The battery's internal components can become corroded while the risk of catching fire increases. The short circuit can be the result of mechanical, electric, and/or thermal abuse, which respectively deforms the internal structure, degrades its electric performance, and causes heat to accumulate.

For example, after Hurricane Helene struck the U.S. in November 2024, 48 lithium-ion batteries reportedly caught fire.

University of South Carolina mechanical engineer Xinyu Huang said they may have been the result of EV batteries rarely being rated to be waterproof when they are sitting in salt water for more than 30 minutes. Such situations are more likely to occur during flooding, which is becoming more common due to climate change and poor urban planning.

What do the IFALPA papers say?

The three position papers are numbered POS01, POS02, and POS03. POS02 and POS03 are more general whereas POS01 is more specific.

POS02 is motivated by the different kind of fires caused by lithium-ion batteries (compared to internal combustion engines). As Mr. Xinyu wrote, "When a lithium-ion battery pack bursts into flames, it releases toxic fumes, burns violently and is extremely hard to put out. Frequently, firefighters' only option is to let it burn out by itself." The position paper thus asks "airports, rescue and fire-fighting services, operators, and ground service providers" to acquire or develop purpose-built fire-safety equipment and protocols.

POS03 extends these concerns to the flight deck – the area colloquially called the "cockpit" in civilian aircraft – where the batteries may be present in components required to operate the aircraft. It also calls attention to studies by the U.S. Federal Aviation Administration and the European Union Aviation Safety Agency finding that existing fire kits couldn't respond adequately to fires of lithium-ion batteries with an energy rating of 100 Wh or higher.

POS01 is concerned with the safe transport of lithium-ion batteries, especially UN regulations 3480 and 3481. Since the UN classifies these batteries as "miscellaneous dangerous goods", the regulations specify the packaging and labelling standards required to transport them by air. UN3480 applies to lithium-ion batteries transported in bulk and UN3481 to lithium-ion batteries fit inside some equipment that's being transported in bulk.

One difference between the two regulations is that UN3480 requires the batteries to be charged to less than 30%, also known as state of charge (SOC) 30%, whereas UN3481 doesn't. POS01 contends that UN3481 didn't adopt this restriction because it assumed manufacturers would install safeguards in the equipment to prevent a fire from one battery spreading to others. But as the energy density of batteries and the number of settings in which they are used is increasing and the size of the equipment that uses them is shrinking, IFALPA's position is that the SOC 30% limit should be extended to UN3481 as well.

Topic →IFALPA Raises Alarm on Lithium-Ion Battery Fire Risks in Aviation

Understanding Lithium-Ion Battery Fire Risks

Lithium-ion batteries, while celebrated for their energy density and versatility, are not without peril. Here's an in-depth look at how these batteries can pose fire risks and the mechanisms behind it:

Fire Ignition Mechanisms:

Mechanical Stress: When batteries are subjected to physical impact or compression, internal components can become damaged, leading to short circuits.

Electrical Short Circuits: A breach in the battery's insulation can create a path for electric current to flow uncontrollably, generating heat and potentially causing ignition.

Thermal Abuse: Excessive temperatures can degrade battery materials, leading to thermal runaway—a self-sustaining reaction that results in fire.

Real-world Incidents:

The aftermath of Hurricane Helene in 2024 highlighted the vulnerabilities of lithium-ion batteries, where flooding resulted in several batteries catching fire due to their exposure to saltwater, which compromised their integrity.

Statistical Insights:

Recent studies indicate that incidents involving lithium-ion battery fires are rising, correlating with the increased deployment of electric vehicles and portable electronic devices.

IFALPA's Position Papers: Key Highlights

The three pivotal position papers released by IFALPA—POS01, POS02, and POS03—provide critical insights into the fire risks associated with lithium-ion batteries:

POS01:

Focuses on the safe transport of lithium-ion batteries, specifically under UN regulations 3480 and 3481.

Advocates for stricter safety measures during transportation, including the recommendation that batteries be transported at a state of charge (SOC) of less than 30%.

POS02:

Discusses the differing fire dynamics of lithium-ion batteries compared to traditional fuel sources.

Emphasizes the need for specialized fire safety protocols and equipment tailored to combat lithium-ion fires, which burn hotter and release toxic fumes.

POS03:

Addresses the risks posed by batteries in the cockpit area, urging the aviation community to enhance fire response strategies.

Cites studies indicating that current fire response kits are inadequate for dealing with lithium-ion battery fires rated at 100 Wh or higher.

Recommendations for Safety Protocols and Fire Safety Equipment

Development of Purpose-Built Equipment: Airports and airlines are urged to invest in advanced fire extinguishing systems designed for lithium-ion battery fires.

Training for Personnel: Firefighters and airline staff should undergo regular training to handle lithium-ion battery incidents effectively.

Regular Assessments and Updates: Continuous evaluation of fire safety protocols is essential to keep pace with evolving battery technologies.

Regulatory Framework and Safe Transport of Batteries

The transport of lithium-ion batteries is governed by a stringent regulatory framework developed by international bodies, including the United Nations:

UN3480 and UN3481 Regulations:

- UN3480 applies to lithium-ion batteries transported in bulk, while UN3481 covers batteries contained in or packed with equipment.
- Packaging Standards: Batteries must be packaged to prevent short circuits and minimize the risk of fire during transport.
- Labeling Requirements: Clear labeling is mandatory to inform handlers of the potential risks involved.

State of Charge (SOC) Limitations:

- Under UN3480, lithium-ion batteries must be transported at a SOC of less than 30%, a measure aimed at reducing fire risks.
- POS01 advocates for extending this SOC limitation to UN3481 to enhance safety across all transport scenarios.

Challenges in Compliance:

As battery energy densities increase, the complexity of ensuring compliance with transport regulations also rises.

The aviation industry must work collaboratively with manufacturers to develop safer battery technologies and transport practices.

Conclusion:

The increasing adoption of lithium-ion batteries in aviation presents unique safety challenges. IFALPA's proactive stance on addressing these risks through comprehensive position papers and recommendations highlights the need for heightened awareness and robust safety protocols.

As the aviation industry evolves with technological advancements, it is crucial to prioritize pilot safety and prevent potential fire hazards related to lithium-ion batteries.

Is groundwater contamination high in India?

What are the contaminants? What happens if nitrate presence is high in groundwater?

Jacob Koshy

The story so far:

An assessment of India's groundwater by the Central Ground Water Board (CGWB) found that several States are grappling with a serious problem of nitrate contamination.

Which are the sources of contamination?

The most concerning finding was that the number of districts with excessive nitrate in their groundwater rose from 359 in 2017 to 440 in 2023. This works out to nearly 56% of India's districts having excessive nitrate in ground water, defined as having more than 45 mg/l (milligram per litre). Of the 15,239 groundwater samples collected from across the country for testing, 19.8% samples had nitrates – nitrogenous compounds – above safe limits though it must be said that this proportion has not substantially changed since 2017. In the 13,028 samples analysed in 2017 for instance, 21.6% had excessive nitrate. There are two major concerns with excess nitrate content: one is methemoglobinemia, or a reduced ability of red blood cells to carry oxygen.

