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THE HINDU NEWSPAPER

14 JULY 2026

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Tamil poet and lyricist Vairamuthu conferred Jnanpith Award

PCS
The Hindu Bureau
NEW DELHI

Tamil poet and lyricist R. Vairamuthu was on Monday conferred the 60th Jnanpith Award for the year 2025. He is the third Tamil literary figure to receive the award, after a gap of 24 years. Earlier recipients include the late writers Akilan and Jayakanthan. Mr. Vairamuthu won the Sahitya Akademi Award in 2003 for *Kallikattu Ithikasm*.

The award was presented by politician and scholar Karan Singh at a ceremony in New Delhi. As part of the honour, Mr. Vairamuthu received a cash prize of ₹11 lakh, a bronze statue of Vagdevi (Goddess Saraswati), and a citation.

Delivering the keynote address, Mr. Singh emphasised the continuing rele-



Vairamuthu

vance of literature in the age of science and technology, and urged the younger generation to forge a deeper connection with Indian languages and literary traditions.

He dedicated the honour to the Tamil language and the wider fraternity of Indian literature. He said the recognition would encourage him to continue his creative pursuits.

14J7. Tamil poet and lyricist Vairamuthu conferred Jnanpith Award

तमिल कवि एवं गीतकार वैरामुथु को ज्ञानपीठ पुरस्कार से सम्मानित किया गया

- Tamil poet and lyricist R. Vairamuthu was on Monday conferred the **60th Jnanpith Award** for the year 2025.

तमिल कवि एवं गीतकार आर. वैरामुथु को सोमवार को वर्ष 2025 के लिए 60वें ज्ञानपीठ पुरस्कार से सम्मानित किया गया।

- He is the **third Tamil literary figure** to receive the award, after a gap of **24 years**.

वे 24 वर्षों के अंतराल के बाद यह सम्मान प्राप्त करने वाले तीसरे तमिल साहित्यकार हैं।

- Earlier recipients include the late writers **Akilan** and **Jayakanthan**.

इससे पहले यह पुरस्कार दिवंगत साहित्यकार अकिलन और जयकांतन को प्रदान किया जा चुका है।

- Mr. Vairamuthu won the **Sahitya Akademi Award** in 2003 for *Kallikattu Ithikasm*.

श्री वैरामुथु को 2003 में उनकी कृति कल्लिकट्टु इथिकासम के लिए साहित्य अकादमी पुरस्कार प्राप्त हुआ था।

- As part of the honour, Mr. Vairamuthu received a cash prize of **₹11 lakh**, a **bronze statue of Vagdevi (Goddess Saraswati)**, and a **citation**.

इस सम्मान के अंतर्गत श्री वैरामुथु को ₹11 लाख की नकद पुरस्कार राशि, वाग्देवी (देवी सरस्वती) की कांस्य प्रतिमा, तथा एक प्रशस्ति-पत्र प्रदान किया गया।

Jnanpith Award

- It is **presented annually by Bharatiya Jnanpith**, a private literary and cultural organisation, to an Indian writer for an outstanding contribution to Indian literature through creative writing.

- The award is not a Government of India award. However, its national stature is reflected in the fact that it has frequently been presented by the **President of India** or other eminent national personalities.

- The **award covers creative writing in the 22 languages included in the Eighth Schedule of the Constitution of India**, along with **English**.

- The award was **instituted in 1961** by Bharatiya Jnanpith.

- The first award was presented in **1965**.

Bharatiya Jnanpith

- **Bharatiya Jnanpith** is a literary, cultural and publishing organisation based in New Delhi.
- It was established in **1944** by industrialist and philanthropist **Sahu Shanti Prasad Jain** and his wife **Rama Jain**.
- Apart from the **Jnanpith Award**, the organisation is associated with honours such as the **Moortidevi Award**, the **Navlekhan Award** and the **Jnanagarima Award**.

First Jnanpith Award

PCS

True to form

The best teams are in the last four, but
FIFA performed poorly

When the 2026 World Cup kicked off on June 11 in Mexico City, the air was filled with cautious optimism. This being the first 48-team World Cup, there were apprehensions that the group stage would be low on quality and feature many one-sided games. But hope stemmed from sport's innate ability to adjust, evolve and thrive in newer settings. After more than a month's action, it can be safely said that the World Cup in North America has been a footballing success. Though semifinalists France, Spain, Argentina and England are all former winners, currently ranked at the top and from the pedigree and established stables, there has been ample space for others to carve their own identities. Cape Verde – a tiny archipelago off Africa's west coast – qualifying for the knock-outs and fighting defending champion Argentina toe-to-toe, spirited performances from the Democratic Republic of Congo and Senegal, Egypt's near-defeat of Argentina in the round of 16, and Norway overcoming five-time titlist Brazil and stretching England for nearly 120 minutes are all vivid examples of the wide geographical spread of sporting excellence. In fact, nine of the 10 African nations in the competition reached the knock-outs, and Asia too would have had more than just Japan and Australia if luck had favoured Iran, which crashed out despite three draws from three matches.

However, on the administrative front, the tournament has been found wanting. There were problems galore at the beginning, such as forcing Iran to camp in Mexico and travel long hours to Seattle and Los Angeles, and arbitrarily denying visas to officials and fans. But governing body FIFA has not turned over a new leaf. Among the controversies was the way the Video Assistant Referee (VAR) system was applied in Argentina's narrow 3-2 win over Egypt. The African nation saw a goal overturned for a foul committed in the lead up but did not see the same yardstick applied for one of Argentina's. Another issue that left supporters seething was the intervention of U.S. President Donald Trump in the deferral of forward Folarin Balogun's one-match suspension in time to play Belgium in the round of 16. There is no evidence to prove that Mr. Trump's phone call to FIFA head Gianni Infantino influenced the decision, but in a scenario where the custodian of the game has condoned every wrong from the chief organising country, suspicion is natural. Starting from Tuesday night, Kylian Mbappe's irresistible France, Lamine Yamal's organised Spain, Jude Bellingham's effervescent England and Lionel Messi's evergreen Argentina will be back mesmerising the world. But it will be in football's best interests if its guardians alter their moral compass and march in tow.

• The first Jnanpith Award was presented in **1965** to Malayalam poet **G. Sankara Kurup**.

• He received the award for his Malayalam poetry collection **Odakkuzhal**, meaning "The Bamboo Flute."

14J7. True to form

वास्तविक स्वरूप के अनुरूप

• Though **semi-finalists France, Spain, Argentina and England** are all former winners, currently ranked at the top and from the pedigree and established stables, there has been ample space for others to carve their own identities.

यद्यपि **सेमीफाइनल** में पहुँची **फ्रांस, स्पेन, अर्जेंटीना** और **इंग्लैंड** की टीमों में सभी पूर्व विजेता हैं, वर्तमान में शीर्ष रैंकिंग पर हैं तथा प्रतिष्ठित फुटबॉल परंपराओं से आती हैं, फिर भी अन्य टीमों को अपनी अलग पहचान बनाने का पर्याप्त अवसर मिला।

• **Cape Verde** — a tiny archipelago off **Africa's** west coast — qualifying for the **knock-outs** and fighting defending champion **Argentina** toe-to-toe, spirited performances from the **Democratic Republic of Congo** and **Senegal**, **Egypt's** near-defeat of **Argentina** in the **round of 16**, and **Norway** overcoming five-time titlist **Brazil** and stretching **England** for nearly **120 minutes** are all vivid examples of the wide geographical spread of sporting excellence.

केप वर्ड — **अफ्रीका** के पश्चिमी तट के निकट स्थित एक छोटा द्वीपसमूह — का **नॉक-आउट** चरण में पहुँचना और गत चैंपियन **अर्जेंटीना** को कड़ी टक्कर देना, **कांगो लोकतांत्रिक गणराज्य** तथा **सेनेगल** का उत्साहपूर्ण प्रदर्शन, **राउंड ऑफ 16** में **मिस्र** द्वारा **अर्जेंटीना** को लगभग पराजित कर देना तथा **नॉर्वे** का पाँच बार के विजेता **ब्राज़ील** को हराकर **इंग्लैंड** को लगभग **120 मिनट** तक संघर्ष करने के लिए विवश करना, खेल उत्कृष्टता के व्यापक भौगोलिक विस्तार के स्पष्ट उदाहरण हैं।

• In fact, nine of the **10 African nations** in the competition reached the **knock-outs**, and **Asia** too would have had more than just **Japan** and **Australia** if luck had favoured **Iran**, which crashed out despite three draws from three matches.

वास्तव में, प्रतियोगिता में भाग लेने वाले **10 अफ्रीकी देशों** में से नौ **नॉक-**



आउट चरण में पहुँचे, और यदि ईरान का भाग्य साथ देता, जिसने तीनों मैच ड्रॉ खेलने के बावजूद प्रतियोगिता से बाहर होना पड़ा, तो एशिया से केवल जापान और ऑस्ट्रेलिया ही नहीं, बल्कि और भी टीमों आगे बढ़ सकती थीं।

- There were problems galore at the beginning, such as forcing Iran to camp in Mexico and travel long hours to Seattle and Los Angeles, and arbitrarily denying visas to officials and fans.
शुरुआत में अनेक समस्याएँ सामने आईं, जैसे ईरान की टीम को मेक्सिको में ठहरने के लिए बाध्य करना तथा सिएटल और लॉस एंजेलिस तक लंबी यात्राएँ करवाना, साथ ही अधिकारियों और प्रशंसकों को मनमाने ढंग से वीजा देने से इनकार करना।
- Among the controversies was the way the Video Assistant Referee (VAR) system was applied in Argentina's narrow 3-2 win over Egypt.
विवादों में एक प्रमुख मुद्दा अर्जेंटीना की मिस्र पर 3-2 की संकीर्ण जीत के दौरान वीडियो सहायक रेफरी (VAR) प्रणाली का उपयोग था।
- The African nation saw a goal overturned for a foul committed in the lead up but did not see the same yardstick applied for one of Argentina's.
अफ्रीकी टीम का एक गोल पूर्ववर्ती फाउल के कारण निरस्त कर दिया गया, किन्तु अर्जेंटीना के एक समान मामले में वही मानदंड लागू नहीं किया गया।
- Another issue that left supporters seething was the intervention of U.S. President Donald Trump in the deferral of forward Folarin Balogun's one-match suspension in time to play Belgium in the round of 16.
एक अन्य मुद्दा, जिसने समर्थकों को अत्यंत आक्रोशित किया, वह अमेरिकी राष्ट्रपति डोनाल्ड ट्रम्प का फॉरवर्ड फोलारिन बालोगुन के एक मैच के निलंबन को स्थगित कराने में हस्तक्षेप था, जिससे वे राउंड ऑफ 16 में बेल्जियम के विरुद्ध खेल सके।
- There is no evidence to prove that Mr. Trump's phone call to FIFA head Gianni Infantino influenced the decision, but in a scenario where the custodian of the game has condoned every wrong from the chief organising country, suspicion is natural.
यह सिद्ध करने के लिए कोई प्रमाण उपलब्ध नहीं है कि श्री ट्रम्प का फीफा अध्यक्ष जियानी इन्फैंटिनो को किया गया फोन निर्णय को प्रभावित करता था, किन्तु ऐसी स्थिति में, जहाँ खेल का संरक्षक संगठन मेज़बान देश की प्रत्येक त्रुटि को अनदेखा करता दिखाई दे, संदेह स्वाभाविक है।
- Starting from Tuesday night, Kylian Mbappe's irresistible France, Lamine Yamal's organised Spain, Jude Bellingham's effervescent England and Lionel Messi's evergreen Argentina will be back mesmerising the world.

Sam Neill, versatile actor known for 'Jurassic Park', dies aged 78



PCS

AFP

Jurassic Park star Sam Neill died on Monday aged 78, his family said. The New Zealander underwent treatment for lymphoma and was declared cancer free earlier this year. In a career spanning roles across TV and film, he also starred in Peaky Blinders and The Hunt for Red October. His role in The Piano drew wide acclaim. AFP

मंगलवार रात्रि से किलियन एम्बाप्पे की प्रभावशाली फ्रांस, लामिन यामाल की सुव्यवस्थित स्पेन, जूड बेलिंगहम की ऊर्जावान इंग्लैंड तथा लियोनेल मेसी की सदाबहार अर्जेंटीना एक बार फिर विश्व को मंत्रमुग्ध करती दिखाई देंगी।

14J7. Sam Neill, versatile actor known for 'Jurassic Park', dies aged 78

'जुरासिक पार्क' के लिए प्रसिद्ध बहुमुखी अभिनेता सैम नील का 78 वर्ष की आयु में निधन

Three pilgrims killed as truck runs into warkaris in Pune

GS I: History
Three warkaris (devotees of Lord Vitthal) were killed and four injured after a truck, also carrying pilgrims hit them in Pune district of Maharashtra on Monday. The accident occurred on Saswad Jejuri Road. According to police, the truck was carrying warkaris from Nanded district. The victims were from Sangli district. The injured have been taken to a hospital for treatment. Deputy Chief Minister Sunetra Ajit Pawar visited the rural hospital and met survivors. The police are investigating the cause of the accident. "It looks like a case of losing control at high speed," a Pune Rural Police official said.

14J7. Team India completes a win for the ages at Lord's
टीम इंडिया ने लॉर्ड्स में ऐतिहासिक जीत दर्ज की

▲ Sneh Rana ambled up to the wicket, tossed the ball up nicely. It turned, and beat Sophie Ecclestone.

The ball went through the gate and hit the stumps. The balls went up in the air. As did Sneh's outstretched hands. She smiled broadly, looking upwards. Her teammates hugged her, and they all celebrated.

Truly special
And there cannot have been too many bigger moments to celebrate than this. A Test victory at Lord's. In the first ever women's Test at cricket's most revered venue.

India won by 270 runs. The margin truly reflected the difference between the two sides.

This was truly a win for the ages by the Indian women's cricket team.

Chasing an unlikely 457 to win, England had resumed the final day at 130 for six.

Amy Jones, who was batting on 52 at the end of the third day, was the last proper batter.

But England's only real hope rested on a miraculous intervention from the

weather. This, however, has been one of the hottest summers in the history of Britain, and there was no chance of rain.

That England managed to take the game to the final day was itself an achievement, thanks largely to that fine effort from Jones.

The gritty wicketkeeper-batter scored two half-centuries in the match while Ecclestone managed a fifty before being the final victim.

Early breakthrough
Jones, however, couldn't stretch her innings much on the final morning. And

it was Sneh who got her out, in the third over of the day. Jones gave an easy catch to mid-wicket, where she was picked up by Shafali Verma.

Ecclestone, the other overnight batter, however, was in no hurry to walk back through the long room.



Done and dusted: Ecclestone is bowled neck and crop by Sneh to wrap up a thumping victory for India. GETTY IMAGES

SCOREBOARD

INDIA — 1ST INNINGS
285 in 74.5 overs

ENGLAND — 1ST INNINGS
170 in 59.1 overs

INDIA — 2ND INNINGS
341/7 dec. in 86.3 overs

ENGLAND — 2ND INNINGS
Target: 457

Maia Bouchier lbw b Sayali 2 (88), Tammy Beaumont b Kranti 0 (1), Heather Knight c Richa b Kranti 13 (34), Nat Sciver-Brunt b Sneh 11 (25), 2nd, Alice Capsey b Sayali 21 (35), 2nd, Amy Jones c Shafali b Sneh 54 (80), 6th, Maddy Villiers c Richa b Sneh 26 (63), 3rd, Sophie Ecclestone b Sneh 50 (66), 6th, Issy Wong b Deepti 1

(33), Lauren Bell b Deepti 0 (10), Lauren Filer (not out) 4 (22), 1st, Extras (lb-4): 4; Total (in 62.5 overs): 196.