A bigger problem with excessive nitrates are environmental: once the nitrates in the groundwater rise to the surface and become part of lakes and ponds, algal blooms throttle the health of aquatic ecosystems.

The most common contaminant identified in groundwater is dissolved nitrogen in the form of nitrate in sub-surface waters. Since, the nitrogen content of soil is generally quite low, farmers have to look for external sources of nitrogen by using ammonium nitrate, calcium nitrate, urea, diammonium hydrogen phosphate etc. Although nitrate is the main form in which nitrogen occurs in groundwater, dissolved nitrogen also occurs in the form of ammonium (NH_4^+), ammonia (NH_3), nitrite (NO_2^-), nitrogen (N_2), nitrous oxide (N_2O) and organic nitrogen.

> The Central Ground Water Board estimates that the country's degree of groundwater extraction is 60.4%, or roughly the same as it has been through the years since 2009

Which places had serious contamination?

Rajasthan, Karnataka and Tamil Nadu reported the highest proportion of tested groundwater blocks with nitrate exceeding permissible levels – 49%, 48% and 37% of the tested samples respectively reported numbers beyond the limit.

Rajasthan, Madhya Pradesh and Gujarat have a long-standing nitrate problem with relative levels fairly constant since 2017, the report says. However a growing concern are blocks in central and southern India, which are reporting an increasing trend, and therefore is a reason for worry. "Maharashtra (15.74%), Telangana (27.48%), Andhra Pradesh (23.5%) and Madhya Pradesh (22.58%) also show notable levels of nitrate contamination," the report notes.

Is nitrate the only chemical contaminant?

Other major chemical contaminants affecting groundwater quality are arsenic, iron, fluoride and uranium. Just as 19.8% samples of tested groundwater had excess nitrate, 9.04% of samples had fluoride levels above the limit.

Fluoride concentrations exceeding the permissible limit were "a major concern" in Rajasthan, Haryana, Karnataka, Andhra Pradesh and Telangana. Rajasthan and Punjab reported the maximum number of samples with uranium concentration exceeding 100 ppb (parts per billion). Anything over 30 ppb is considered unsafe and several of these samples were predominant in regions of Rajasthan, Gujarat, Haryana, Punjab, Tamil Nadu, Andhra Pradesh, and Karnataka, where groundwater was over-exploited: more water was being drawn out than replenished by rains or other means.

What was the state of groundwater in 2024?

Along with its report on groundwater quality, the organisation also produced a report on the quantity of groundwater in various blocks, enumerating the availability of groundwater across India. The CGWB estimates that on the whole, the country's degree of groundwater extraction is 60.4%, or roughly the same as it has been through the years since 2009. About 73% of the blocks are in the 'safe' zone, meaning that they are replenished enough to compensate for water drawn out.

How are groundwater levels measured?

The CGWB relies on a network of about 26,000 groundwater observation wells that require technicians to manually measure the state of groundwater in a region. Since 2023, however, around 16,000-17,000 digital water level recorders were connected to piezometers in the wells. Piezometers measure groundwater levels and transmit the information digitally to a centralised location. In the next three years, the CGWB aims to increase its network from the existing 26,000 to about 40,000. When combined with similar networks possessed by other institutions, India will have about 67,000 digitally recordable units to monitor ground water dynamics.

Topic → An Assessment of India's Groundwater Contamination

Groundwater is a vital resource for millions in India, but recent assessments by the Central Ground Water Board (CGWB) reveal alarming levels of nitrate contamination across several states. This article delves into the sources of this contamination, the states most affected, and the implications for health and the environment.

Introduction to Groundwater Issues in India

India relies heavily on groundwater for drinking, irrigation, and industrial use. However, the quality of this precious resource is under threat, particularly from nitrate contamination. The CGWB's findings highlight a growing crisis that demands immediate attention.

The Role of the Central Ground Water Board (CGWB)

The CGWB is responsible for monitoring and managing groundwater resources in India. Their assessments provide crucial insights into the state of groundwater quality and quantity, helping to inform policy and conservation efforts.

Nitrate Contamination: A Growing Concern

One of the most pressing issues identified by the CGWB is the rise in nitrate levels in groundwater. This contamination poses serious health risks and environmental challenges.

Statistics on Nitrate Levels

The CGWB's assessment revealed that the number of districts with excessive nitrate levels increased from 359 in 2017 to 440 in 2023. This means that nearly 56% of India's districts now have groundwater with nitrate levels exceeding the safe limit of 45 mg/l.

Comparison of Nitrate Levels: 2017 vs. 2023

In 2017, 21.6% of groundwater samples tested showed excessive nitrate levels. By 2023, this figure slightly decreased to 19.8%, indicating that while the situation is concerning, it hasn't worsened dramatically in terms of percentage.

Health and Environmental Impacts of Nitrate Contamination

Excessive nitrate levels in groundwater can lead to serious health issues and environmental degradation.

Methemoglobinemia: A Health Risk

One of the primary health concerns associated with high nitrate levels is methemoglobinemia, a condition that reduces the ability of red blood cells to carry oxygen, particularly affecting infants and pregnant women.

Algal Blooms: Environmental Consequences
Nitrates that seep into lakes and ponds can trigger algal blooms, which deplete oxygen levels and harm aquatic ecosystems, leading to a loss of biodiversity.

Sources of Nitrate Contamination
Understanding the sources of nitrate contamination is crucial for addressing the issue effectively.

Agricultural Practices and Fertilizer Use
The primary source of nitrate contamination is agricultural runoff. Farmers often use nitrogen-rich fertilizers like ammonium nitrate and urea to enhance crop yields, but this leads to excess nitrates leaching into groundwater.

: Other Contributing Factors
Urbanization, industrial waste, and inadequate sewage treatment also contribute to nitrate contamination, compounding the problem.

States Most Affected by Nitrate Contamination

- Certain states are more severely impacted by nitrate contamination than others.
- : Rajasthan, Karnataka, and Tamil Nadu
- Rajasthan, Karnataka, and Tamil Nadu reported the highest proportions of groundwater samples exceeding permissible nitrate levels, with 49%, 48%, and 37% respectively.

Emerging Concerns in Central and Southern India

States like Maharashtra, Telangana, and Andhra Pradesh are also showing increasing trends in nitrate contamination, raising alarms for public health and environmental sustainability.

: Other Chemical Contaminants in Groundwater

Nitrate is not the only concern; other chemical contaminants also threaten groundwater quality.

Arsenic, Iron, Fluoride, and Uranium

Alongside nitrates, contaminants like arsenic, iron, fluoride, and uranium are prevalent. For instance, 9.04% of groundwater samples had fluoride levels above safe limits, particularly in Rajasthan and Haryana.

Groundwater Availability and Extraction in 2024

The CGWB also assesses groundwater availability, revealing that extraction rates remain high.

Current State of Groundwater Extraction

As of 2024, the CGWB estimates that 60.4% of groundwater is being extracted, with 73% of blocks classified as 'safe' for replenishment. However, over-extraction remains a concern.

Monitoring Groundwater Levels

Effective monitoring is essential for managing groundwater resources.

The Role of Technology in Groundwater Measurement

The CGWB employs a network of 26,000 observation wells, with plans to expand to 40,000. Digital recorders and piezometers are being used to enhance data collection and monitoring efficiency.

Conclusion

The assessment of groundwater quality in India highlights a critical issue that requires urgent action. Addressing nitrate contamination and other chemical pollutants is essential for safeguarding public health and preserving the environment.

WHAT IS IT?

IMD: India's weather tracker

Vasudevan Mukunth

On January 15, 2025, the India Meteorological Department (IMD) will turn 150 years old.

The organisation was set up by the provincial British government in the country in 1875, and its first (Imperial) Meteorological Reporter was Henry Francis Blanford. The IMD's genesis can be traced to the importance of the monsoons over South Asia and the formation and effects of cyclones from the Indian Ocean.

Its formation was particularly accelerated by the 1864 Calcutta cyclone, which devastated the city and left more than 60,000 people dead, and the Orissa famine that followed just two years later because the monsoons had failed. So the government at the time decided to funnel weather data collected around the country into a single set of records, managed by a bespoke organisation. This organisation was the IMD.

It was originally headquartered in Calcutta but by 1944 had moved to New Delhi. In independent India, the IMD became a member of the World Meteorological Organisation in 1949.

Students taking part in an event to mark the 150th anniversary of the India Meteorological Department (IMD) in Chennai. ANI

The IMD currently operates six Regional Meteorological Centres, a Meteorological Centre in every State capital, plus a panoply of centres for various meteorological services. Aside from tracking and studying phenomena like rainfall and cyclones, the IMD helps record earthquakes and atmospheric pollution and generates alerts and warnings about impending anomalous weather. It also maintains a complicated communications system that collects data from a variety of sources, including ground observatories, naval vessels, atmospheric balloons, and satellites.

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

Topic → India Meteorological Department: A Historical Overview

📅 150th Anniversary Celebration

Date: January 15, 2025
Significance: Marks 150 years of the India Meteorological Department's contributions to meteorology.

🇮🇳 Establishment and Early History

Year Founded: 1875
Founder: British provincial government in India
First Meteorological Reporter: Henry Francis Blanford

🌧️ Importance of Monsoons and Cyclones

Reason for Establishment: Critical role of monsoons and cyclones in South Asia
Historical Event: 1864 Calcutta cyclone highlighted the need for meteorological services

📍 Headquarters Relocation

Original Location: Calcutta
Current Location: New Delhi (since 1944)

🌍 Global Integration

World Meteorological Organisation Membership: Joined in 1949
Impact: Enhanced international collaboration

🛰️ Meteorological Services and Operations

Regional Centres: Six Regional Meteorological Centres
Services Provided: Weather tracking, earthquake recording, pollution monitoring

📡 Data Collection Methods

Communication System: Complex network for data gathering
Sources: Ground observatories, naval vessels, balloons, satellites

Summary: The India Meteorological Department, established in 1875, will celebrate its 150th anniversary in 2025, playing a crucial role in weather monitoring and disaster management in South Asia.

BIG SHOT

African tiger fish (*Hydrocynus vittatus*) in the Okavango river in Botswana. Freshwater environments cover about 1% of the earth's surface but account for more than 10% of known species. In a new study in *Nature*, researchers assessed the status of 23,496 species of freshwater animals and found 24% of them to be at high risk of extinction. REUTERS

Topic →African Tiger Fish Overview

Key Characteristics

Scientific Name: Hydrocynus vittatus 🐟

Habitat: Native to freshwater environments in Africa 🌍

Physical Traits: Notable for sharp teeth and aggressive predatory behavior 🦈
Common Locations: Found in rivers, lakes, and reservoirs 🏞️

Diet: Primarily consumes smaller fish and invertebrates 🍽️

Popularity: Sought after by sport fishermen for its fighting ability 🎣
Conservation Concerns: Status not well-documented; habitat loss is a potential threat 📈

The Okavango River

🌊 The Okavango River is located in Botswana.

🦓 It is known for its unique ecosystem and biodiversity.

🐘 The river supports a variety of wildlife, including elephants and other species.

🌍 The Okavango Delta, formed by the river, is a UNESCO World Heritage Site.

🚣 The river is a popular destination for eco-tourism and adventure activities.

🌿 It plays a crucial role in the local economy and sustains the livelihoods of many communities.

🐦 The river is home to numerous bird species, making it a birdwatcher's paradise.

Summary: The Okavango River in Botswana is a vital ecological and economic resource, renowned for its biodiversity and as a UNESCO World Heritage Site

India's data protection rules need some fine-tuning

Vivan Sharan

a technology policy expert at Koan Advisory Group

Srishti Joshi

a technology policy expert at Koan Advisory Group

On January 3, 2025, the Ministry of Electronics and Information Technology (MeitY) released the much-anticipated Draft Digital Personal Data Protection (DPDP) Rules – a key moment in India's journey to regulate digital personal data. This step follows the passage of the DPDP Act, 2023, bringing India closer to operationalising its framework for safeguarding personal data.

The draft rules represent a departure from the earlier and controversial Personal Data Protection Bill, which many deemed was overly restrictive and even hostile to industry interests. The Bill underwent extensive framing, reframing and consultations over nearly a decade, only to be rescinded when committees and government stakeholders wisely decided it was untenable.

In contrast, the positive response to the DPDP Act and its accompanying rules, reflected in conversations with businesses and in media coverage, stems from the less prescriptive, principles-based approach of the draft rules.

Unlike the earlier rush to regulate under the so-called "Brussels Effect", where global digital rulemaking mirrored the European Union (EU)'s interventionist regulatory ethos, India has taken a more pragmatic stance. The EU's General Data Protection Regulation (GDPR), once hailed as a gold standard by privacy experts, now faces criticism for unintended consequences – favouring well-resourced corporations, stifling smaller enterprises, and failing to significantly enhance public trust in the Internet. India's measured approach thus far offers a refreshing alternative to Europe's interventionist policies.

The hits as pragmatism and flexibility

One of the draft rules' standout features is their principles-based framework for notice and consent. While the GDPR has cumbersome requirements, such as notifying users of indirect data acquisition, cross-border data transfers, and automated decision-making processes, India's rules emphasise simplicity and clarity. This helps reduce "consent fatigue", a significant issue in Europe, where users are inundated with unnecessary details, such as the location of data processing – information of little practical use.