FALL OF WICKETS
1-2 (Beaumont, 1.1 overs), 2-6 (Bouchier, 2.2), 3-23 (Sciver-Brunt, 9.3), 4-34 (Knight, 13.3), 5-59 (Capsey, 19.3), 6-126 (Villiers, 36.6), 7-135 (Jones, 42.6), 8-157 (Wong, 52.5), 9-159 (Bell, 54.5).

INDIA BOWLING
Sayali 10-2-24-2, Kranti 11-0-54-2, Sneh 19-5-4-42-4, Shree Charani 9-2-25-0, Deepti 12-0-36-2, Shafali 1-0-1-0. India won the one-off Test by 270 runs.

Player-of-the-Match: Kranti.

The world's premier spinner, who had become a day ago the first Englishwoman to make it to the Lord's honours board with her five-wicket haul, was determined to put the Indians on the field as long as she could.

Double blow
Ecclestone watched offie Deepti Sharma clean up Issy Wong and Lauren Bell in successive overs. But she received some support from Lauren Filer,

who defended stoutly and helped Ecclestone score what would be her maiden Test fifty.

Filer actually played 20 dot balls before getting her first run.

England's No. 11 actually showed more application than some of the batters that came higher up the order.

When that last-wicket partnership was worth 27, Sneh came up with that ball she, and India, will remember for a long time.

Another beautiful step forward

Every cricketer carries the dream of playing at Lord's. Over the past four days, a new generation lived that dream as women's Test cricket arrived at the Home of Cricket for the very first time. The journey of women's cricket has been remarkable, and this was another beautiful step forward.

A complete team performance to seal a legendary historic Test win in England.

What a dominant performance by the Indian women's team at Lord's! To win by 270 runs at the Mecca of cricket is pure history.

- In the **first ever women's Test** at cricket's most revered venue. क्रिकेट के सबसे प्रतिष्ठित मैदान पर खेले गए पहले महिला टेस्ट में।
- **India won by 270 runs.** भारत ने 270 रन से जीत दर्ज की।
- Chasing an unlikely **457** to win, **England** had resumed the final day at **130 for six.** 457 रन के कठिन लक्ष्य का पीछा करते हुए इंग्लैंड ने अंतिम दिन की शुरुआत 6 विकेट पर 130 रन से की।

GS Paper 1: History		14 July 2026
TOPICS COVERED		
14J7	Three pilgrims killed as truck runs into warkaris in Pune पुणे में ट्रक की टक्कर से तीन वारकरियों की मृत्यु	
14J7	Faith meets endurance at Kailash Manasarovar Yatra कैलाश मानसरोवर यात्रा में आस्था और सहनशक्ति का संगम	
14J7	How genetic history reveals why some languages are so unique आनुवंशिक इतिहास यह कैसे बताता है कि कुछ भाषाएँ इतनी विशिष्ट क्यों हैं	

14J7. Three pilgrims killed as truck runs into warkaris in Pune पुणे में ट्रक की टक्कर से तीन वारकरियों की मृत्यु

- Three warkaris (devotees of Lord Vitthal) were killed and four injured after a truck, also carrying pilgrims, hit them in Pune district of Maharashtra on Monday. सोमवार को महाराष्ट्र के पुणे ज़िले में तीर्थयात्रियों को ले जा रहे एक ट्रक की टक्कर से भगवान विठ्ठल के भक्त वारकरी समुदाय के तीन श्रद्धालुओं की मृत्यु हो गई तथा चार अन्य घायल हो गए।
-

Warkaris (Devotees of Lord Vitthal)

Warkaris are followers of the **Warkari Sampradaya**, a popular **Bhakti (devotional) movement** that originated in **Maharashtra**. They are devoted to **Lord Vitthal (Vithoba or Panduranga)**, who is regarded as a form of **Lord Vishnu/Krishna**. The movement emphasizes **devotion (bhakti), equality, humility, compassion, and service to humanity** rather than elaborate rituals.

Who is Lord Vitthal?

Vitthal is worshipped mainly in Maharashtra and parts of Karnataka.

He is usually depicted:

- Standing on a **brick (Vit)**.
- With **hands placed on his waist**.
- Accompanied by his consort **Rukmini**.

According to tradition, Lord Vitthal stood on a brick while waiting for his devotee **Pundalik**, symbolizing that **serving one's parents is itself a form of devotion to God**.

The Vari Pilgrimage

The most important practice of the Warkaris is the **Vari**, an annual pilgrimage to Vitthal Rukmini Temple.

The two major pilgrimages occur during:

- **Ashadhi Ekadashi** (June–July)
- **Kartiki Ekadashi** (October–November)

Faith meets endurance at Kailash Manasarovar Yatra

GS: History: A&C
Vinaya Deshpande Pandit
DARCHEN, CHINA

For 68-year-old twins Jayanthi Gopinath and Rajshri Sheshnag, the Kailash Manasarovar Yatra is a dream come true. The Bengaluru-based sisters prepared for months in advance, walking six kilometres every day with heavy backpacks to simulate the conditions in the Tibetan region. Their children also ensured that they practised pranayama regularly as part of their preparation.

"We kept giving them a pep talk," said Punitha, Jayanthi's daughter. Punitha's mother-in-law Lalithamma is the oldest member in the group. At 69, she is ecstatic about her visit to Mount Kailash at this age.

This week, not just the twins, but their children, nephew, and the children's spouses also accompanied them for one of the most arduous and challenging religious pilgrimages. Due to the high altitude, rugged



Rarefied air: A group of devotees visiting Mount Kailash as part of the ongoing Kailash Manasarovar Yatra. VINAYA DESHPANDE PANDIT

and harsh terrain, and unpredictable weather, the Kailash Manasarovar Yatra is a test of the physical, mental and emotional strength of devotees.

Mount Kailash, located in Ngari Prefecture of the Tibet Autonomous Region in China, rises to over 21,778 feet above sea level. Its *parikrama*, or circumambulation, is considered sacred by followers of several faiths, including Hinduism, Buddhism, Jainism and Bon.

It begins in Darchen, situated at a height of 15,338 feet. The entire circuit

takes around two to three days for completion, with the highest point being the Dolma La Pass, at 18,471 feet.

Pilgrims are required to undergo fitness tests and a period of gradual acclimatisation before undertaking the trek.

More devotees
Jayanthi, Rajshri, and their six family members are among the nearly 24,000 pilgrims who have visited Mount Kailash since May. The pilgrimage season will continue till September. The number of visitors is

up from 20,750 last year, when the pilgrimage was opened up for Indian devotees after a gap of five years.

While the Indian government selects pilgrims for the Kailash Manasarovar Yatra through a lottery system, the numbers are heavily tilted towards the list submitted by private tour operators. According to the Chinese government, around 23,000 pilgrims have been brought to Mount Kailash by these operators during the current pilgrimage season.

Eco-friendly toilets
Several devotees appreciated the efforts of the Indian and Chinese governments for making the journey hospitable for visitors in such harsh terrain. Good roads and infrastructure, medical stations on the route, and the support of local guides were some of the points highlighted by the devotees.

Yet, many travellers also raised concerns about the lack of hygienic toilet facilities

on the *parikrama* marg at Dirapuk and Zuthulphuk.

Responding to the concerns, Yu Jing, spokesperson at the Chinese Embassy in India, said, "Many new eco-friendly toilets have been built. They are regularly cleaned and maintained. We understand that the *yatris* prefer flush toilets. However, in this mountain region area, flush toilet is not practical."

At Lake Manasarovar, devotees described the experience of completing the *parikrama* around Mount Kailash as deeply moving. With the lake's turquoise waters shimmering behind them and Mount Kailash visible in the distance, many said meditating there felt like a divine experience. Situated at an altitude 15,060 feet, Manasarovar is one of the highest large permanent freshwater lakes in the world.

(The journalist was part of a media delegation invited by the Chinese Embassy in India to cover the Kailash Manasarovar Yatra)

14J7. Faith meets endurance at Kailash Manasarovar Yatra

कैलाश मानसरोवर यात्रा में आस्था और सहनशक्ति का संगम

- **Mount Kailash**, located in **Ngari Prefecture** of the **Tibet Autonomous Region** in **China**, rises to over **21,778 feet** above **sea level**.
चीन के तिब्बत स्वायत्त क्षेत्र के नगरी प्रीफेक्चर में स्थित कैलाश पर्वत समुद्र तल से 21,778 फीट से अधिक ऊँचाई पर स्थित है।
- Its **parikrama**, or **circumambulation**, is considered sacred by followers of several **faiths**, including **Hinduism**, **Buddhism**, **Jainism** and **Bon**.
इसकी परिक्रमा (सर्कमएम्बुलेशन) को हिंदू धर्म, बौद्ध धर्म, जैन धर्म तथा बोन धर्म सहित अनेक धर्मों के अनुयायी पवित्र मानते हैं।
- It begins in **Darchen**, situated at a height of **15,338 feet**.
यह यात्रा 15,338 फीट की ऊँचाई पर स्थित दारचेन से प्रारंभ होती है।
- The entire **circuit** takes around **two to three days** for completion, with the highest point being the **Dolma La Pass**, at **18,471 feet**.
पूरी परिक्रमा को पूरा करने में लगभग दो से तीन दिन लगते हैं, जिसका सबसे ऊँचा बिंदु डोल्ला ला दर्रा है, जो 18,471 फीट की ऊँचाई पर स्थित है।
- **Pilgrims** are required to undergo **fitness tests** and a period of gradual **acclimatisation** before undertaking the **trek**.
तीर्थयात्रियों को इस पदयात्रा पर निकलने से पहले शारीरिक फिटनेस परीक्षण तथा क्रमिक ऊँचाई-अनुकूलन (एक्लाइमेटाइज़ेशन) की प्रक्रिया से गुजरना अनिवार्य होता है।
- While the **Indian government** selects pilgrims for the **Kailash Mansarovar Yatra** through a **lottery system**, the numbers are heavily tilted towards the list submitted by **private tour operators**.
जहाँ भारत सरकार कैलाश मानसरोवर यात्रा के लिए लॉटरी प्रणाली के माध्यम से श्रद्धालुओं का चयन करती है, वहीं कुल यात्रियों की संख्या में बड़ा हिस्सा निजी टूर ऑपरेटरों द्वारा भेजी गई सूची का होता है।

GS Paper 1: Society		01 July 2026
TOPICS COVERED		
14J7	Is the undocumented migrant counted? क्या अपंजीकृत प्रवासी की गणना की जाती है?	

Is the undocumented migrant counted?

Evidence using official Census data suggest that there is no surge of undocumented migrants from Bangladesh, at least between 1991 and 2011

GS I: Society

DATA POINT

Abhishek Shaw

Can India's official statistics detect large-scale undocumented migration? Undocumented migrants may evade law, but can they evade the Census? If millions of them are living in India, they must appear somewhere in the country's official statistics. Union Minister of Parliamentary Affairs Kiren Rijiju told Parliament that "As per available inputs, there are around 20 million illegal Bangladeshi migrants staying in India". Then, they must come across enumerators during the Census. What might an undocumented migrant do in such an encounter?

They can respond in three ways: avoid or duck the Census altogether, contributing to coverage error; be counted but report India rather than Bangladesh as the place of birth, creating measurement error; or report the place of birth truthfully.

Each of these choices leaves a different mark in the data, which can be checked. Together, this provides a simple framework for asking whether India's official data are consistent with the claimed scale of undocumented migration. But a framework based on birthplace has a built-in limit: the Census records where a person was born, not whether they entered legally. The same "born in Bangladesh" category contains citizens, visa-holders, and the undocumented alike, with nothing to tell them apart. What the data can speak to, then, is scale: whether a population of the claimed size exists at all.

Ducking

Ducking is hiding from the enumerator altogether. But hiding is not the only way to duck. A subtler version, for example, is to tell the enumerator "I don't actually live here; I will be counted at my usual residence elsewhere" and then not to be counted at that other place

either. The outcome is the same, an omission, which is exactly what the Census is built to detect via the Post Enumeration Survey (PES). This has been conducted after every Census to estimate coverage error and reasons for measurement errors.

The 2011 PES finds a net omission of 23 persons per 1,000 nationally, or 2.3%, unchanged from 2001 (up from 1.8% in 1991). The Eastern zone, with States bordering Bangladesh and where "infiltration" claim is concentrated, is best covered (Table 1). What can be said confidently is that the population missed by enumeration is small, stable across the decades, and smallest at the border. This leaves little room for the unenumerated population of the scale the political claim requires.

Misreporting

The second option—being enumerated but recording one's birthplace as India rather than abroad—is the one that costs the least and can be neither verified nor refuted at the point of enumeration. But it has an implication: a person who misreports is still a person the Census has counted. This is what would be termed measurement error. They remain in the total population, in the count by religion, and in the age and sex tables, but the birthplace entry is false.

If, for example, large numbers of undocumented Muslim migrants were doing this, the effect would not be a hidden population but an inflated one—a Muslim population, and with a rate of population growth, larger than natural increase and differential fertility can account for—and concentrated in the border districts. That inflation has been examined in an earlier article in *The India Forum*, which found no such signature. If misreporting were hiding a large migrant inflow, it would surface as border-concentrated Muslim growth beyond what fertility explains. The counts showed growth that is moderate, fertility-consistent, and geographically dispersed instead.

tent, and geographically dispersed instead.

Truthful Responses

The third option is to report their place of birth truthfully with the belief that the Census enumeration is anonymous and does not put them at risk. Migrant stock is a widely used measure to keep track of levels of migration. A person enumerated in India, but born in another country is considered a migrant in this measure.

The composition of the migrant stock in India has seen substantial declines of those born in Bangladesh and Pakistan, with large increases in that of Nepal (Chart 1). However, despite decline in overall migrant stock, about half of India's has consistently been Bangladesh-born persons.

In the last three Censuses, roughly 94% of all India's Bangladesh-born residents lived in the five border States (West Bengal, Assam, Tripura, Meghalaya, and Mizoram); a share that barely moved even as the national Bangladesh-born population itself fell by nearly one-third from about 4.0 million to 2.7 million.

Table 2 shows data from districts in the Eastern States bordering Bangladesh. Both by share and by absolute numbers across these districts, migrants who are overwhelmingly from Bangladesh are ageing and likely dying out. The younger age-groups show meagre numbers. Much of this population arrived during Partition in 1947 or the Bangladesh War in 1971. That generation is now elderly, and its numbers are falling chiefly because its members are dying.

Thus, the evidence using official data, in all its forms, suggest that there is no surge of undocumented migrants from Bangladesh, at least between 1991 and 2011.

The Census cannot tell us there are no undocumented migrants from Bangladesh. What it does tell, as checked in three different ways above, is that there are not 20 million of them.