In 2023, the European Commission introduced the Cookie Pledge Initiative to address growing frustration over incessant consent pop-ups. However, such course correction would have been unnecessary had the EU taken a less invasive approach to regulating user interfaces and consent mechanisms. The very existence of this pledge highlights the burdens created by prescriptive regulation.

India's DPDP Rules sidestep these pitfalls by focusing on outcomes rather than processes, empowering users without drowning businesses and consumers in unnecessary complexities. The rules avoid dictating how entities should enable users to exercise their rights to correction, erasure, nomination, withdrawal of consent and to seek information from entities. They require only the publication of relevant information on apps and websites. In contrast, the GDPR is prescriptive about how similar information should be presented, including instances where entities may need to provide this information orally to users. Why should the state dictate every aspect of an app or website's design or user interface? India's approach, thankfully, respects business autonomy and innovation.

The largely positive response to the Draft Digital Personal Data Protection (DPDP) Rules flows from its less prescriptive, principles-based approach

The processing of children's personal data requires stricter protection compared to other types of data processing – which the rules provide for. However, as more children engage with digital technologies online, they increasingly benefit from certain activities, such as monitoring and tracking, which are of value in specific contexts. Take the case of educational institutions, including supplementary education and vocational training services. They rely on activities such as behavioural monitoring and tracking to deliver targeted interventions tailored to students' academic performance. These practices leverage the benefits of learning management systems, which personalise instruction and improve educational outcomes. Recognising this, the rules thoughtfully allow exemptions for specific industries. Educational institutions, clinical and mental health establishments, allied health-care providers, and child-care centres are not required to verify parental consent for tracking and behavioural monitoring, as long as they adhere to guardrails. The exemption for such industries demonstrates a nuanced understanding of industry-specific needs, reflecting the principles of thoughtful policymaking.

The misses as data localisation, overreach

However, the draft rules are not without flaws. Their provisions for restricting cross-border data flows introduce unnecessary complexity and ambiguity. Significant Data Fiduciaries (SDFs) – large enterprises handling substantial data volumes – face potential localisation mandates that extend beyond the legislation's original scope. While the DPDP Act allows the government to restrict personal data transfers, it limits such action to specific notified countries. Differentiating between SDFs and smaller entities, where the second enjoy relaxed transfer rules for the same data, creates the risk of regulatory arbitrage. Smaller entities could exploit the lighter regime to gain an unfair advantage. These inconsistencies may deter investment and drive businesses out of India. The localisation provision likely stems from the challenges faced by law enforcement agencies in accessing cross-border data for investigations. While these agencies undeniably need access to such data, a narrower sectoral approach to localisation could prove more effective than a centralised one. The Reserve Bank of India's 2018 mandate for localising payment data is a prime example of proportionate regulation. Tailored specifically to the financial sector, it effectively addressed legitimate industry concerns without causing too many business disruptions. Applying this approach to personal data could balance security and compliance with economic competitiveness.

Some areas still require greater clarity. Businesses need safeguards to verify whether users requesting information about data processing are legitimate. This necessity is acknowledged even in the GDPR. However, India's draft rules do not address scenarios where businesses face incessant information requests or provide scope for businesses to charge a reasonable fee for requests which are excessive or even unfounded. A related ambiguity is whether the government can demand access to sensitive business data. If so, how will it ensure the protection of such information from falling into the hands of competitors? What if this information is a trade secret? These gaps highlight the need for thinking about procedural integrity.

What lies ahead

According to IBM, data breaches cost Indian businesses an average of ₹19.5 crore ($2.35 million) in 2024. Compliance with data protection laws should not be seen as a regulatory obligation, but as critical to protecting business reputation and ensuring continuity.

India must also move beyond reliance on notice-and-consent mechanisms to safeguard citizens' privacy in future laws. Notice and consent originate from the medical profession, where they can still be deemed to work effectively in controlled settings. However, in environments such as malls, airports, or even beaches, individuals have little opportunity to provide consent. With the convergence of the Internet of Things, 5G, and artificial intelligence enabling unprecedented data collection, India must envision privacy frameworks that do not exclusively rely on the fallible principle of consent. As public consultations refine the draft rules, prioritising preservation of the framework's flexibility and industry-specific accommodations is key. This approach will help maintain a balance between innovation, economic growth, and individual rights – something not many jurisdictions have managed to get right.

The views expressed are personal

Draft digital data protection rules and authoritarianism

Apar Gupta

an advocate and the founder-director of the Internet Freedom Foundation

In August 2024, as India marked six years since the K.S. Puttaswamy judgment reaffirmed privacy as a fundamental right, the Internet Freedom Foundation hosted its annual "Privacy Supreme" event – not as a celebration, but as a sombre reflection on its unfulfilled promise. Social activist Nikhil Dey shared chilling accounts, from Ajmer in Rajasthan, on how Aadhaar, heralded for efficiency, has excluded vulnerable residents from pensions and rations. This grim reality must be central to tech policy discussions, including the Draft Digital Data Protection Rules, 2025.

Executive overreach, scant transparency

Rulemaking typically fleshes out legislation, ensuring laws passed by Parliament are enforceable while maintaining administrative flexibility. Yet, the draft Data Protection Rules provoke concern on questions of executive overreach and vague governance. Some earlier analysis here bears repetition for these rules are a conscientious pupil in obedience of its master. Here, its parent is the Digital Personal Data Protection Act, 2023, that was rammed through Parliament as "a product of the subversion of the democratic process". There is more than a mere lack of trust in how the law was created, for its substantive provisions advance a broader policy of "total state control – a digital leash to yank us and make us stand in line than to serve the preambular objectives of the Constitution of India". Its provisions are deliberately vague, granting broad discretion under the nebulous phrase "as may be prescribed".

Despite the Act's swift passage on August 9, 2023, its implementation remains in limbo. Sixteen months later, the draft Rules have been unveiled for consultation. But are they truly "public"? Published as a 51-page pdf (in Hindi/English as a gazette notification), with a three-page explanatory note that reads as AI glop, a simplistic and vague summary offers little insight into the policy choices during drafting. Comments can only be submitted through the MyGov platform that might encourage expert input but restricts broader participation.

There is a common thread with the parent Digital Personal Data Protection Act, 2023, with its digital leash

Transparency is undermined by the government's decision to treat submissions as fiduciary, precluding public disclosure and counter-comments. This controlled feedback process resembles a "corporate consultation" rather than a public one.

Substantively, the Data Protection Rules build on a framework of intentional vagueness and executive dominance. Many compliance obligations are either self-determined by companies handling personal data or left to government discretion. Consider Rule 3, which governs consent notices. It mandates "clear and plain language" but fails to define these terms, leaving interpretation subject to India's vast linguistic and comprehension diversity. Without specific standards, notices risk being overly generic or oversimplified, omitting critical details. Similarly, while the Rules require an "itemized description" of data, they do not clarify whether the disclosure is for categories such as financial or health data; or to specific data points such as account numbers, or even metadata and inferred data. Nor do they define timelines for data breach notifications to users, raising risks for individuals in urgent situations. Such ambiguities, if purely administrative, should have been resolved by the standard setting powers of an independent regulatory authority that does not exist.