Exaggerated claim

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TABLE 1:

This shows the net omission rates in each of the six zones (as defined by Census) in 2011

Zone	Net Omission Rate (%)	Undercount in 2011 (millions)	Percentage of Undercount
Central	4.17	12.78	46.6%
Northern	3.8	6.07	22.1%
Southern	1.5	3.8	13.8%
Eastern	0.84	2.2	8%
Western	1.17	2.02	7.4%
Northeast	1.24	0.57	2.1%
India	2.3	27.67	100%

CHART 1:

This shows the share of people, whose place of birth was not India, counted in the last three Census

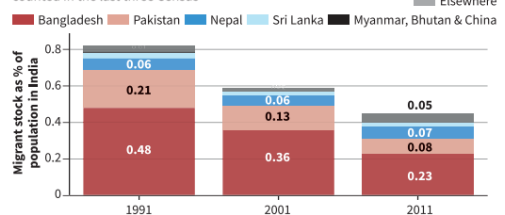


TABLE 2:

This shows the number of people in different age groups and their share in total migrant stock in the districts in Eastern States bordering Bangladesh

Age group	2001		2011	
	No of people	% share in total migrant stock	No of people	% share in total migrant stock
0-4 years	2,699	0.2	1,982	0.18
5-9 years	7,348	0.55	3,467	0.31
10-14 years	22,991	1.71	7,030	0.63
15-24 years	72,081	5.35	38,340	3.41
25-34 years	1,42,446	10.58	81,108	7.21
35-59 years	6,48,416	48.14	5,01,655	44.62
60+	4,50,958	33.48	4,90,709	43.65
Total	13,46,939	100	11,24,291	100

14J7. Is the undocumented migrant counted?

क्या अपंजीकृत प्रवासी की गणना की जाती है?

- Union Minister of Parliamentary Affairs Kiren Rijiju told Parliament that "As per available inputs, there are around 20 million illegal Bangladeshi migrants staying in India".

संसदीय कार्य मंत्री किरन रिजिजू ने संसद में कहा कि "उपलब्ध सूचनाओं के अनुसार, भारत में लगभग 2 करोड़ अवैध बांग्लादेशी प्रवासी रह रहे हैं।"

- They can respond in three ways: avoid or duck the Census altogether, contributing to coverage error; be counted but report India rather than Bangladesh as the place of birth, creating measurement error; or report the place of birth truthfully.

वे तीन प्रकार से प्रतिक्रिया कर सकते हैं: जनगणना से पूरी तरह बचना, जिससे कवरेज त्रुटि (Coverage Error) उत्पन्न होगी; जनगणना में शामिल होना, किंतु जन्म स्थान के रूप में बांग्लादेश के स्थान पर भारत

बताना, जिससे मापन त्रुटि (Measurement Error) होगी; अथवा अपने जन्म स्थान की सही जानकारी देना।



Ducking

जनगणना से बचना

- **Ducking** is hiding from the **enumerator** altogether.
जनगणना से बचने का अर्थ है प्रगणक से पूरी तरह छिप जाना।
- The **2011 PES** finds a net omission of **23 persons per 1,000** nationally, or **2.3%**, unchanged from **2001** (up from **1.8%** in **1991**).
2011 के PES के अनुसार, राष्ट्रीय स्तर पर प्रति **1,000** व्यक्तियों में **23** व्यक्ति, अर्थात् **2.3%**, जनगणना से छूट गए थे, जो **2001** के समान था तथा **1991** के **1.8%** से अधिक था।

Misreporting

भ्रामक जानकारी देना

- The **second option**—being **enumerated** but recording one's **birthplace** as **India** rather than abroad—is the one that costs the least and can be neither verified nor refuted at the point of **enumeration**.
दूसरा विकल्प यह है कि जनगणना में शामिल होते हुए अपने जन्मस्थान को विदेश के बजाय भारत दर्ज कराया जाए। यह सबसे कम लागत वाला विकल्प है और जनगणना के समय इसकी न तो पुष्टि की जा सकती है और न ही इसका खंडन।
- But it has an implication: a person who **misreports** is still a person the **Census** has counted. किन्तु इसका एक निहितार्थ है: जो व्यक्ति गलत जानकारी देता है, वह फिर भी जनगणना में गिना जाता है।
- This is what would be termed **measurement error**.
इसे मापन त्रुटि कहा जाता है।
- They remain in the **total population**, in the count by **religion**, and in the **age** and **sex** tables, but the **birthplace** entry is false.
वे कुल जनसंख्या, धर्म के आधार पर की गई गणना तथा आयु एवं लिंग संबंधी सारणियों में बने रहते हैं, किन्तु जन्मस्थान का विवरण असत्य होता है।

GS Paper 1: Geography	14 July 2026
TOPICS COVERED	
14J7 Musandam in Oman	



Ships and tankers in the Strait of Hormuz, Musandam, Oman. REUTERS

GS Paper II: Polity	14 July 2026
TOPICS COVERED	
14J7 SC stays Madras HC order banning cow slaughter	



	उच्चतम न्यायालय ने गौवध पर प्रतिबंध संबंधी मद्रास उच्च न्यायालय के आदेश पर रोक लगाई
14J7	65% online RTI applications from last 2 years pending: Sai पिछले दो वर्षों की 65% ऑनलाइन आरटीआई आवेदन लंबित: साय

SC stays Madras HC order banning cow slaughter

GS II: Polity

The Hindu Bureau
NEW DELHI

The Supreme Court on Monday stayed a May 27 order of the Madras High Court that directed the Tamil Nadu government to enforce a State-wide prohibition on the slaughter of cows and calves.

A Bench comprising Justices Vikram Nath and Sandeep Mehta was hearing a special leave petition filed by the Tamilaga Vettri Kazhagam (TVK)-led government challenging the High Court's order on the ground that the direction was contrary to the provisions of the Tamil Nadu Animal Preservation Act, 1958, which permits the slaughter of cows over 10 years of age if a competent authority declares them unfit for work and breeding.

The State also pointed

Slaughter rules

The Madras HC had observed in its May 27 order that slaughter of animals could take place only in licensed/designated places

T.N.'s CONTENTION IN SC:

■ Order amounted to 'judicial lawmaking' and was internally inconsistent

■ Several existing laws regulate slaughter without any blanket ban

■ Necessary steps already taken to prevent the slaughter of animals in public places



out that laws such as the Prevention of Cruelty to Animals Act, 1960; the Prevention of Cruelty to Animals (Slaughter House) Rules, 2001; the Tamil Nadu Urban Local Bodies Act, 1998; and the Tamil Nadu Urban Local Bodies Rules, 2023, do not impose a blanket prohibition on slaughter, but instead regulates the manner and con-

ditions under which it may be carried out.

'Need for correction'

Observing that the impugned order required *prima facie* "correction", the Bench issued notice on the appeal filed by Tamil Nadu and stayed the operation of the High Court's order insofar as it directed the State to impose a complete

ban on cow slaughter.

The impugned order was passed by a Division Bench of Justices G.R. Swaminathan and V. Lakshminarayanan, which had directed the Chief Secretary and the Director-General of Police/Head of Police Force to ensure that no cow or calf was slaughtered anywhere in the State either on the eve of Bakrid on May 28, 2026, or on any subsequent day.

The petition, filed by the Secretary to the State government, arraigned as respondents K. Surya, youth wing secretary of the Indu Makkal Katchi, who had moved the original writ petition before the High Court, along with the Director-General of Police and other State officials.

The Tamil Nadu government apprised the top court that the High Court's order amounted to "judi-

cial lawmaking" and was internally inconsistent. It pointed out that while the High Court had correctly observed that slaughter could take place only in designated slaughterhouses or places notified under the law, it had simultaneously directed a complete prohibition on the slaughter of cows and calves.

The State further submitted it had already taken the necessary steps to prevent the slaughter of animals in public places and had consistently maintained that any animal sacrifice would be permitted only in enclosed spaces away from public view.

The High Court had observed that slaughter of animals could take place only in licensed slaughterhouses or places specifically designated by the competent authorities under the law.

14J7. SC stays Madras HC order banning cow slaughter

उच्चतम न्यायालय ने गौवध पर प्रतिबंध संबंधी मद्रास उच्च न्यायालय के आदेश पर रोक लगाई

- The Supreme Court on Monday stayed a May 27 order of the Madras High Court that directed the Tamil Nadu government to enforce a State-wide prohibition on the slaughter of cows and calves.

उच्चतम न्यायालय ने सोमवार को 27 मई के मद्रास उच्च न्यायालय के उस आदेश पर रोक लगा दी, जिसमें तमिलनाडु सरकार को पूरे राज्य में गायों और बछड़ों के वध पर प्रतिबंध लागू करने का निर्देश दिया गया था।

- A Bench comprising Justices Vikram Nath and Sandeep Mehta was hearing a Special Leave Petition (SLP) filed by the Tamilaga Vettri Kazhagam (TVK)-led government challenging the High Court's order on the ground that the direction was contrary to the provisions of the Tamil Nadu Animal Preservation Act, 1958, which permits the slaughter of cows over 10 years of age if a competent authority declares them unfit for work and breeding.

न्यायमूर्ति विक्रम नाथ और न्यायमूर्ति संदीप मेहता की पीठ तमिलगा वेत्री कषगम (TVK) के नेतृत्व वाली सरकार द्वारा दायर विशेष अनुमति याचिका (SLP) पर सुनवाई कर रही थी। सरकार ने यह तर्क दिया कि उच्च न्यायालय का निर्देश तमिलनाडु पशु संरक्षण अधिनियम, 1958 के प्रावधानों के विपरीत है, जिसके अनुसार यदि सक्षम प्राधिकारी 10 वर्ष से अधिक आयु की गायों को कार्य एवं प्रजनन के लिए अनुपयुक्त घोषित कर दे, तो उनके वध की अनुमति दी जा सकती है।

- The State also pointed out that laws such as the Prevention of Cruelty to Animals Act, 1960; the Prevention of Cruelty to Animals (Slaughter House) Rules, 2001; the Tamil Nadu Urban Local Bodies Act, 1998; and the Tamil Nadu Urban Local Bodies Rules,



2023, do not impose a blanket prohibition on slaughter, but instead regulate the manner and conditions under which it may be carried out.

राज्य सरकार ने यह भी स्पष्ट किया कि पशुओं के प्रति क्रूरता निवारण अधिनियम, 1960, पशुओं के प्रति क्रूरता निवारण (वधशाला) नियम, 2001, तमिलनाडु शहरी स्थानीय निकाय अधिनियम, 1998, तथा तमिलनाडु शहरी स्थानीय निकाय नियम, 2023 जैसे कानून वध पर पूर्ण प्रतिबंध नहीं लगाते, बल्कि यह निर्धारित करते हैं कि किन परिस्थितियों और किस प्रकार से वध किया जा सकता है।

‘Need for correction’

‘सुधार की आवश्यकता’

- Observing that the **impugned order** required **prima facie** “correction”, the **Bench** issued notice on the **appeal** filed by **Tamil Nadu** and stayed the operation of the **High Court’s order** insofar as it directed the State to impose a complete **ban on cow slaughter**.
यह टिप्पणी करते हुए कि चुनौती दिए गए आदेश में प्रथम दृष्टया (प्राइमा फेसी) "सुधार" की आवश्यकता है, पीठ ने तमिलनाडु द्वारा दायर अपील पर नोटिस जारी किया तथा उच्च न्यायालय के आदेश के उस भाग के क्रियान्वयन पर रोक लगा दी, जिसमें राज्य को गौ-हत्या पर पूर्ण प्रतिबंध लगाने का निर्देश दिया गया था।

65% online RTI applications from last 2 years pending: Sai

GS II: Polity

Shubhomoy Sikdar

RAIPUR

Around 65% of the over 1.5 lakh applications received through the RTI online portal under the Right to Information Act, 2005, in Chhattisgarh in the last two years remain “pending”, the State government told the Legislative Assembly on Monday.

Replying to a question raised by Bharatiya Janata Party MLA Dipesh Yadav on the number of RTI applications received, resolved, and pending applications through the portal in the financial years 2024-25 and 2025-26, Chief Minister Vishnu Deo Sai stated that in FY25, 69,463 applications were received in which 20,409 applications were resolved and 49,054 were pending. In the following financial year, the corresponding numbers were



Chhattisgarh CM Vishnu Sai

84,935 (received), 33,310 (resolved) and 51,625 (pending) respectively.

Cumulatively, 1,54,398 applications were received in both the years put together, of which 1,00,679 or 65.2% RTI applications received through the portal remain pending.

‘Numbers worrying’

RTI activists said such numbers are worrying.

“While it is not very clear what all is included in the pending list provided by the

government in the State Assembly, that 65% applications remaining pending in these two years is extremely alarming. This is because the Right to Information law was supposed to provide a time-bound access to information. Information delayed is information denied. A large percentage of RTI applications filed in the country are filed by the poorest and the most marginalised,” said Anjali Bharadwaj, co-convenor of the National Campaign for People’s Right to Information and founder-member of the Satark Nagrik Sangathan, which brings out report cards on the functioning of Information Commissions across the country.

Uchit Sharma, a Raipur-based RTI activist, alleged that the RTI Act is being continuously weakened in the State.

14J7. 65% online RTI applications from last 2 years pending: Sai पिछले दो वर्षों की 65% ऑनलाइन आरटीआई आवेदन लंबित: साय

- Around **65%** of the over **1.5 lakh applications** received through the **RTI online portal** under the **Right to Information Act, 2005**, in **Chhattisgarh** in the last **two years** remain **"pending"**, the **State government** told the **Legislative Assembly** on **Monday**.
छत्तीसगढ़ में पिछले दो वर्षों के दौरान सूचना का अधिकार अधिनियम, 2005 के अंतर्गत आरटीआई ऑनलाइन पोर्टल के माध्यम से प्राप्त 1.5 लाख से अधिक आवेदनों में से लगभग 65% आवेदन "लंबित" हैं, यह जानकारी राज्य सरकार ने सोमवार को विधानसभा में दी।
- This is because the **Right to Information law** was supposed to provide a **time-bound access to information**.
ऐसा इसलिए है क्योंकि सूचना का अधिकार (RTI) कानून का उद्देश्य समयबद्ध रूप से सूचना उपलब्ध कराना था।
- **Information delayed is information denied.**
विलंब से प्राप्त सूचना, सूचना से वंचित किए जाने के समान है।
- A large percentage of **RTI applications** filed in the country are filed by the poorest and the most marginalised," said **Anjali Bharadwaj**, co-convenor of the **National Campaign for People's Right to Information** and founder-member of the **Satark Nagrik Sangathan**, which brings out report cards on the functioning of **Information Commissions** across the country.
देश में दायर किए जाने वाले आरटीआई आवेदनों का एक बड़ा हिस्सा सबसे गरीब और सबसे अधिक वंचित वर्गों द्वारा दायर किया जाता है," राष्ट्रीय जन सूचना अधिकार अभियान (National Campaign for People's Right to Information) की सह-संयोजक तथा सतर्क नागरिक संगठन की संस्थापक सदस्य अंजलि भारद्वाज ने कहा। यह संगठन देशभर के सूचना आयोगों के कार्य-निष्पादन पर नियमित रिपोर्ट कार्ड जारी करता है।

GS Paper II: Governance		14 July 2026
TOPICS COVERED		
14J7	All Ladakh districts to get autonomous hill councils लद्दाख के सभी जिलों को स्वायत्त पर्वतीय विकास परिषदें मिलेंगी	
14J7	User data exposed due to flaws in UMANG portal: researchers यूएमएनजी पोर्टल में खामियों के कारण उपयोगकर्ताओं का डेटा उजागर: शोधकर्ताओं का दावा	
14J7	Universities call for clear framework for disbursement of grants under VBSA Bill वीबीएसए विधेयक के अंतर्गत अनुदान वितरण के लिए स्पष्ट ढाँचे की मांग कर रहे हैं विश्वविद्यालय	
14J7	SC asks Centre to place on record new aviation rules उच्चतम न्यायालय ने केंद्र से नए विमानन नियम अभिलेख पर प्रस्तुत करने को कहा	

All Ladakh districts to get autonomous hill councils

Ladakh administration announces creation of 17 new tehsils: Chief Secretary Ashish Kundra says several rounds of talks were held with regional representatives over constitutional safeguards

GS II: Governance

Peerzada Ashiq
SRINAGAR

The Ladakh administration on Monday announced 17 new tehsils "to strengthen grassroots governance" in the Union Territory and said the Ladakh Autonomous Hill Development Council (LAHDC) Act will be extended to all seven districts of the region.

"The administration is working on an institutional framework suited to Ladakh's unique requirements and is also taking steps to extend the benefits of the Ladakh Autonomous Hill Development Council (LAHDC) Act to all seven newly created districts through appropriate legal provisions," said Ladakh Chief Secretary Ashish Kundra.

Earlier, Ladakh had only two districts of Leh and Kargil. However, five new districts of Sham, Nubra, Changthang, Zaskar and Drass were notified in April. With 17 additional tehsils, Ladakh has a total of 32 tehsils now. "These initiatives would bring government services closer to the people, reduce travel for citizens living in remote villages and strengthen infrastructure and



Governance boost: With the creation of new tehsils, the Union Territory has a total of 32 tehsils now. FILE PHOTO

development across regions, including Zaskar, Drass, Nubra, Changthang and Sham," said Mr. Kundra.

He said the administration has issued posting orders for tehsildars in 17 newly created tehsils. "Four new divisions under the Public Health Engineering (PHE) and Flood Control Department, along with five new divisions under the Public Works Department (PWD) and PMGSY (Pradhan Mantri Gram Sadak Yojana), have been created to strengthen service delivery in remote areas," he added.

He said significant progress has been made in government recruitment, decentralised governance, and ongoing discussions on constitutional safeguards for Ladakh.

On the issue of constitutional safeguards, Mr. Kundra said several rounds of discussions have been held with representatives of religious organisations and civil society bodies. "The minutes of the meetings held on May 22 and July 3 have been shared in the public domain to ensure transparency. There is broad consensus on protecting Ladakh's land, culture and identity while promoting inclusive development," said Mr. Kundra.

Glaring imbalance: KDA In July, the draft shared by a team from the Union Home Ministry in Leh suggested that the Centre was considering a customised *sui generis* model, most suitable for Ladakh, under the provisions of Article 371 for the Union Territory.

The Kargil-based civil society organisation, the Kargil Democratic Alliance (KDA), said the tehsil figures "reveal a glaring imbalance". "While the erstwhile Leh district has been allotted 12 new tehsils, the erstwhile Kargil district has received only five," said KDA leader Sajjad Kargili. He said this disparity was difficult to reconcile with objective parameters. "Kargil has a larger population and a greater number of villages than the other five newly created districts combined. Yet its administrative needs appear to have been overlooked. Even more striking is the fact that Drass has not been granted a single additional tehsil, despite its substantial population, large number of villages, and genuine administrative requirements," he said.

He said there were instances where a new tehsil was created for a single village. "It has raised serious questions about the criteria adopted for this exercise. This also shows the absence of a sense of justice from the administration and also shows discriminatory approach towards the people of Kargil and Drass," he added.

14J7. All Ladakh districts to get autonomous hill councils

लद्दाख के सभी जिलों को स्वायत्त पर्वतीय विकास परिषदें मिलेंगी

• The **Ladakh administration on Monday announced 17 new tehsils "to strengthen grassroots governance" in the Union Territory and said the Ladakh Autonomous Hill Development Council (LAHDC) Act will be extended to all seven districts of the region.**

लद्दाख प्रशासन ने सोमवार को केंद्र शासित प्रदेश में जमीनी स्तर के शासन को सुदृढ़ करने के उद्देश्य से 17 नए तहसीलों की घोषणा की तथा कहा कि लद्दाख स्वायत्त पर्वतीय विकास परिषद (LAHDC) अधिनियम का विस्तार क्षेत्र के सभी सात जिलों तक किया जाएगा।

• "The administration is working on an institutional framework suited to Ladakh's unique requirements and is also taking steps to extend the benefits of the Ladakh Autonomous Hill Development Council (LAHDC) Act to all seven newly created districts through appropriate legal provisions," said Ladakh Chief

Secretary Ashish Kundra.

लद्दाख के मुख्य सचिव आशीष कुंद्रा ने कहा, "प्रशासन लद्दाख की विशिष्ट आवश्यकताओं के अनुरूप एक उपयुक्त संस्थागत ढाँचा विकसित करने पर कार्य कर रहा है तथा उपयुक्त कानूनी प्रावधानों के माध्यम से नवगठित सभी सात जिलों तक लद्दाख स्वायत्त पर्वतीय विकास परिषद (LAHDC) अधिनियम के लाभों का विस्तार करने के लिए भी आवश्यक कदम उठा रहा है।"

- **Earlier, Ladakh had only two districts of Leh and Kargil.**

पूर्व में लद्दाख में केवल दो जिले, लेह और कारगिल, थे।

- **However, five new districts of Sham, Nubra, Changthang, Zaskar and Drass were notified in April.**

हालाँकि, अप्रैल में शाम, नुब्रा, चांगथांग, ज़ांस्कर और द्रास नामक पाँच नए जिलों की अधिसूचना जारी की गई।

- **With 17 additional tehsils, Ladakh has a total of 32 tehsils now.**

17 अतिरिक्त तहसीलों के साथ अब लद्दाख में कुल 32 तहसीलें हो गई हैं।

- **"Four new divisions under the Public Health Engineering (PHE) and Flood Control Department, along with five new divisions under the Public Works Department (PWD) and PMGSY (Pradhan Mantri Gram Sadak Yojana), have been created to strengthen service delivery in remote areas," he added.**

उन्होंने आगे कहा, "दूरस्थ क्षेत्रों में सेवाओं की आपूर्ति को सुदृढ़ करने के लिए लोक स्वास्थ्य अभियांत्रिकी (PHE) एवं बाढ़ नियंत्रण विभाग के अंतर्गत चार नए प्रभाग तथा लोक निर्माण विभाग (PWD) एवं प्रधानमंत्री ग्राम सड़क योजना (PMGSY) के अंतर्गत पाँच नए प्रभाग स्थापित किए गए हैं।"



- In July, the draft shared by a team from the **Union Home Ministry** in **Leh** suggested that the **Centre** was considering a customised **sui generis** model, most suitable for **Ladakh**, under the provisions of **Article 371** for the **Union Territory**.
जुलाई में लेह में केंद्रीय गृह मंत्रालय की एक टीम द्वारा साझा किए गए प्रारूप से संकेत मिला कि केंद्र सरकार केंद्रशासित प्रदेश लद्दाख के लिए अनुच्छेद 371 के प्रावधानों के अंतर्गत एक अनुकूलित सुई जेनरिस (विशिष्ट प्रकृति का) मॉडल पर विचार कर रही है।

User data exposed due to flaws in UMAN portal: researchers

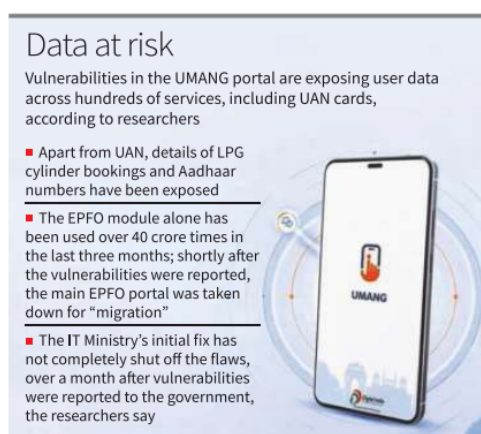
UAN of PF subscribers, LPG booking details, and Aadhaar numbers among the exposed data; IT Ministry acknowledges vulnerabilities, says necessary measures are being implemented; initial fixes do nothing to fix the system, says researcher

Aroon Deep
NEW DELHI

Multiple vulnerabilities in the UMAN, or Unified Mobile Application for New-age Governance, portal that aggregates hundreds of public services offered by the Union and State governments are leaving data of potentially millions of Indians exposed across a variety of databases, including those from the Employees' Provident Fund Organisation (EPFO), according to two security researchers who shared their findings with *The Hindu*.

The vulnerabilities, which have likely existed for years, affect several services tested on the UMAN portal, which has onboarded over 2,400 services. It stems from the architecture of the portal itself, said the researchers, Akshay C.S. and Viral Vaghela. "Almost everything is broken by design," Mr. Vaghela said.

The data exposed included Unique Account Numbers (UAN) with the EPFO, LPG cylinder booking details with at least one major oil marketing com-



pany, and Aadhaar numbers across several services where a user's ID details are saved. The Aadhaar numbers were found across many services in plain text, though such storage is disallowed by the Aadhaar Act, 2016. The Aadhaar module itself within UMAN was not vulnerable.

The EPFO module is UMAN's most-used service, recording over 40 crore transactions over the past three months.

The Ministry of Electronics and Information Technology acknowledged the vulnerabilities in a

statement to *The Hindu*. "Our development and security teams have carefully examined the observations and are implementing the necessary corrective and preventive measures," the Ministry said. "The plain-text information in the concerned APIs has been appropriately encrypted."

API review

The Ministry added that it has "reviewed the API transaction logs for the past three months" and found that "transaction volumes" were consistent and that it continued to keep a watch on activities on the

UMAN portal.

The Hindu is withholding the precise technical details of the vulnerabilities, as they remain active despite the above interventions. The encryption the IT Ministry referred to is "flawed and inadequate", Mr. Akshay said, adding that a simple workaround allowed it to be cracked anyway. At *The Hindu's* request, the researchers shared their findings with Karan Saini, another independent security researcher, who termed the vulnerabilities "significant".

"Considering that rate limiting was implemented and the large number-space of EPFO UANs, it is unlikely that the vulnerability could have been exploited to mirror the entire EPFO database," Mr. Saini said, referring to the steps taken by the site to limit the number of requests a user can make. Still, he added, it "could potentially have been abused by cybercriminals in possession of UANs to siphon funds at scale by allowing for both changing of bank account details and initiating payouts, which is very concerning".

"The fixes initially im-

plemented following the disclosure appear to do nothing to secure the system and instead confuse obscurity with security, while also introducing another vulnerability in the process," Mr. Saini said.

Mr. Akshay and Mr. Vaghela reported both vulnerabilities to the IT Ministry and the Computer Emergency Response Team, India (CERT-In), which issues alerts and helps organisations across the country with fixes for vulnerabilities like these. Shortly after the pair reported the vulnerabilities, the EPFO took down its online portal for a "migration", and some services remained unavailable this week.

The researchers said they suspected this was in response to their alerts, which were also sent to the organisation. The Ministry of Labour and Employment did not respond to a request for comment.

"It is worth examining whether the fixes deployed on the UMAN portal were simultaneously deployed across the services for which UMAN acts as a proxy," Mr. Saini said.

14J7. User data exposed due to flaws in UMAN portal: researchers

यूएमएनजी पोर्टल में खामियों के कारण उपयोगकर्ताओं का डेटा उजागर: शोधकर्ताओं का दावा

- Multiple vulnerabilities in the **UMAN (Unified Mobile Application for New-age Governance)** portal that aggregates hundreds of **public services** offered by the **Union and State governments** are leaving data of potentially millions of **Indians** exposed across a variety of **databases**, including those from the **Employees' Provident Fund Organisation**

(EPFO), according to two security researchers who shared their findings with **The Hindu**. यूएमएएनजी (यूनिफाइड मोबाइल एप्लिकेशन फॉर न्यू-एज गवर्नेंस) पोर्टल, जो केंद्र और राज्य सरकारों द्वारा प्रदान की जाने वाली सैकड़ों सार्वजनिक सेवाओं को एकीकृत करता है, में पाई गई अनेक सुरक्षा कमजोरियों के कारण संभावित रूप से लाखों भारतीयों का डेटा विभिन्न डेटाबेसों, जिनमें कर्मचारी भविष्य निधि संगठन (EPFO) का डेटाबेस भी शामिल है, में उजागर हो रहा है। यह जानकारी दो साइबर सुरक्षा शोधकर्ताओं ने द हिंदू के साथ साझा की।

- The data exposed included **Unique Account Numbers (UAN)** with the EPFO, **LPG cylinder booking details** with at least one major oil marketing company, and **Aadhaar numbers across several services** where a user's ID details are saved.

उजागर हुए डेटा में ईपीएफओ के यूनिक अकाउंट नंबर (UAN), कम-से-कम एक प्रमुख तेल विपणन कंपनी के एलपीजी सिलेंडर बुकिंग विवरण, तथा उन अनेक सेवाओं में संग्रहीत आधार संख्या, जहाँ उपयोगकर्ताओं की पहचान संबंधी जानकारी सुरक्षित रखी जाती है, शामिल थीं।

- Mr. Akshay and Mr. Vaghela reported both vulnerabilities to the IT Ministry and the **Computer Emergency Response Team, India (CERT-In)**, which issues alerts and helps organisations across the country with fixes for vulnerabilities like these.

श्री अक्षय और श्री वाघेला ने इन दोनों कमजोरियों की सूचना आईटी मंत्रालय तथा कंप्यूटर इमरजेंसी रिसपॉन्स टीम-इंडिया (CERT-In) को दी, जो इस प्रकार की सुरक्षा कमजोरियों के संबंध में चेतावनियाँ जारी करती है और देशभर के संगठनों को उनके समाधान में सहायता प्रदान करती है।

UMANG: Unified Mobile Application for New-age Governance

- UMANG stands for Unified Mobile Application for New-age Governance.**
- It is a unified digital platform that allows citizens to access a large number of public services through a single mobile application and web portal.
- The services available on UMANG are provided by the **Union Government, State Governments, Union Territory administrations, and certain local authorities.**
- UMANG is an important component of the Government of India's **Digital India Programme.**
- It promotes **mobile governance**, commonly called **m-Governance**, by making public services accessible through mobile phones and other digital devices.
- The Government of India launched the **Digital India Programme on 1 July 2015.**
- One of the major objectives of Digital India is to make government services available to citizens electronically.
- Before UMANG, citizens often had to use separate applications and websites for different government departments.
- UMANG was developed to bring these scattered services together on one common platform.

- It was formally launched on 23 November 2017 during the **Global Conference on Cyberspace** held in New Delhi.

Implementing Authorities

- UMANG functions under the **Ministry of Electronics and Information Technology**.
- It has been developed and managed through the **National e-Governance Division**.
- The National e-Governance Division is associated with the implementation of major digital governance initiatives in India.

Universities call for clear framework for disbursal of grants under **VBSA Bill**

14J7. Universities call for clear framework for disbursal of grants under VBSA Bill
वीबीएसए विधेयक के अंतर्गत

अनुदान वितरण के लिए स्पष्ट ढाँचे की मांग कर रहे हैं विश्वविद्यालय

GS II: Governance
Abhinay Lakshman
NEW DELHI

Appearing before the Joint Parliamentary Committee examining the **Viksit Bharat Shiksha Adhishtan Bill, 2025**, institutes and universities across the country have sought a clear framework from the Centre to continue the grant disbursal commitments currently under the University Grants Commission.

This came even as members of the JPC, including from the ruling BJP, flagged concerns that the Bill “does not expressly create a mechanism for institutional financial support”. The panel is headed by BJP MP D. Purandeswari.

The **VBSA Bill was introduced by the government to overhaul the higher education regulatory framework and intends to replace the UGC, the All India Council for Technical Education, and the National Council for Teacher Education with a single umbrella Commission, under which separate regulatory, accreditation, and standards councils will operate. The Bill notably divorces grant-disbursal powers currently held by the UGC from the regulator under**



The Bill is currently being reviewed by a JPC headed by MP D. Purandeswari. FILE PHOTO

the new structure. BJP MPs, including Bansuri Swaraj and Bhartruhari Mahtab, and other members suggested setting up a separate funding agency or council under the VBSA structure in addition to the regulatory, accreditation, and standards councils.