No independence for Data Protection Board

The vagueness reflects deeper structural flaws. The Act eschews the creation of an independent regulatory body, instead, consolidating power within the Union Government. Through informal interactions and gazette notifications, the government wields unchecked authority over citizens and the digital marketplace. Even the Data Protection Board (DPB), which has a limited ambit of jurisdiction to adjudicate on breaches, lacks independence. The Board's chairperson is selected based on recommendations of a search and selection committee chaired by the Cabinet Secretary, raising critical concerns. How will the committee address the critiques of political control that plague similar appointment processes? What value does the search committee offer when it has advance knowledge that its recommendations are not binding on the Union Government?

Even after its formation, the DPB is hamstrung. Its authority is largely limited to determining data breaches, and its independence is compromised by service conditions of its members to central government employees. This contravenes long-standing recommendations, such as the 2006 Planning Commission consultation paper on regulation, which emphasised that "the selection, appointment, and removal of chairpersons and members should be insulated against any perceived interference or manipulation that may influence the outcome". How will a subservient DPB apply data protection effectively? Rule 5 exempts data processing for subsidies from consent requirements. In such cases, can there be any meaningful accountability? It is not unreasonable to foresee scenarios where the DPB may fail to act promptly or effectively, particularly when complaints involve powerful government entities such as the UIDAI that handles Aadhaar. It raises fundamental doubts about what it means for community organisations that may approach it for redress on user rights for things as simple as getting a data record corrected to receive rations.

Finally, regarding Rule 22, which contains the power of the government to requisition information, there is an absence of limitations and safeguards. As many may read this column, they may still wonder why the data protection rules are too late, too little, too vague? The answer may be provided by Mr. Dey who framed his characterisation of the digital policies of the Indian state with a reference to Through the Looking-Glass. When Alice probes Humpty Dumpty on how the same word can have different meanings, his reply captures the core of India's data protection regime: "The question is... which is to be master – that's all."

TOPIC → India's Draft Digital Personal Data Protection Rules, 2025

The Context of DPDP Rules

India's Draft Digital Personal Data Protection (DPDP) Rules, unveiled by the Ministry of Electronics and Information Technology (MeitY) on January 3, 2025, signal a transformative leap in the nation's approach to safeguarding personal data.

The DPDP Act, 2023, now lays the groundwork for a more pragmatic and less prescriptive framework.

> This evolution is welcomed by industry stakeholders who seek clarity and flexibility in navigating data regulations.

Key Points:

- The DPDP Rules represent a significant departure from previous legislative attempts.
- Emphasis on a principles-based approach rather than a one-size-fits-all regulation.
- Aiming to create a balance between user rights and fostering an environment conducive to business growth.

Principles-Based Framework

The Draft DPDP Rules are notable for their principles-based framework, which contrasts sharply with the cumbersome requirements often associated with the General Data Protection Regulation (GDPR) in Europe.

- The draft rules focus on clarity and simplicity, addressing issues like "consent fatigue" that plague users in Europe.
- Instead of inundating users with excessive details about data processing, the framework promotes straightforward communication.

Highlights:

- Simplified notice and consent mechanisms.
- Reduction in unnecessary complexities for businesses while ensuring user empowerment.
- Encouragement for businesses to innovate in data handling practices without stringent prescriptive guidelines.

Sector-Specific Exemptions

One of the standout features of the DPDP Rules is their recognition of sector-specific needs, particularly in education and healthcare.

- Educational institutions and healthcare providers are granted exemptions from certain consent requirements, allowing them to monitor and track data without stringent parental approval.
- This flexibility acknowledges the evolving landscape of digital interactions, where children increasingly engage online for educational purposes.

Key Exemptions:

- Behavioral monitoring in educational settings to enhance learning outcomes.
- Clinical and mental health services leveraging data for targeted interventions.
- A balanced approach that prioritizes user protection while facilitating necessary industry practices.

Challenges Ahead: Data Localisation and Regulatory Overreach

Despite the progressive aspects of the DPDP Rules, challenges linger, particularly concerning provisions for data localisation and potential regulatory overreach.

- The rules propose restrictions on cross-border data flows, which could complicate operations for significant data fiduciaries.
- Localisation mandates may unintentionally stifle innovation and deter foreign investment, creating an uneven playing field for smaller entities.

Concerns:

The distinction between Significant Data Fiduciaries (SDFs) and smaller entities could lead to regulatory arbitrage, where smaller firms exploit lenient regulations. A centralized approach to localisation may not adequately address the nuanced needs of different sectors, potentially impacting economic competitiveness.

The Need for Clarity and Procedural Integrity

A significant aspect of the DPDP Rules that requires attention is the clarity surrounding user verification and the government's access to sensitive business data.

- Businesses need mechanisms to ascertain the legitimacy of users requesting information about data processing.
- Ambiguities regarding governmental access to sensitive data raise concerns about potential misuse and the protection of trade secrets.

Key Considerations:

- Without clear guidelines, businesses might face challenges in managing excessive or unfounded information requests.
- The lack of defined protocols may endanger competitive advantage and privacy.

Future Considerations: Evolving Privacy Frameworks

As India navigates the complexities of digital data protection, the future will demand a rethinking of privacy frameworks beyond mere notice and consent mechanisms.

- The convergence of technologies like the Internet of Things (IoT), 5G, and artificial intelligence necessitates innovative approaches that accommodate widespread data collection.
- Policymakers must prioritize flexibility and industry-specific accommodations to balance innovation, economic growth, and individual rights.

Key Recommendations:

- Emphasize adaptive privacy frameworks that move away from rigid consent models, considering real-world scenarios where consent is impractical.
- Encourage ongoing public consultations to refine the draft rules, ensuring diverse stakeholder perspectives are included

Conclusion: Navigating the Digital Landscape

The introduction of the DPDP Rules marks a pivotal moment in India's data protection journey. While the rules present a more balanced approach compared to previous legislation, they also come with challenges that need careful navigation.

- Fostering an environment of trust, transparency, and innovation will be crucial as India establishes its role in the global digital landscape.
- Continued dialogue and stakeholder engagement will help ensure that the framework evolves to meet the needs of both citizens and businesses

Should voter IDs be linked with Aadhaar?

Why was the National Electoral Rolls Purification and Authentication Program launched by the Election Commission? How do already existing voters link EPIC with their respective Aadhaar numbers? What did the Supreme Court mandate in the Puttaswamy case in 2018?