Ms. Swaraj further submitted that the legislation should have a provision mandating that a “successor grant mechanism” should be established within a year of its implementation.

‘Grant-giving powers’

Further, institutions like Jamia Milia Islamia, Indian Institute of Foreign Trade, Gauhati University, and Central University of Gujarat have said that removing grant-giving powers from

the regulator “may create uncertainty for public universities, especially State institutions dependent on Central support”, calling for a specific framework to ensure these grants continue uninterrupted.

The Higher Education Department of the Congress-ruled Telangana government also added to this argument, noting that the UGC’s general development grants – as they stand now – are the “primary statutory channel” of Central funding to State Universities.

Seeks assurances

Noting that the VBSA Bill calls for the repeal of the UGC Act without providing for a replacement for this, the Telangana government has sought assurances from the Union government to specify how these grants and funds to State Universities will be replicated under a new proposed structure.

The Union government has maintained its position during the JPC deliberations that divorcing grant-giving powers from the regulatory body was essential to avoid conflicts of interest and make funding to institutes more transparent and “performance-based”.

• Appearing before the **Joint Parliamentary Committee (JPC)** examining the **Viksit Bharat Shiksha Adhishtan (VBSA) Bill, 2025**, institutes and universities across the country have sought a clear **framework** from the **Centre** to continue the **grant disbursal** commitments currently under the **University Grants Commission (UGC)**.

विकसित भारत शिक्षा अधिष्ठान (VBSA) विधेयक, 2025 की समीक्षा कर रही संयुक्त संसदीय समिति (JPC) के समक्ष उपस्थित होकर देशभर के शैक्षणिक संस्थानों और विश्वविद्यालयों ने केंद्र सरकार से वर्तमान में विश्वविद्यालय अनुदान आयोग (UGC) के अंतर्गत संचालित अनुदान वितरण व्यवस्था को जारी रखने हेतु एक स्पष्ट ढाँचे की मांग की।

• The **VBSA Bill** was introduced by the government to overhaul the **higher education regulatory framework** and intends to replace the **UGC, the All India Council for Technical Education (AICTE), and the National Council for Teacher Education (NCTE)** with a **single umbrella Commission, under which separate regulatory, accreditation, and standards**



councils will operate.

वीबीएसए विधेयक सरकार द्वारा उच्च शिक्षा नियामक ढाँचे में व्यापक सुधार के उद्देश्य से प्रस्तुत किया गया है। इसका उद्देश्य विश्वविद्यालय अनुदान आयोग (UGC), अखिल भारतीय तकनीकी शिक्षा परिषद (AICTE) तथा राष्ट्रीय अध्यापक शिक्षा परिषद (NCTE) के स्थान पर एक एकीकृत आयोग की स्थापना करना है, जिसके अंतर्गत पृथक नियामक, मान्यता (अक्रेडिटेशन) तथा मानक निर्धारण परिषदें कार्य करेंगी।

SC asks Centre to place on record new aviation rules

GS II: Governance
Aaratrika Bhaumik
NEW DELHI

The Supreme Court on Monday asked the Union government to place on record the new aviation rules framed under the Bharatiya Vayuyan Adhiniyam, 2024, to regulate volatile airfares and predatory pricing in civil aviation.

The court was informed that the regulations have already been finalised, and were currently being translated into Hindi and other official languages before being tabled in Parliament.

However, senior advocate Ravindra Srivastava, appearing for the petitioner, social activist S. Laxminarayan, contended that under the provisions of the 2024 Act, the new rules must first be published for public consultation before being tabled before Parliament.

Finding merit in the submission, the Bench granted the Centre two weeks to place the draft aviation rules before the court in a sealed cover. The PIL plea sought binding regulatory norms to address arbitrary airfare pricing and ancillary charges imposed by airlines during festive periods, holidays, and emergencies.

14J7. SC asks Centre to place on record new aviation rules उच्चतम न्यायालय ने केंद्र से नए विमानन नियम अभिलेख पर प्रस्तुत करने को कहा

- The Supreme Court on Monday asked the Union government to place on record the new aviation rules framed under the **Bharatiya Vayuyan Adhiniyam, 2024**, to regulate volatile airfares and predatory pricing in civil aviation.

उच्चतम न्यायालय ने सोमवार को केंद्र सरकार को निर्देश दिया कि वह भारतीय वायुयान अधिनियम, 2024 के अंतर्गत तैयार किए गए नए विमानन नियमों को न्यायालय के अभिलेख पर प्रस्तुत करे। इन नियमों का उद्देश्य नागरिक उड्डयन क्षेत्र में अस्थिर हवाई किरायों तथा शोषणकारी मूल्य निर्धारण (Predatory Pricing) को विनियमित करना है।



Red Sea: a hinge between West Asia and Horn of Africa

Wars and rivalries across West Asia and the Horn of Africa are increasingly becoming interconnected; as the Gaza conflict spills into the Red Sea through Houthi attacks, Sudan's war fuels competition among Gulf states and Ethiopia seeks greater maritime access, major powers are expanding their military, diplomatic and economic presence along this critical corridor linking two volatile regions

NEWS ANALYSIS

Sharmada V.

When commercial ships started bypassing the Red Sea due to attacks from Yemen's Houthis, the immediate consequences could be felt thousands of kilometres away in the form of higher freight charges, slower supply chains and ships taking the longer route around Africa. At first sight, it seemed like yet another disruption in one of the world's busiest waterways, brought on by the conflict in West Asia.

However, the Red Sea crisis was not merely about shipping.

The attacks highlighted a larger geopolitical reality: conflicts in West Asia and the Horn of Africa are no longer isolated events but are increasingly converging into one another. While the Gaza war has bled into the Red Sea through Houthi attacks on commercial vessels, the war in Sudan has intensified competition for influence in Africa among the Gulf countries. Ethiopia's drive for maritime access has heightened tensions in the Horn of Africa, even as external players, from the U.S. and China to Turkey and the Gulf monarchies, have expanded their military, diplomatic and economic presence along the Red Sea.

Historically, West Asia and the Horn of Africa were treated as separate

strategic regions. The former was discussed within the context of the Arab-Israeli conflict, Iran-Gulf rivalry and oil politics, while the latter was associated with civil wars, piracy and humanitarian crises. Geography linked the two regions, but policy rarely did.

This distinction is now rapidly fading away. The Red Sea has emerged as the essential link connecting West Asia to the Horn of Africa, changing what was previously viewed as a maritime route into an area of intersecting conflicts, rivalry and rising geopolitical tensions. Conflicts in Gaza and Sudan, attacks on shipping off Yemen, internal tensions in Ethiopia and rivalries among the Gulf states are no longer separate conflicts. Gradually, they are all becoming intertwined with each other within the same narrow stretch of water.

Single strategic system

The emergence of such an interconnected security environment represents one of the major yet least recognised geopolitical developments in recent times. International relations theorists describe such regions as a 'regional security complex' or a space where the security of one country becomes inseparable from that of its neighbours. Gradually, the Red Sea is becoming such a regional security complex, as the conflicts of Gaza, Yemen and Sudan, Ethiopia's maritime ambitions and

Gulf rivalries are no longer separate developments but mutually reinforcing elements of a single strategic system.

This transformation did not occur overnight. For centuries, the Red Sea has been a vital route for trade, pilgrimage and imperial expansion, linking Europe and Asia through the Suez Canal and the Bab el-Mandeb Strait. It connected the Mediterranean with the Indian Ocean and shaped the fortunes of empires ranging from the Ottomans to the British. During the Cold War, it also became an arena of superpower rivalry, as the U.S. and the Soviet Union competed for influence among states on both shores.

This sea stretches for about 2,200 km from the Suez Canal to the Bab el-Mandeb, connecting the Mediterranean to the Indian Ocean, and it is bordered by eight countries. Its geography accounts for why any political issues that occur in either of its shores never tend to be restricted. Any disturbance in the passage through the Bab el-Mandeb could have an impact on commerce between Europe and Asia within days.

Yet, for the better part of the post-Cold War period, the Red Sea was perceived primarily through an economic angle. While events such as the Somali piracy attacks in the late 2000s generated some international interest in the area, the sea itself was not seen as a geopolitical arena in its own right. West Asia



Rising rivalries: Houthi supporters brandish their weapons during a protest against U.S. strikes on Iran, in Sanaa on Friday, Apr

and the Horn of Africa were areas of separate diplomatic and security considerations.

However, the importance of the region goes far beyond the borders of the countries surrounding it. The Red Sea is an incredibly vital waterway through which a great volume of world trade flows, including the container shipping industry, and one of the busiest maritime routes in the world. It is essential for India's commerce as it provides access to Europe, North Africa and the eastern Mediterranean, while carrying much of its energy supplies and cargo.

But looking at the Red Sea from only the perspective of shipping overlooks the broader geopolitical shift that is taking place. It is now at the core of a much larger security arc, where land conflicts determine the maritime conditions. The Bab el-Mandeb Strait, the narrow choke-

point from their interconnectedness.

The most obvious example of the changing nature of the Red Sea as a strategic space is the conflict in Gaza. What started as a conflict between Israel and Hamas gradually expanded from the Levantine region to involve other parties in order to show that the security situation in one part of the Red Sea increasingly influences the situation on the other shore.

The Houthis in Yemen, who refer to themselves as members of the "Iranian Axis of Resistance", justified their attacks on commercial ships in the Red Sea as solidarity with the Palestinians and pressure on Israel and its allies in the West. Even though many of the attacked ships were not connected with Israel at all, the attacks made one of the busiest sea trade routes into a theatre of war.

Companies started to redirect their ships, which eventually raised the price of transporting goods, insurance and travel time, whereas the U.S. and some European countries sent naval forces to escort commercial traffic in the Red Sea. But Yemen is only a small part of a much bigger chain of instability.

In Africa, the civil war in Sudan has emphasised the importance of the western littoral for strategic purposes. Following the outbreak of the civil war between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) in 2023, the conflict has de-

veloped into a battleground of regional rivalry. On one hand, Egypt has sided with the SAF, while on the other hand, the UAE has rejected claims regarding its backing of the RSF. In addition to that, Saudi Arabia has been trying to mediate the dispute and Russia still aims to achieve its long-held ambition of establishing a naval base in Sudan's Red Sea coastline.

In addition to the resulting humanitarian crisis, the civil war in Sudan has emphasised that ports, logistics, and coastal access have emerged as crucial strategic assets for contemporary wars.

Broader implications

The example of Ethiopia brings out another element of this geopolitical shift. Despite the fact that Ethiopia lost direct access to the Red Sea when Eritrea gained independence, the country's economy heavily relies on maritime access through other countries. This has made Ethiopia's search for better maritime access very important in terms of regional diplomacy, bringing into the picture the issue of connectivity and access in relation to geopolitics in the Horn of Africa region.

Right in the middle of all this are the Gulf states. In the past decade, Saudi Arabia, UAE, and Qatar have increased their political, economic, and military relationships with the Horn of Africa region, because they understand that the stability of the African shore directly affects their

security interests. Such a trend is connected to the general change in the strategic approaches of the Gulf states.

First, the situation in Yemen has shown how vulnerable the Red Sea is, second, economic diversification has made the ports and corridors the strategic resources for these countries, and third, issues connected to food security have led to investments in the agricultural sector and infrastructure of Africa.

Today, the competition between countries is not determined by the traditional military alliances but by ports, logistic systems, infrastructure projects and business connections. Increasingly, geopolitical rivalry is pursued not just through military coalitions, but also through ports, logistics systems, infrastructure projects and business relationships. Economic connectivity has been made into a tool of strategic leverage.

The Red Sea is no longer a barrier but rather a transmission channel of instability. Conflicts in Gaza affect Yemen, insecurity in Yemen affects international shipping routes; the Sudanese civil war increases competition in Africa's coast; and Ethiopia and the Gulf States' strategies bring all of these into one geopolitical framework. Apparently independent crises are becoming more interconnected, making the Red Sea one of the most important strategic theatres in the world.

14J7. Red Sea: a hinge between West Asia and Horn of Africa

लाल सागर: पश्चिम एशिया और अफ्रीका के हॉर्न क्षेत्र के बीच एक रणनीतिक सेतु

- When **commercial ships** started bypassing the **Red Sea** due to attacks from **Yemen's Houthis**, the immediate consequences could be felt thousands of kilometres away in the form of higher **freight charges**, slower **supply chains** and ships taking the longer route around **Africa**.

जब वाणिज्यिक जहाजों ने यमन के हूती विद्रोहियों के हमलों के कारण लाल सागर से होकर गुजरना बंद किया, तो इसके तात्कालिक प्रभाव हजारों किलोमीटर दूर तक महसूस किए गए। इनमें माल-भाड़ा शुल्क में वृद्धि, आपूर्ति श्रृंखलाओं की गति में कमी तथा जहाजों का अफ्रीका के चारों ओर लंबा मार्ग अपनाना शामिल था।

- At first sight, it seemed like yet another disruption in one of the world's busiest **waterways**, brought on by the **conflict** in **West Asia**.

प्रथम दृष्टि में यह पश्चिम एशिया के संघर्ष के कारण विश्व के सबसे व्यस्त समुद्री मार्गों में से एक में उत्पन्न एक और व्यवधान जैसा प्रतीत हुआ।

- However, the **Red Sea crisis** was not merely about **shipping**.

किन्तु लाल सागर संकट केवल समुद्री परिवहन तक सीमित नहीं था।

- The attacks highlighted a larger **geopolitical reality**: **conflicts** in **West Asia** and the **Horn of Africa** are no longer isolated events but are increasingly converging into one another.

इन हमलों ने एक व्यापक भू-राजनीतिक वास्तविकता को उजागर किया कि पश्चिम एशिया और अफ्रीका के हॉर्न क्षेत्र के संघर्ष अब अलग-अलग घटनाएँ नहीं रहे, बल्कि वे तेजी से एक-दूसरे से जुड़ते जा रहे हैं।

- While the **Gaza war** has bled into the **Red Sea** through **Houthi attacks** on **commercial vessels**, the war in **Sudan** has intensified competition for **influence** in **Africa** among the **Gulf countries**.