EXPLAINER

Rangarajan. R

The story so far:

The Aam Aadmi Party (AAP) and the Bharatiya Janata Party (BJP) have accused each other of manipulating electoral rolls before the Delhi Assembly elections. This has reignited the debate about linking voter IDs/Election Photo Identity Card (EPIC) with respective Aadhaar numbers.

What is the history of the proposal?

The Election Commission (EC) had in February 2015 launched the National Electoral Rolls Purification and Authentication Program (NERPAP). This was to address the issue of duplicate entries in the electoral roll and to remove such entries. In order to achieve this, the EC began authenticating EPIC data by linking it with the Aadhaar database. It had linked more than 300 million voters in a span of three months. However, the Supreme Court in an interim order, in August 2015, held that the mandatory use of Aadhaar should only be for welfare schemes and PAN linking. Following this order, the NERPAP exercise was discontinued.

After the Supreme Court's final order in *Puttaswamy* in September 2018, that upheld the constitutional validity of the Aadhaar Act, the EC sought amendments to the Representation of the People Act, 1950 (RP Act, 1950). The Parliament amended the RP Act, 1950 and The Registration of Electors Rules, 1960 in December 2021 to enable the linking of EPIC with Aadhaar. It provided the format in which Aadhaar information may be submitted to the electoral registration officer by a new voter at the time of fresh registration (Form 6: to establish identity) or an existing voter already included in the electoral roll (Form 6B: for the purpose of authentication). Any other listed document may be submitted only if the voter is unable to furnish their Aadhaar number because they do not have one. However, in order to keep these amendments voluntary in nature, the word 'may' have been used in the amendments. Further, the amendment also specifies that no application for inclusion of name in the electoral roll shall be denied and no entries shall be deleted due to the inability of an individual to furnish or intimate the Aadhaar number due to 'sufficient cause.'

Such individuals may furnish alternate documents like PAN card, Driving Licence, Passport, Bank passbook etc.

While the above amendments were challenged in the Supreme Court, the EC in September 2023 informed the court that submission of the Aadhaar number is not mandatory. It added that it is looking into issuing appropriate clarificatory changes in the forms introduced for this purpose. However, it may be noted that Form 6 and 6B have not been amended till date and they continue to seek the same details as before from the applicants.

The forms require the voters to declare that they do not have an Aadhar number to avoid providing the same.

Need to verify: A special camp for linking Aadhaar with voter ID card held in Madurai in 2022. FILE PHOTO

What are the pros and cons?

EPIC linkage with the respective Aadhaar number would definitely help in weeding out duplicate entries; that is essential. At present, more than 650 million Aadhaar numbers have already been uploaded in the process of finalising the electoral rolls. However, there are some concerns about this exercise that need to be considered.

Firstly, the errors in the Aadhaar database, however miniscule, may result in wrongful rejection or deletion of entries from the electoral roll. Secondly, Aadhaar is only a proof of residence and not a proof of citizenship. Thus, it may not help in removing voters who are not citizens from the electoral roll. It would require a separate effort from the EC.

Finally, while the linkage is to happen at the back end and a mere mention of the Aadhaar number on the EPIC/electoral roll may not by itself be a violation of right to privacy, it may still result in misuse as the electoral rolls are widely circulated amongst political parties.

What can be the way forward?

The right to vote is a constitutional right and declared so by the Supreme Court in various cases. It is part of the basic structure of free and fair elections and cannot be constricted through legislative action. Citizens are the most important stakeholders in a democracy and any electoral process should gain their confidence. There must be wide publicity about the benefits of linking EPIC and Aadhaar to clean up the electoral roll of duplicate entries, which in turn strengthens the electoral process. Any misplaced concern amongst voters about the secrecy of their vote being compromised because of this linking should be assuaged.

Meanwhile, the forms should be suitably modified without any delay, to reflect that providing Aadhaar is not mandatory, as per the submission of the EC in the Supreme Court in September 2023.

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

THE GIST

- The right to vote is a constitutional right and declared so by the Supreme Court in various cases. It is part of the basic structure of free and fair elections and cannot be constricted through legislative action.
- The Election Commission of India (EC) had in February 2015 launched the National Electoral Rolls Purification and Authentication Program (NERPAP). This was to address the issue of duplicate entries in the electoral roll and to remove such entries.
- EPIC linkage with the respective Aadhaar number would definitely help in weeding out duplicate entries; that is essential.

Topic → National Electoral Rolls Purification and Authentication Program (NERPAP)

Overview of NERPAP

📅 Initiation of NERPAP: Launched in February 2015 by the Election Commission to eliminate duplicate entries in the electoral roll.

🔗 Linking with Aadhaar: Over 300 million voters' EPIC data linked with Aadhaar within three months for identity authentication.

⚖️ Supreme Court Intervention: In August 2015, the Supreme Court ruled Aadhaar mandatory only for welfare schemes and PAN linking, halting NERPAP.

📜 Amendments to RP Act: Post-2018 Supreme Court ruling, the Representation of the People Act, 1950, was amended in December 2021 to allow voluntary EPIC-Aadhaar linking.

📝 Forms for Registration: New voters use Form 6, existing voters use Form 6B for Aadhaar submission; alternate documents accepted if Aadhaar is unavailable.

🚫 Voluntary Nature of Amendments: No voter will be denied registration or removed from the electoral roll for not providing an Aadhaar number.

⚠️ Current Status of Forms: As of September 2023, Aadhaar provision is not mandatory, but forms 6 and 6B remain unchanged.

Summary: The Election Commission's initiative to link voter IDs with Aadhaar faced legal challenges, resulting in amendments that make the process voluntary, though specific forms are still required

What is different about small language models?

What led to the shift to small language models from large language models? What are the use cases for such models? Are they better than LLMs?

Poulomi Chatterjee

The story so far:

"We've achieved peak data," former OpenAI chief scientist Ilya Sutskever said onstage at the NeurIPS conference last year. "We have to deal with the data that we have, and there's only one Internet." Mr. Sutskever's comment comes amidst speculation that the speed of progress in large language models (LLM) was hitting a wall as scaling was reaching its digital end.

Why are smaller models in demand?

The race towards building large AI models has been building up ever since OpenAI released their 175 billion parameter LLM, GPT-3, in 2020. In the next three years, the company's LLMs further increased in size with GPT-4 trained on 1.7 trillion parameters. But, in 2024, researchers started to look at language models differently as scaling training data, scoured from the Internet, was giving marginal gains. The idea of building smaller language models emerged then.

This is evident in announcements made by Big Tech firms. Most of them released a nifty language model alongside their flagship AI models. Google DeepMind released Gemini Ultra, Nano and Flash models, while OpenAI and Meta launched their GPT-4o mini and Llama 3 models. Amazon-backed Anthropic AI launched Claude 3 and Haiku alongside its Opus.

What are the pros and cons of small language models?

Small Language Models (SLMs) are cheaper and ideal for specific use cases. For a company that needs AI for a set of specialised tasks, a large AI model is not required. Training small models require less time, less compute and smaller training data. French start up Mistral AI, an SLM provider, pitched its AI model to be as efficient as LLMs for specialised, focused applications. Microsoft released a family of small language models called Phi (the latest Phi-3-mini comprised 3.8 billion parameters).

Apple Intelligence, the AI system deployed in the latest iPhones and iPads, runs on-device AI models that can sort of match the performance of top LLMs. If LLMs are built to achieve Artificial General Intelligence (AGI), small language models are made for specific use cases.

How do use cases differ?

"Small language models are perfect for edge cases," said Rahul Dandwate, ML engineer at Adobe. "When I am using WhatsApp or any Meta application which is powered by the Llama 8B model, I am trying to learn a new language because its reasonably good at translation and other basic tasks like this."

"But they wouldn't do well at most benchmarks that large language models are measured against like coding or logical problems. There still isn't a small language model that's as good at solving more complex problems," he said.

We still aren't fully aware why this bottleneck exists. "But the best way we can understand this is just as human beings have brains with a massive number of neurons, a smaller animal has a limited number of neurons. This is why human brains have the capacity for far more complex levels of intelligence. This is similar to how small language models and large language models work," he said.

How does it work for India?

In a country like India, where the scope of AI adoption is immense but resources are constrained, the diminutiveness of SLMs is perfect. Another AI initiative from IIIT Hyderabad, Visvam, is building datasets from the ground up to build SLMs that can be used in healthcare, agriculture, education and to "promote and preserve language and cultural diversity through AI," their website stated. As the world of language model develops, it's not just enough to build frontier models from scratch. Sarvam AI's co-founder Vivek Raghavan said, "We want to build GenAI that a billion Indians can use."

THE GIST

- Small Language Models (SLMs) are cheaper and ideal for specific use cases. For a company that needs AI for a set of specialised tasks, a large AI model is not required.
- "Small language models are perfect for edge cases," said Rahul Dandwate, ML engineer at Adobe.
- In a country like India, where the scope of AI adoption is immense but resources are constrained, the diminutiveness of SLMs is perfect.

Topic → Small language models

🤖 Small language models are AI systems designed to understand and generate human language.

📏 They typically have fewer parameters compared to larger models, making them less resource-intensive.

⚡ Small language models can be deployed on devices with limited computational power, such as smartphones and IoT devices.

🌍 They are often used for specific tasks like chatbots, text summarization, and sentiment analysis.

🔄 Despite their size, small language models can still achieve competitive performance on various natural language processing tasks.

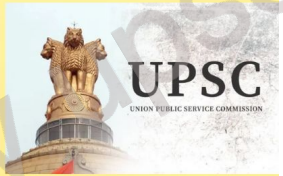
🛠️ They are easier to fine-tune and adapt for specific applications compared to larger models.

💡 Small language models contribute to making AI more accessible and efficient for everyday use.

Summary: Small language models are efficient AI systems that perform language tasks with fewer resources and can be easily adapted for specific applications

LOHRI AND MAKARSAKRANTI OFFER

LAST YEAR 50 + QS In prelims 2024 from our course



50 PER OFF IN ALL IAS COURSES

Connect with sir
9057921649(only Message)

Download saurabh pandey cse app

visit - saurabhpandeyupsc.com

Schedule CRASH COURSE ON UPSC CSE Prelims 2025

Upcoming week, 13th to 18th January

Monday	13th January 2025	Indian Geography through Mapping of INDIA (Mountain)
Wednesday	15th January 2025	Indian GEOGRAPHY old ncert-Class XI
Friday	17th January 2025	Indian Geography through Mapping of INDIA
Saturday	18th January 2025	Indian GEOGRAPHY old ncert-Class XI

Download Saurabh pandey cse app

For any Query 9057921649—Only Message

COMPLETE CRASH COURSE ON UPSC CSE PRELIMS 2025

(SUCCESS Batch)

-->Complete coverage of all static subjects.
NCERTs + Mapping + Advance books + PYQS
--> Developing elimination Tricks.
2 yrs coverage of prelims specific current affairs

By saurabh pandey sir

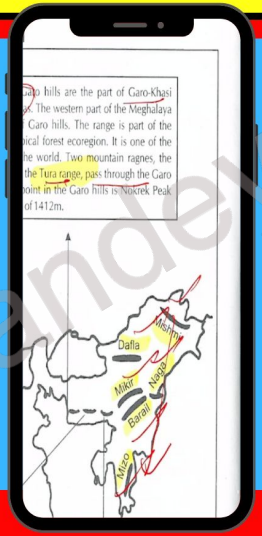
Download saurabh pandey cse app

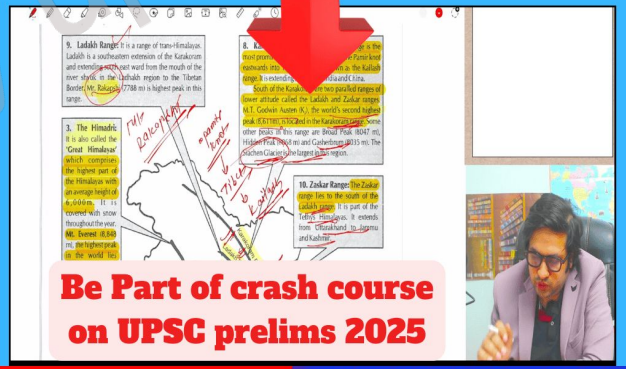
Visit - saurabhpandeyupsc.com

For Any Query Message
9057921649

EVERYTHING IN ONE COURSE !!

Are you missing These Mapping classes ??