जहाँ गाज़ा युद्ध हूती विद्रोहियों द्वारा वाणिज्यिक जहाजों पर किए गए हमलों के माध्यम से लाल सागर तक



फैल गया है, वहीं **सूडान का युद्ध अफ्रीका में खाड़ी देशों के बीच प्रभाव स्थापित करने की प्रतिस्पर्धा को और अधिक तीव्र बना रहा है।**

- **Ethiopia's drive for maritime access** has heightened tensions in the **Horn of Africa**, even as external players, from the **U.S.** and **China** to **Turkey** and the **Gulf monarchies**, have expanded their **military, diplomatic and economic presence** along the **Red Sea**.
इथियोपिया द्वारा समुद्री पहुँच प्राप्त करने के प्रयासों ने अफ्रीका के हॉर्न क्षेत्र में तनाव बढ़ा दिया है। इसी बीच संयुक्त राज्य अमेरिका, चीन, तुर्किये तथा खाड़ी राजतंत्रों सहित बाहरी शक्तियों ने लाल सागर के तटवर्ती क्षेत्रों में अपनी सैन्य, कूटनीतिक तथा आर्थिक उपस्थिति का विस्तार किया है।
- Historically, **West Asia** and the **Horn of Africa** were treated as separate **strategic regions**. ऐतिहासिक रूप से **पश्चिम एशिया और अफ्रीका के हॉर्न क्षेत्र को अलग-अलग रणनीतिक क्षेत्रों के रूप में देखा जाता था।**
- The former was discussed within the context of the **Arab-Israeli conflict, Iran-Gulf rivalry** and **oil politics**, while the latter was associated with **civil wars, piracy and humanitarian crises**.
पहले क्षेत्र पर चर्चा मुख्यतः अरब-इज़राइल संघर्ष, ईरान-खाड़ी प्रतिद्वंद्विता तथा तेल की राजनीति के संदर्भ में होती थी, जबकि दूसरे क्षेत्र को गृहयुद्धों, समुद्री डकैती और मानवीय संकटों से जोड़कर देखा जाता था।
- **Geography** linked the two regions, but **policy** rarely did.
भौगोलिक स्थिति ने इन दोनों क्षेत्रों को जोड़ा था, किन्तु नीतिगत दृष्टिकोण ने शायद ही कभी ऐसा किया।
- This distinction is now rapidly fading away.
अब यह अंतर तेजी से समाप्त होता जा रहा है।
- The **Red Sea** has emerged as the essential link connecting **West Asia** to the **Horn of Africa**, changing what was previously viewed as a **maritime route** into an area of intersecting **conflicts, rivalry** and rising **geopolitical tensions**.
लाल सागर अब पश्चिम एशिया और अफ्रीका के हॉर्न क्षेत्र को जोड़ने वाले एक महत्वपूर्ण सेतु के रूप में उभरा है, जिसने पहले केवल एक समुद्री मार्ग माने जाने वाले क्षेत्र को परस्पर जुड़े संघर्षों, प्रतिद्वंद्विता और बढ़ते भू-राजनीतिक तनावों के केंद्र में बदल दिया है।
- Conflicts in **Gaza** and **Sudan**, attacks on **shipping off Yemen**, internal tensions in **Ethiopia** and rivalries among the **Gulf states** are no longer separate conflicts.
गाज़ा और सूडान के संघर्ष, यमन के तट के निकट समुद्री जहाज़ों पर हमले, इथियोपिया के आंतरिक तनाव तथा खाड़ी देशों के बीच की प्रतिद्वंद्विताएँ अब अलग-अलग संघर्ष नहीं रह गई हैं।
- Gradually, they are all becoming intertwined with each other within the same narrow stretch of **water**.
धीरे-धीरे ये सभी एक ही संकरे समुद्री क्षेत्र के भीतर परस्पर गहराई से एक-दूसरे से जुड़ते जा रहे हैं।

Single strategic system

एकीकृत सामरिक प्रणाली

- The emergence of such an **interconnected security environment** represents one of the major yet least recognised **geopolitical developments** in recent times.
इस प्रकार के परस्पर जुड़े सुरक्षा परिवेश का उभरना हाल के वर्षों के सबसे महत्वपूर्ण, किन्तु सबसे कम पहचाने गए भूराजनीतिक घटनाक्रमों में से एक है।
- **International relations theorists** describe such regions as a “**regional security complex**,” or a space where the **security** of one country becomes inseparable from that of its neighbours.
अंतरराष्ट्रीय संबंधों के सिद्धांतकार ऐसे क्षेत्रों को “क्षेत्रीय सुरक्षा परिसर (Regional Security Complex)” कहते हैं, अर्थात् ऐसा क्षेत्र जहाँ एक देश की सुरक्षा उसके पड़ोसी देशों की सुरक्षा से अविभाज्य हो जाती है।
- Gradually, the **Red Sea** is becoming such a **regional security complex**, as the conflicts of **Gaza, Yemen and Sudan, Ethiopia's maritime ambitions** and **Gulf rivalries** are no longer separate developments but mutually reinforcing elements of a **single strategic system**.
धीरे-धीरे लाल सागर (Red Sea) ऐसा ही एक क्षेत्रीय सुरक्षा परिसर बनता जा रहा है, क्योंकि गाज़ा, यमन और



सूडान के संघर्ष, इथियोपिया की समुद्री महत्वाकांक्षाएँ, तथा खाड़ी क्षेत्र की प्रतिद्वंद्विताएँ अब अलग-अलग घटनाएँ नहीं रह गई हैं, बल्कि एक एकीकृत सामरिक प्रणाली के परस्पर सुदृढ़ करने वाले घटक बन गई हैं।

- This transformation did not occur overnight.
यह परिवर्तन अचानक नहीं हुआ।
- For centuries, the **Red Sea** has been a vital route for **trade, pilgrimage and imperial expansion**, linking **Europe** and **Asia** through the **Suez Canal** and the **Bab el-Mandeb Strait**.
सदियों से लाल सागर व्यापार, तीर्थयात्रा और साम्राज्यवादी विस्तार का एक महत्वपूर्ण मार्ग रहा है, जो स्वेज़ नहर और बाब-अल-मंदेब जलडमरूमध्य के माध्यम से यूरोप और एशिया को जोड़ता है।
- It connected the **Mediterranean** with the **Indian Ocean** and shaped the fortunes of empires ranging from the **Ottomans** to the **British**.
इसने भूमध्य सागर को हिंद महासागर से जोड़ा तथा ऑटोमन साम्राज्य से लेकर ब्रिटिश साम्राज्य तक अनेक साम्राज्यों के उत्थान और विस्तार को प्रभावित किया।
- During the **Cold War**, it also became an arena of **superpower rivalry**, as the **U.S.** and the **Soviet Union** competed for influence among states on both shores.
शीत युद्ध के दौरान यह महाशक्तियों की प्रतिस्पर्धा का भी केंद्र बना, जहाँ संयुक्त राज्य अमेरिका और सोवियत संघ दोनों तटों पर स्थित देशों में प्रभाव स्थापित करने के लिए प्रतिस्पर्धा कर रहे थे।
- This sea stretches for about **2,200 km** from the **Suez Canal** to the **Bab el-Mandeb**, connecting the **Mediterranean** to the **Indian Ocean**, and it is bordered by **eight countries**.
यह समुद्र स्वेज़ नहर से बाब-अल-मंदेब तक लगभग **2,200 किलोमीटर** तक फैला हुआ है, जो भूमध्य सागर को हिंद महासागर से जोड़ता है तथा इसकी सीमाएँ आठ देशों से मिलती हैं।
- Its geography accounts for why any political issues that occur on either of its shores never tend to be restricted.
इसकी भौगोलिक स्थिति के कारण इसके किसी भी तट पर उत्पन्न होने वाले राजनीतिक घटनाक्रम केवल स्थानीय क्षेत्र तक सीमित नहीं रहते।
- Any disturbance in the passage through the **Bab el-Mandeb** could have an impact on commerce between **Europe** and **Asia** within days.
बाब-अल-मंदेब जलडमरूमध्य में आवागमन में कोई भी बाधा कुछ ही दिनों में यूरोप और एशिया के बीच व्यापार को प्रभावित कर सकती है।
- Yet, for the better part of the **post-Cold War** period, the **Red Sea** was perceived primarily through an **economic** angle.
फिर भी शीत युद्ध के बाद के अधिकांश काल में लाल सागर को मुख्यतः आर्थिक दृष्टिकोण से देखा गया।
- While events such as the **Somali piracy attacks** in the late **2000s** generated some international interest in the area, the sea itself was not seen as a **geopolitical arena** in its own right.
यद्यपि 2000 के दशक के उत्तरार्ध में हुए सोमाली समुद्री डकैती हमलों ने इस क्षेत्र की ओर कुछ अंतरराष्ट्रीय ध्यान आकर्षित किया, फिर भी इस समुद्र को स्वयं एक स्वतंत्र भूराजनीतिक क्षेत्र के रूप में नहीं देखा गया।
- **West Asia** and the **Horn of Africa** were areas of separate diplomatic and security considerations.
पश्चिम एशिया और अफ्रीका का हॉर्न क्षेत्र अलग-अलग कूटनीतिक और सुरक्षा दृष्टिकोणों से देखे जाते थे।
- However, the importance of the region goes far beyond the borders of the countries surrounding it.
किन्तु इस क्षेत्र का महत्व इसके आसपास स्थित देशों की सीमाओं से कहीं अधिक व्यापक है।
- The **Red Sea** is an incredibly vital **waterway** through which a great volume of **world trade** flows, including the **container shipping industry**, and one of the busiest **maritime routes** in the world.
लाल सागर एक अत्यंत महत्वपूर्ण जलमार्ग है, जिसके माध्यम से वैश्विक व्यापार का विशाल भाग, जिसमें कंटेनर शिपिंग उद्योग भी शामिल है, संचालित होता है। यह विश्व के सबसे व्यस्त समुद्री मार्गों में से एक है।
- It is essential for **India's commerce** as it provides access to **Europe, North Africa** and the **eastern Mediterranean**, while carrying much of its **energy supplies and cargo**.

यह भारत के व्यापार के लिए अत्यंत महत्वपूर्ण है, क्योंकि इसके माध्यम से यूरोप, उत्तरी अफ्रीका और पूर्वी भूमध्यसागर तक पहुँच प्राप्त होती है तथा भारत की अधिकांश ऊर्जा आपूर्ति और मालवाहक परिवहन इसी मार्ग से होता है।

- But looking at the **Red Sea** from only the perspective of **shipping** overlooks the broader **geopolitical shift** that is taking place.
किन्तु लाल सागर को केवल समुद्री परिवहन के दृष्टिकोण से देखना वहाँ हो रहे व्यापक भूराजनीतिक परिवर्तन की उपेक्षा करना होगा।
- It is now at the core of a much larger **security arc**, where **land conflicts** determine the **maritime conditions**.
अब यह एक व्यापक सुरक्षा चक्र (Security Arc) का केंद्र बन चुका है, जहाँ स्थलीय संघर्ष समुद्री परिस्थितियों को प्रभावित करते हैं।
- The **Bab el-Mandeb Strait**, the narrow **choke point** linking the **Red Sea** with the **Gulf of Aden**, illustrates this **interdependence**.
लाल सागर को अदन की खाड़ी से जोड़ने वाला संकीर्ण बाब-अल-मंदेब जलडमरूमध्य, जो एक महत्वपूर्ण चोक पॉइंट है, इस परस्पर निर्भरता को स्पष्ट रूप से दर्शाता है।
- Any actor able to disrupt movement across it has the potential to influence **trade** between **Asia, Africa, and Europe**, thereby giving **regional conflicts** a wider impact than just on the local battlegrounds.
जो भी पक्ष इस मार्ग पर आवागमन को बाधित करने में सक्षम होगा, वह एशिया, अफ्रीका और यूरोप के बीच व्यापार को प्रभावित कर सकता है, जिससे क्षेत्रीय संघर्षों का प्रभाव स्थानीय युद्धक्षेत्रों से कहीं अधिक व्यापक हो जाता है।
- This is the very reason why the **Red Sea** differs from most other regions of **geopolitical tension**.
यही कारण है कि लाल सागर अन्य अधिकांश भूराजनीतिक तनाव वाले क्षेत्रों से भिन्न है।
- It is more than just a boundary separating two land masses; it is the intersection point of **military positioning, business dealings and diplomatic rivalries** that make the region pivotal for both **regional security** as well as **international trade**.
यह केवल दो भू-भागों को अलग करने वाली सीमा नहीं है, बल्कि सैन्य तैनाती, व्यावसायिक गतिविधियों और कूटनीतिक प्रतिद्वंद्विताओं का संगम है, जो इसे क्षेत्रीय सुरक्षा तथा अंतरराष्ट्रीय व्यापार—दोनों के लिए अत्यंत महत्वपूर्ण बनाता है।
- In order to comprehend this new arc of **geopolitical instability**, it is necessary to go beyond individual conflicts.
भूराजनीतिक अस्थिरता के इस नए स्वरूप को समझने के लिए केवल अलग-अलग संघर्षों का अध्ययन पर्याप्त नहीं है।
- The significance of the **Red Sea** region does not arise from these individual crises alone but rather from their **interconnectedness**.
लाल सागर क्षेत्र का महत्व केवल इन व्यक्तिगत संकटों के कारण नहीं, बल्कि उनके परस्पर अंतर्संबंध (Interconnectedness) के कारण उत्पन्न होता है।
- The most obvious example of the changing nature of the **Red Sea** as a **strategic space** is the **conflict in Gaza**.
रणनीतिक क्षेत्र के रूप में लाल सागर की बदलती प्रकृति का सबसे स्पष्ट उदाहरण गाज़ा का संघर्ष है।
- What started as a conflict between **Israel** and **Hamas** gradually expanded from the **Levantine region** to involve other parties in order to show that the **security situation** in one part of the **Red Sea** increasingly influences the situation on the other shore.
जो संघर्ष इज़राइल और हमास के बीच प्रारंभ हुआ था, वह धीरे-धीरे लेवांत क्षेत्र से आगे बढ़कर अन्य पक्षों तक फैल गया। इससे यह स्पष्ट हुआ कि लाल सागर के एक हिस्से की सुरक्षा स्थिति अब दूसरे तट की परिस्थितियों को भी बढ़ते हुए प्रभावित कर रही है।

- The Houthis in Yemen, who refer to themselves as members of the “Iranian Axis of Resistance”, justified their attacks on **commercial ships** in the **Red Sea** as solidarity with the **Palestinians** and pressure on **Israel** and its allies in the **West**.
यमन के हूती, जो स्वयं को “ईरानी प्रतिरोध धुरी” का सदस्य बताते हैं, ने लाल सागर में वाणिज्यिक जहाजों पर अपने हमलों को फ़िलिस्तीनियों के प्रति एकजुटता तथा इज़राइल और उसके पश्चिमी सहयोगियों पर दबाव बनाने के प्रयास के रूप में उचित ठहराया।
- Even though many of the attacked **ships** were not connected with **Israel** at all, the attacks made one of the busiest **sea trade routes** into a **theatre of war**.
यद्यपि हमले का शिकार बने अनेक जहाजों का इज़राइल से कोई संबंध नहीं था, फिर भी इन हमलों ने विश्व के सबसे व्यस्त समुद्री व्यापार मार्गों में से एक को युद्ध क्षेत्र में बदल दिया।
- Companies started to redirect their **ships**, which eventually raised the price of transporting **goods, insurance** and **travel time**, whereas the **U.S.** and some **European countries** sent **naval forces** to escort **commercial traffic** in the **Red Sea**.
कंपनियों ने अपने जहाजों के मार्ग बदलने शुरू कर दिए, जिसके परिणामस्वरूप वस्तुओं के परिवहन की लागत, बीमा प्रीमियम तथा यात्रा समय बढ़ गया। वहीं संयुक्त राज्य अमेरिका और कुछ यूरोपीय देशों ने लाल सागर में वाणिज्यिक जहाजों की सुरक्षा के लिए नौसैनिक बल तैनात किए।
- But **Yemen** is only a small part of a much bigger chain of **instability**.
किन्तु यमन व्यापक अस्थिरता की एक लंबी श्रृंखला का केवल एक छोटा भाग है।
- In **Africa**, the **civil war** in **Sudan** has emphasised the importance of the **western littoral** for **strategic purposes**.
अफ्रीका में सूडान के गृहयुद्ध ने रणनीतिक दृष्टि से पश्चिमी तटीय क्षेत्र के महत्व को और अधिक रेखांकित किया है।
- Following the outbreak of the **civil war** between the **Sudanese Armed Forces (SAF)** and the **Rapid Support Forces (RSF)** in **2023**, the conflict has developed into a battleground of **regional rivalry**.
2023 में सूडानी सशस्त्र बल (SAF) और रैपिड सपोर्ट फोर्स (RSF) के बीच गृहयुद्ध शुरू होने के बाद यह संघर्ष क्षेत्रीय प्रतिद्वंद्विता के युद्धक्षेत्र में बदल गया है।
- On one hand, **Egypt** has sided with the **SAF**, while on the other hand, the **UAE** has rejected claims regarding its backing of the **RSF**.
एक ओर मिस्र ने एसएफ का समर्थन किया है, जबकि दूसरी ओर संयुक्त अरब अमीरात (यूएई) ने आरएसएफ को समर्थन देने के आरोपों को अस्वीकार किया है।
- In addition to that, **Saudi Arabia** has been trying to mediate the dispute and **Russia** still aims to achieve its long-held ambition of establishing a **naval base** on **Sudan's Red Sea coastline**.
इसके अतिरिक्त, सऊदी अरब इस विवाद में मध्यस्थता का प्रयास कर रहा है और रूस अब भी सूडान के लाल सागर तट पर नौसैनिक अड्डा स्थापित करने की अपनी दीर्घकालिक महत्वाकांक्षा को पूरा करना चाहता है।
- In addition to the resulting **humanitarian crisis**, the **civil war** in **Sudan** has emphasised that **ports, logistics**, and **coastal access** have emerged as crucial **strategic assets** for contemporary wars.
उत्पन्न मानवीय संकट के अतिरिक्त, सूडान के गृहयुद्ध ने यह भी स्पष्ट किया है कि बंदरगाह, लॉजिस्टिक्स तथा तटीय पहुँच आधुनिक युद्धों के लिए अत्यंत महत्वपूर्ण रणनीतिक परिसंपत्तियाँ बनकर उभरे हैं।

Broader implications

व्यापक निहितार्थ

- The example of **Ethiopia** brings out another element of this **geopolitical shift**.
इथियोपिया का उदाहरण इस भू-राजनीतिक परिवर्तन के एक अन्य महत्वपूर्ण पहलू को उजागर करता है।
- Despite the fact that **Ethiopia** lost direct access to the **Red Sea** when **Eritrea** gained independence, the country's **economy** heavily relies on **maritime access** through other countries.



यद्यपि इरीट्रिया की स्वतंत्रता के बाद इथियोपिया ने लाल सागर तक अपनी प्रत्यक्ष पहुँच खो दी, फिर भी उसकी अर्थव्यवस्था अन्य देशों के माध्यम से समुद्री पहुँच पर अत्यधिक निर्भर है।

- This has made **Ethiopia's** search for better **maritime access** very important in terms of **regional diplomacy**, bringing into the picture the issue of **connectivity** and **access** in relation to geopolitics in the **Horn of Africa** region.
इस कारण इथियोपिया के लिए बेहतर समुद्री पहुँच की खोज क्षेत्रीय कूटनीति की दृष्टि से अत्यंत महत्वपूर्ण हो गई है, जिससे अफ्रीका के हॉर्न क्षेत्र की भू-राजनीति में संपर्क (कनेक्टिविटी) और पहुँच का प्रश्न प्रमुख हो गया है।
- Right in the middle of all this are the **Gulf states**.
इन सभी घटनाक्रमों के केंद्र में खाड़ी देश स्थित हैं।
- In the past decade, **Saudi Arabia, UAE, and Qatar** have increased their **political, economic, and military relationships** with the **Horn of Africa** region, because they understand that the stability of the **African shore** directly affects their **security interests**.
पिछले एक दशक में सऊदी अरब, संयुक्त अरब अमीरात (यूएई) और कतर ने अफ्रीका के हॉर्न क्षेत्र के साथ अपने राजनीतिक, आर्थिक और सैन्य संबंधों को मजबूत किया है, क्योंकि वे समझते हैं कि अफ्रीकी तट की स्थिरता सीधे उनके सुरक्षा हितों को प्रभावित करती है।
- Such a trend is connected to the general change in the **strategic approaches** of the **Gulf states**.
यह प्रवृत्ति खाड़ी देशों की रणनीतिक नीतियों में आए व्यापक परिवर्तन से जुड़ी हुई है।
- First, the situation in **Yemen** has shown how vulnerable the **Red Sea** is.
पहला, यमन की स्थिति ने यह स्पष्ट कर दिया है कि लाल सागर कितना संवेदनशील और असुरक्षित है।
- Second, **economic diversification** has made **ports and corridors** strategic resources for these countries.
दूसरा, आर्थिक विविधीकरण ने बंदरगाहों और गलियारों को इन देशों के लिए महत्वपूर्ण रणनीतिक संसाधन बना दिया है।
- Third, issues connected to **food security** have led to investments in the **agricultural sector and infrastructure of Africa**.
तीसरा, खाद्य सुरक्षा से जुड़े मुद्दों ने अफ्रीका के कृषि क्षेत्र तथा अवसंरचना में निवेश को बढ़ावा दिया है।
- Today, the competition between **countries** is not determined by traditional **military alliances** but by **ports, logistic systems, infrastructure projects and business connections**.
आज देशों के बीच प्रतिस्पर्धा का निर्धारण केवल पारंपरिक सैन्य गठबंधनों से नहीं, बल्कि बंदरगाहों, लॉजिस्टिक प्रणालियों, अवसंरचना परियोजनाओं तथा व्यावसायिक संपर्कों से भी हो रहा है।
- Increasingly, **geopolitical rivalry** is pursued not just through **military coalitions**, but also through **ports, logistics systems, infrastructure projects and business relationships**.
अब भू-राजनीतिक प्रतिद्वंद्विता केवल सैन्य गठबंधनों के माध्यम से ही नहीं, बल्कि बंदरगाहों, लॉजिस्टिक प्रणालियों, अवसंरचना परियोजनाओं तथा व्यावसायिक संबंधों के माध्यम से भी आगे बढ़ाई जा रही है।
- **Economic connectivity** has been made into a tool of **strategic leverage**.
आर्थिक संपर्क (इकोनॉमिक कनेक्टिविटी) को अब रणनीतिक प्रभाव स्थापित करने के एक महत्वपूर्ण साधन में बदल दिया गया है।
- The **Red Sea** is no longer a barrier but rather a transmission channel of **instability**.
लाल सागर अब केवल एक भौगोलिक अवरोध नहीं, बल्कि अस्थिरता के प्रसार का माध्यम बन गया है।
- Conflicts in **Gaza** affect **Yemen**.
गाज़ा का संघर्ष यमन को प्रभावित करता है।
- Insecurity in **Yemen** affects **international shipping routes**.
यमन की असुरक्षा अंतरराष्ट्रीय समुद्री व्यापार मार्गों को प्रभावित करती है।
- The **Sudanese civil war** increases competition on **Africa's coasts**.
सूडान का गृहयुद्ध अफ्रीका के तटीय क्षेत्रों में प्रतिस्पर्धा को बढ़ाता है।



- **Ethiopia's** and the **Gulf States'** strategies bring all of these into one **geopolitical framework**.
इथियोपिया तथा खाड़ी देशों की रणनीतियाँ इन सभी घटनाओं को एक साझा भू-राजनीतिक ढाँचे में जोड़ देती हैं।
- Apparently independent **crises** are becoming more interconnected, making the **Red Sea** one of the most important **strategic theatres** in the world.
जो संकट पहले स्वतंत्र प्रतीत होते थे, वे अब एक-दूसरे से अधिक गहराई से जुड़े जा रहे हैं, जिससे लाल सागर विश्व के सबसे महत्वपूर्ण रणनीतिक क्षेत्रों में से एक बन गया है।

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The right path for India's nuclear power development

GS III: Economy

International sanctions were imposed on India after its peaceful nuclear test of 1974. The India-United States civil nuclear deal, which was signed in 2008, ended the restrictions on the import of uranium and of nuclear power plants, with some critical exceptions. The free import of natural uranium has enabled India to grow its nuclear programme. Negotiations with major western nuclear power plant suppliers were started but had to be given up as their plants were far too expensive.

Homegrown nuclear advantage

Sanctions forced India to innovate. Every part going into India's nuclear plants was designed, developed, tested, and manufactured in India in patient partnerships between the Atomic Energy Commission (AEC) and Indian firms. The unit size of India's nuclear power plants went up from 200 MW to 500 MW. Now, 700 MW units have been developed. Four units are under construction and another 10 are being developed. India now makes the cheapest nuclear power plants in the world, costing approximately \$1,700 per Kw. The South Korean plants cost more, around \$2,200 per Kw, the French over \$5,500 per Kw, and the U.S. \$15,000 per Kw. Therefore, India has the potential to become a major exporter of nuclear power plants.

With such a clear cost advantage and self-reliance, reports of plans to import nuclear power plants and technology indicate insufficient awareness of India's own capabilities and price competitiveness. The size of India's potential market for nuclear energy is so large that it would be rational for international suppliers to do whatever it takes to get a substantial share of this market. But would that be the optimum choice for India if costs are much higher or if it creates a new stream of technological vulnerability?

At this time, India has further strengthened its



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The country's nuclear future must balance growth with self-reliance and safety

leadership in technology as its 500 MW commercial fast breeder reactor is getting commissioned after overcoming many difficult challenges. Today, India makes Pressurised Heavy Water Reactors (PHWR), which use natural uranium as fuel. The Light Water Reactors (LWRs) use enriched uranium as fuel and are based on uranium enrichment technology which is more widely used in the world. India should try and develop its own LWRs, specially as the Nuclear Suppliers Group waiver permanently prohibits the transfer of enrichment and reprocessing technology to India. This should not be beyond India's capabilities, given sufficient resources and a dedicated programme.

Scaling up, staying self-reliant

The government has decided that by 2047, India will develop 100 GW of nuclear power capacity. To achieve this, the sector has been opened up to new entrants from both the public and private sectors through enabling legislation that is well-crafted and investor-friendly. The price of nuclear power in India is now competitive vis-à-vis thermal power. The use of the proven, cost-competitive domestic technology by new entrants would be the ideal cost-effective way to scale up. A large programme has scale effects resulting in lower production costs. Further, new entrants could potentially reduce project execution costs and time. Bringing in technology streams and equipment which will give India far more expensive electricity should not merit serious consideration.

To meet the enormous dedicated power demands of artificial intelligence data centres, small modular reactors (SMRs) are being considered as a solution in the West. However, the designs remain under development, with commercial deployment yet to begin. The AEC has offered its technology for 200 MW nuclear

plants to new entrants. Smaller unit sizes to suit emerging market needs can also be developed domestically in partnership between the AEC and Indian firms. The market for SMRs in India would be a bilateral contractual matter between the generator and buyer. From a regulatory perspective, there would be merit in taking the view that a foreign-designed SMR plant should have operated satisfactorily for a few years before being deployed in India. There would be little justification for an untested SMR being developed elsewhere being first deployed, experimentally, in India.

Ambition needs caution

Given the critical importance of ensuring the safety of nuclear power plants, it would be prudent that new players establish themselves before scaling up. India's record on safety in its nuclear plants has been exemplary till now. This must be preserved going forward. This will be a major challenge amid rapid expansion and the entry of new players, given the prevailing industrial culture in India, where accidents at construction sites and operating industrial plants continue to occur.

A single nuclear mishap could trigger a strong public backlash, similar to the one experienced by the West after Chernobyl (1986), which led to nuclear power development coming to a virtual standstill in many western countries. It would, therefore, be prudent for new entrants to initially develop only a few plants and establish the rigorous internal safety culture required for nuclear facilities, subject to continuous external auditing. Scaling up can thereafter take place gradually, without needlessly risking safety. The goal of achieving 100 GW of capacity by 2047 could be achieved safely while also strengthening self-reliance within India and enabling the country to become a globally competitive player.

14J7. The right path for India's nuclear power development
भारत के परमाणु ऊर्जा विकास के लिए उचित मार्ग

- International **sanctions** were imposed on **India** after its peaceful **nuclear test** of **1974**.
1974 में भारत द्वारा किए गए शांतिपूर्ण परमाणु परीक्षण के बाद भारत पर अंतरराष्ट्रीय प्रतिबंध लगाए गए।
- The **India-United States civil nuclear deal**, which was signed in **2008**, ended the restrictions on the import of **uranium** and of **nuclear power plants**, with some critical exceptions.
2008 में हस्ताक्षरित भारत-संयुक्त राज्य अमेरिका असैनिक परमाणु समझौते ने कुछ महत्वपूर्ण अपवादों को छोड़कर यूरेनियम तथा परमाणु ऊर्जा संयंत्रों के आयात पर लगे प्रतिबंधों को समाप्त कर दिया।
- The **free import of natural uranium** has enabled India to grow its **nuclear programme**.
प्राकृतिक यूरेनियम के मुक्त आयात ने भारत को अपने परमाणु कार्यक्रम का विस्तार करने में सक्षम बनाया।
- Negotiations with major western nuclear power plant suppliers** were started but had to be given up as their plants were far too expensive.
प्रमुख पश्चिमी परमाणु ऊर्जा संयंत्र आपूर्तिकर्ताओं के साथ वार्ताएँ प्रारंभ की गईं, किंतु उनके संयंत्र अत्यधिक महंगे होने के कारण उन्हें आगे नहीं बढ़ाया जा सका।

Homegrown nuclear advantage

स्वदेशी परमाणु क्षमता का लाभ

- Sanctions** forced **India** to innovate.
प्रतिबंधों ने भारत को नवाचार करने के लिए प्रेरित किया।
- Every part going into India's **nuclear plants** was designed, developed, tested, and manufactured in India in patient partnerships between the **Atomic Energy Commission (AEC)** and Indian firms.
भारत के परमाणु ऊर्जा संयंत्रों में प्रयुक्त प्रत्येक भाग का अभिकल्पन, विकास, परीक्षण और निर्माण परमाणु ऊर्जा आयोग (AEC) तथा भारतीय कंपनियों के बीच दीर्घकालिक सहयोग के माध्यम से भारत में ही किया गया।
- The **unit size of India's nuclear power plants** went up from **200 MW** to **500 MW**.
भारत के परमाणु ऊर्जा संयंत्रों की इकाई क्षमता 200 मेगावाट से बढ़कर 500 मेगावाट हो गई।
- Now, 700 MW units have been developed.**
अब 700 मेगावाट क्षमता वाली इकाइयाँ भी विकसित की जा चुकी हैं।
- Four units are under construction and another 10 are being developed.**
चार इकाइयों का निर्माण कार्य जारी है तथा अन्य 10 इकाइयाँ विकसित की जा रही हैं।
- India now makes the cheapest nuclear power plants in the world, costing approximately \$1,700 per kW.**
भारत वर्तमान में विश्व के सबसे सस्ते परमाणु ऊर्जा संयंत्र निर्मित करता है, जिनकी लागत लगभग 1,700 अमेरिकी डॉलर प्रति किलोवाट है।
- The **South Korean** plants cost more, around **\$2,200 per kW**, the **French** over **\$5,500 per kW**, and the **U.S.** **\$15,000 per kW**.
दक्षिण कोरिया के संयंत्रों की लागत लगभग 2,200 अमेरिकी डॉलर प्रति किलोवाट, फ्रांस के संयंत्रों की 5,500 अमेरिकी डॉलर प्रति किलोवाट से अधिक तथा संयुक्त राज्य अमेरिका के संयंत्रों की लगभग 15,000 अमेरिकी डॉलर प्रति किलोवाट है।
- Therefore, India has the potential to become a major exporter of nuclear power plants.**
इस प्रकार, भारत में परमाणु ऊर्जा संयंत्रों का प्रमुख निर्यातक बनने की क्षमता है।
- With such a clear **cost advantage** and **self-reliance**, reports of plans to import **nuclear power plants** and technology indicate insufficient awareness of India's own capabilities and price competitiveness.
इतने स्पष्ट लागत लाभ और आत्मनिर्भरता के बावजूद परमाणु ऊर्जा संयंत्रों तथा प्रौद्योगिकी के आयात की योजनाओं की खबरें भारत की अपनी क्षमताओं और लागत प्रतिस्पर्धात्मकता के प्रति अपर्याप्त जागरूकता को दर्शाती हैं।