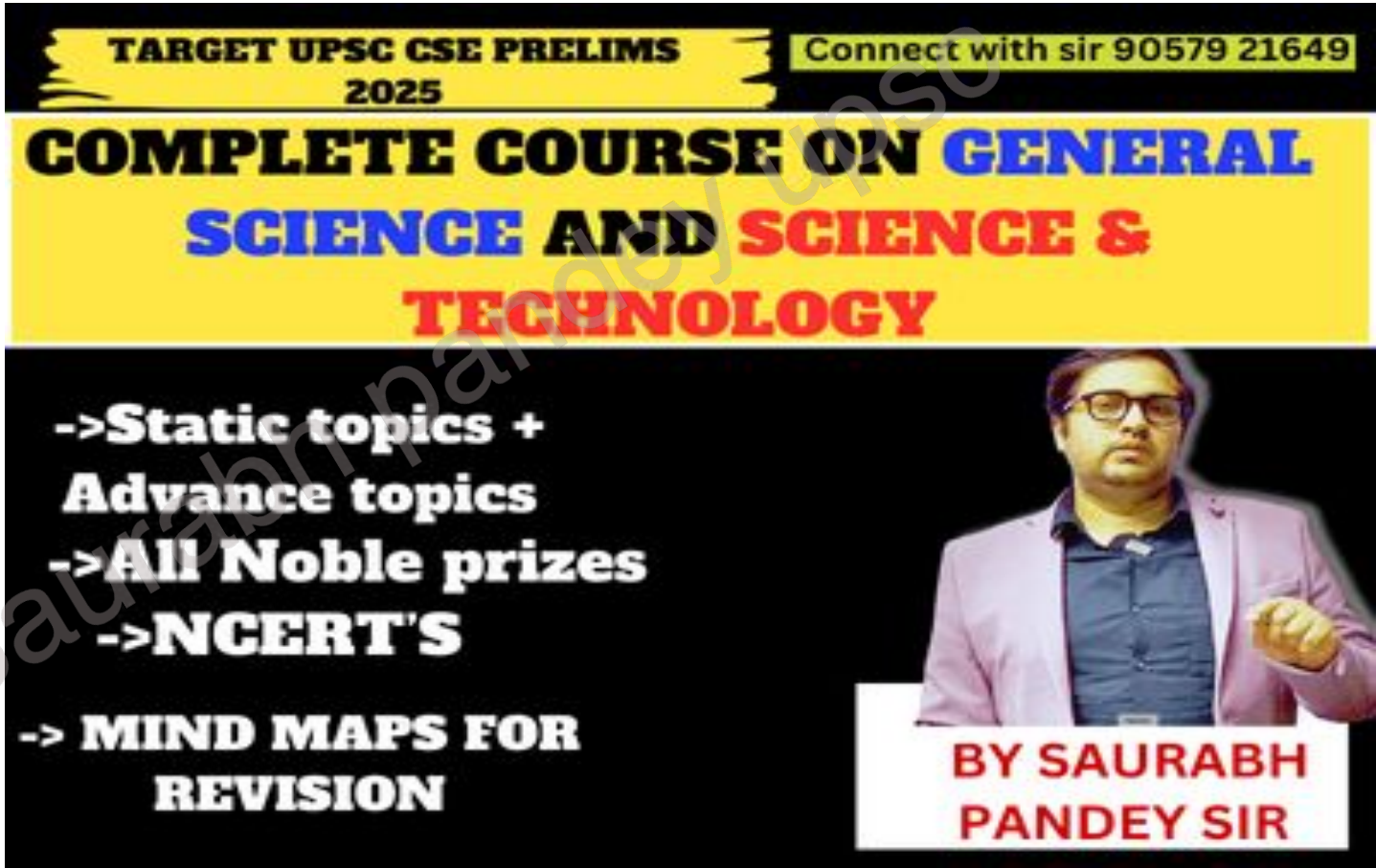


Last year 50 + qs from sessions

Download - saurabh pandey cse app

For any query msg
9057921649

Download - saurabh pandey cse app



TARGET UPSC CSE PRELIMS 2025

Connect with sir 90579 21649

COMPLETE COURSE ON 2 YEARS PRELIMS CURRENT AFFAIRS

- Mind maps for Revision
- Focus on Newspapers , down to earth PIB and all imp sources
- Practice sets

BY SAURABH PANDEY SIR

Download - saurabh pandey cse app

saurabhpandeyupsc.com

All Bookm

We're fine-tuning our website in beta mode for the best experience. We're working tirelessly to ensure it's top-notch... Also please join us on Telegram

SAURABH PANDEY CSE (CIVIL SERVICES EXAMINATION) FROM BASICS TO UPSC BRILLIANCE

Categories

Search for anythings...

Login

Visit - saurabhpandeyupsc.com

Home Courses Pages More About UPSC Exam Current-Affairs Pointers

YouTube Channel All Courses

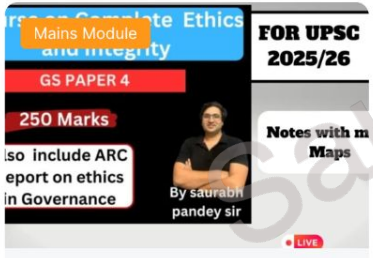
Impo All Courses

...rrent Affairs 22nd & 23rd SEPTEMBER 2024 Current Affairs 21st SEPTEMBER 2024 Curren

Connect with sir
9057921649 (ONLY MSG)

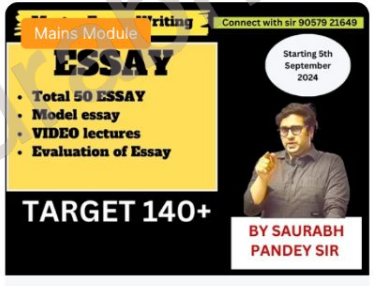
Popular Courses

See More →



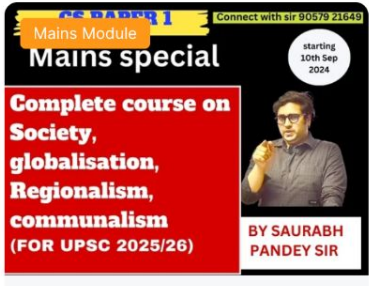
Best Course On Ethics And Integrity For UPSC...

Admin



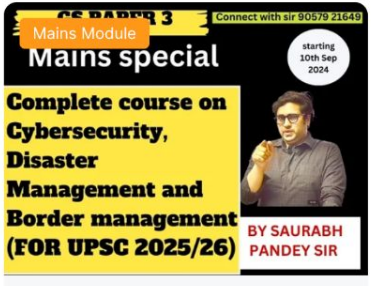
Master The Art Of Essay Writing With This...

Admin



Course On Society , Globalisation...

Admin



Complete Course On Cyber Security ,Disaste...

Admin

Google Play Games Apps Movies Books Kids

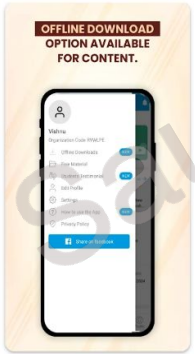
Saurabh Pandey CSE

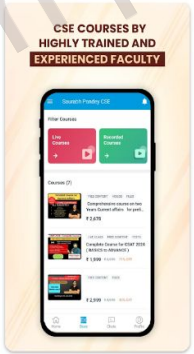
Saurabh Pandey CSE

4.8★ 77 reviews | 1K+ Downloads | 3+ Rated for 3+

Install Share Add to wishlist

This app is available for your device





App support

PDF Download → https://t.me/gesreporter

Q. The buffalo and bulbul fights are part of the folk culture associated with the winter harvest of which among the following State. (IE)

A) Arunachal Pradesh

B) Assam

C) Nagaland

D) Mizoram

Ans: B

Target Mains -2025/26 -

Q Explain technological evolution in weather forecasting in india .

(JOIN AAKLAN PLUS TO GET ANSWERS EVALUATED) Download saurabh pandey cse app

Connect with sir
9057921649

send your answer - Saurabh pandey upsc telegram channel