- The size of India's potential market for **nuclear energy** is so large that it would be rational for international suppliers to do whatever it takes to get a substantial share of this market.
परमाणु ऊर्जा के लिए भारत का संभावित बाजार इतना विशाल है कि अंतरराष्ट्रीय आपूर्तिकर्ताओं के लिए इस बाजार में महत्वपूर्ण हिस्सेदारी प्राप्त करने हेतु हर संभव प्रयास करना स्वाभाविक होगा।
- But would that be the optimum choice for India if costs are much higher or if it creates a new stream of **technological vulnerability**?
किन्तु यदि लागत बहुत अधिक हो अथवा इससे **प्रौद्योगिकीय निर्भरता** का नया स्रोत उत्पन्न हो, तो क्या यह भारत के लिए सर्वोत्तम विकल्प होगा?
- At this time, India has further strengthened its leadership in technology as its **500 MW commercial fast breeder reactor** is getting commissioned after overcoming many difficult challenges.
वर्तमान समय में भारत ने अनेक कठिन चुनौतियों पर विजय प्राप्त करने के बाद अपने **500 मेगावाट वाणिज्यिक फास्ट ब्रीडर रिएक्टर** के परिचालन के साथ प्रौद्योगिकी के क्षेत्र में अपना नेतृत्व और अधिक सुदृढ़ किया है।
- Today, India makes **Pressurised Heavy Water Reactors (PHWRs)**, which use **natural uranium** as fuel.
आज भारत **प्रेसराइज्ड हेवी वाटर रिएक्टर (PHWR)** का निर्माण करता है, जिनमें प्राकृतिक **यूरेनियम** का ईंधन के रूप में उपयोग किया जाता है।
- The **Light Water Reactors (LWRs)** use **enriched uranium** as fuel and are based on **uranium enrichment technology** which is more widely used in the world.
लाइट वाटर रिएक्टर (LWR) संवर्धित **यूरेनियम** का ईंधन के रूप में उपयोग करते हैं और **यूरेनियम संवर्धन प्रौद्योगिकी** पर आधारित हैं, जिसका विश्वभर में अधिक व्यापक उपयोग होता है।
- India should try and develop its own **LWRs**, specially as the **Nuclear Suppliers Group (NSG) waiver** permanently prohibits the transfer of **enrichment and reprocessing technology** to India.
भारत को अपने स्वयं के **लाइट वाटर रिएक्टर (LWR)** विकसित करने का प्रयास करना चाहिए, विशेषकर इसलिए क्योंकि **न्यूक्लियर सप्लायर्स ग्रुप (NSG) छूट** के अंतर्गत **यूरेनियम संवर्धन तथा पुनर्प्रसंस्करण प्रौद्योगिकी** के भारत को हस्तांतरण पर स्थायी प्रतिबंध है।
- This should not be beyond India's capabilities, given sufficient resources and a dedicated programme.
पर्याप्त संसाधनों तथा एक समर्पित कार्यक्रम के साथ यह लक्ष्य भारत की क्षमताओं से परे नहीं होना चाहिए।

Scaling up, staying self-reliant विस्तार के साथ आत्मनिर्भर बने रहना

- The **government** has decided that by **2047**, India will develop **100 GW of nuclear power capacity**.
सरकार ने निर्णय लिया है कि **2047** तक भारत **100 गीगावाट** की परमाणु ऊर्जा क्षमता विकसित करेगा।
- To achieve this, the sector has been opened up to new entrants from both the **public and private sectors** through enabling legislation that is well-crafted and **investor-friendly**.
इस लक्ष्य को प्राप्त करने के लिए सुविचारित तथा **निवेशक-अनुकूल** कानूनों के माध्यम से इस क्षेत्र को सार्वजनिक तथा निजी क्षेत्र के नए प्रतिभागियों के लिए खोल दिया गया है।
- The **price of nuclear power in India** is now competitive vis-à-vis **thermal power**.
भारत में **परमाणु ऊर्जा** की लागत अब **तापीय ऊर्जा** की तुलना में प्रतिस्पर्धी हो गई है।
- The use of the proven, **cost-competitive domestic technology** by new entrants would be the ideal **cost-effective** way to scale up.
नए प्रतिभागियों द्वारा प्रमाणित और **लागत-प्रतिस्पर्धी स्वदेशी प्रौद्योगिकी** का उपयोग विस्तार का सबसे **लागत-प्रभावी** उपाय होगा।



- A large programme has **scale effects** resulting in lower **production costs**.
एक बड़े कार्यक्रम से पैमाने की अर्थव्यवस्था का लाभ मिलता है, जिससे उत्पादन लागत कम होती है।
- Further, new entrants could potentially reduce **project execution costs** and **time**.
इसके अतिरिक्त, नए प्रतिभागी परियोजना निष्पादन लागत और समय दोनों को संभावित रूप से कम कर सकते हैं।
- Bringing in **technology streams** and **equipment** which will give **India** far more expensive **electricity** should not merit serious consideration.
ऐसी प्रौद्योगिकियों और उपकरणों को अपनाने पर गंभीरता से विचार नहीं किया जाना चाहिए, जो भारत में बिजली को अत्यधिक महंगा बना दें।
- To meet the enormous dedicated power demands of **artificial intelligence data centres**, **small modular reactors (SMRs)** are being considered as a solution in the **West**.
कृत्रिम बुद्धिमत्ता डेटा केंद्रों की विशाल विद्युत आवश्यकताओं को पूरा करने के लिए पश्चिमी देशों में लघु मॉड्यूलर रिएक्टर (एसएमआर) को एक समाधान के रूप में देखा जा रहा है।
- However, the designs remain under development, with **commercial deployment** yet to begin.
हालाँकि, इनके डिज़ाइन अभी विकासाधीन हैं और इनका व्यावसायिक उपयोग अभी प्रारंभ नहीं हुआ है।
- The **AEC** has offered its technology for **200 MW nuclear plants** to new entrants.
एईसी ने नए प्रतिभागियों के लिए 200 मेगावाट परमाणु संयंत्रों की अपनी प्रौद्योगिकी उपलब्ध कराने की पेशकश की है।
- Smaller unit sizes to suit emerging **market needs** can also be developed domestically in partnership between the **AEC** and **Indian firms**.
उभरती हुई बाज़ार आवश्यकताओं के अनुरूप छोटे आकार की इकाइयाँ भी एईसी और भारतीय कंपनियों की साझेदारी में देश के भीतर विकसित की जा सकती हैं।
- The market for **SMRs** in **India** would be a bilateral contractual matter between the **generator** and **buyer**.
भारत में एसएमआर का बाज़ार उत्पादक और क्रेता के बीच द्विपक्षीय संविदात्मक व्यवस्था का विषय होगा।
- From a **regulatory** perspective, there would be merit in taking the view that a **foreign-designed SMR plant** should have operated satisfactorily for a few years before being deployed in **India**.
नियामकीय दृष्टि से यह उचित होगा कि किसी विदेशी डिज़ाइन वाले एसएमआर संयंत्र को भारत में स्थापित करने से पहले वह कुछ वर्षों तक सफलतापूर्वक संचालित हो चुका हो।
- There would be little justification for an untested **SMR** being developed elsewhere being first deployed, experimentally, in **India**.
किसी अन्य देश में विकसित और अपरीक्षित एसएमआर को सबसे पहले प्रयोगात्मक रूप से भारत में स्थापित करने का कोई ठोस औचित्य नहीं होगा।

Ambition needs caution

महत्वाकांक्षा के साथ सावधानी भी आवश्यक है

- Given the critical importance of ensuring the **safety** of **nuclear power plants**, it would be prudent that new players establish themselves before scaling up.
परमाणु ऊर्जा संयंत्रों की सुरक्षा सुनिश्चित करने के अत्यधिक महत्व को देखते हुए यह विवेकपूर्ण होगा कि नए प्रतिभागी बड़े पैमाने पर विस्तार करने से पहले स्वयं को स्थापित करें।
- India's** record on **safety** in its **nuclear plants** has been exemplary till now.
भारत का अपने परमाणु संयंत्रों में सुरक्षा का रिकॉर्ड अब तक उत्कृष्ट रहा है।
- This must be preserved going forward.
भविष्य में भी इस उपलब्धि को बनाए रखा जाना चाहिए।

- This will be a major challenge amid rapid expansion and the entry of new players, given the prevailing **industrial culture** in **India**, where accidents at **construction sites** and operating **industrial plants** continue to occur.
तेज़ी से हो रहे विस्तार और नए प्रतिभागियों के प्रवेश के बीच यह एक बड़ी चुनौती होगी, क्योंकि **भारत** की वर्तमान औद्योगिक संस्कृति में निर्माण स्थलों और संचालित औद्योगिक संयंत्रों में दुर्घटनाएँ अब भी होती रहती हैं।
- A single **nuclear mishap** could trigger a strong **public backlash**, similar to the one experienced by the **West** after **Chernobyl (1986)**, which led to **nuclear power development** coming to a virtual standstill in many western countries.
एक भी परमाणु दुर्घटना व्यापक जन-विरोध को जन्म दे सकती है, जैसा कि चेर्नोबिल (1986) दुर्घटना के बाद पश्चिमी देशों में हुआ था, जिसके परिणामस्वरूप अनेक देशों में परमाणु ऊर्जा विकास लगभग ठप हो गया।
- It would, therefore, be prudent for new entrants to initially develop only a few plants and establish the rigorous internal **safety culture** required for **nuclear facilities**, subject to continuous **external auditing**.
अतः यह उचित होगा कि नए प्रतिभागी प्रारंभ में केवल कुछ संयंत्र विकसित करें तथा परमाणु प्रतिष्ठानों के लिए आवश्यक कठोर आंतरिक सुरक्षा संस्कृति स्थापित करें, जो निरंतर बाहरी लेखा-परीक्षण के अधीन हो।
- Scaling up can thereafter take place gradually, without needlessly risking **safety**.
इसके बाद सुरक्षा को अनावश्यक जोखिम में डाले बिना क्रमिक रूप से विस्तार किया जा सकता है।
- The goal of achieving **100 GW** of capacity by **2047** could be achieved safely while also strengthening **self-reliance** within **India** and enabling the country to become a globally competitive player.
2047 तक **100 गीगावाट** क्षमता प्राप्त करने का लक्ष्य सुरक्षित रूप से हासिल किया जा सकता है, साथ ही **भारत** में आत्मनिर्भरता को सुदृढ़ करते हुए देश को वैश्विक स्तर पर प्रतिस्पर्धी शक्ति बनाया जा सकता है।



Can biogas aid India's energy security?

India, which imports nearly 85% of its crude oil needs, remains vulnerable to global energy shocks. Over the years, it has pushed several initiatives to promote compressed biogas. Despite these efforts, progress has been limited; government support and incentives could provide a boost to the sector

SS III Economy

EXPLAINER

V. Nivedita

Tensions in West Asia continue to keep global energy markets on edge. India imports nearly 85% of its crude oil needs, much of it from West Asia, and supplies faced disruptions due to the Israel-U.S.-Iran war. While the government has diversified its crude oil suppliers, around 90% of India's LPG imports still transit through the Strait of Hormuz, making any instability in the region a potential risk to India's energy security.

Over the years, India has pushed several initiatives to promote alternate fuels like compressed biogas to reduce dependence on imported fuel, tackle agricultural waste and support rural incomes. But despite ambitious targets and policy support, progress has remained limited.

The search for an alternative fuel
Biogas is a mixture of methane, CO₂ and small quantities of other gases produced by anaerobic digestion of organic matter. It can be processed and compressed to get Compressed Biogas (CBG). It is chemically identical to CNG; renewable, carbon-neutral and can be produced from waste. It can be used directly to produce electricity, heating or as an energy source for cooking.

India has also been trying to blend biogas into its gas supply for at least a decade. The push gathered pace in 2018, when the Sustainable Alternative Towards Affordable Transportation (SATAT) initiative was launched with a target of establishing 5,000 plants by 2023. Only 132 are completed as of June 3, 2026.

The Centre launched the GOBARdhan (Galvanising Organic Bio-Agro Resources Dhan) scheme to increase CBG production. Under this 'waste to wealth' programme, the government offered grants of up to ₹50 lakh per district for



A biogas plant at the Waste-to-Energy unit in Koramangala in Bengaluru. J. ALLEN EGENUSE

community biogas plants. ₹564 crore was earmarked for the purchase of biomass collection machinery, while ₹994 crore was allocated to build pipelines connecting biogas plants directly to the gas grid.

However, progress on the ground has remained limited. The lack of infrastructure, poor private investment, difficulties in accessing formal credit and high upfront cost of technologies have stalled progress. Financial support from the government can make biogas projects economically viable. Other incentives, like accelerated depreciation and tax holidays, would also help attract private players.

Impact on cultivation patterns
The development of biogas has been uneven across the world, with Europe, China and the United States accounting for 90% of global production.

Germany is one of the largest producers in Europe, along with France, Denmark and the U.K. The fillip for the sector came in 2000, when Germany introduced the Renewable Energy Sources Act to incentivise production.

Over the years, it introduced schemes to guarantee income to producers, gave bonuses to help operators increase their income and encouraged small-scale biogas plants. However, the country's push for biogas triggered a "corn mania", with maize cultivation rising sharply because it was highly profitable for farmers. Maize slowly started to replace other food crops. Over a decade later, the government was forced to step in and control this by introducing a cap on the use of maize in biogas plants.

This danger hits close to home. The Economic Survey 2026 noted that maize cultivation in India has increased sharply, potentially affecting crop diversity and food security. It noted that while the national maize yield increased from approximately 2.56 tonnes per hectare in FY16 to roughly 3.78 tonnes per hectare by FY25, the yields for soybeans, sunflower, rapeseed, peanuts and millets, among other crops, have either stagnated or declined.

While this trend could be attributed to technological advancements, ethanol pricing can be an important factor. The government fixes administered

per-litre ethanol prices based on the feedstock used. The price for maize-based ethanol is higher, while the price for rice-based ethanol is lower. The price for molasses-based ethanol is fixed between the two. Between FY22 and FY25, the administered price of maize-based ethanol grew at a compound annual growth rate (CAGR) of 11.7%, making maize more lucrative for farmers.

While maize's area under cultivation and production jumped between FY22 and FY25, pulses output declined, while oilseeds and other cereals registered only modest growth.

India imports large quantities of pulses and edible oils to meet demand. Yet, instead of focusing on increasing production, the government's policy might inadvertently disincentivise farmers from cultivating them. Over time, this could increase India's dependence on imports and expose domestic food prices to greater volatility during supply shocks.

Denmark, which is targeting to use only biomethane in its gas system by 2030, offers a solution. The government discouraged the use of crops as feedstock, and the primary source is livestock manure and agricultural waste.

Government's action plan

In 2023, the National Biofuels Coordination Committee approved a mandatory blending obligation. Gas distributors have been mandated to blend CBG into their supply from FY26. It would start at 1% and rise to 5% by FY29. In her Budget speech in February 2024, Finance Minister Nirmala Sitharaman said the phased blending of CBG in CNG for transport and Piped Natural Gas for domestic purposes "will be mandated."

To meet these targets, the government is ramping up the establishment of plants. The question is whether the government can replicate India's ethanol blending programme with CBG. In 2014, just 1.5% of petrol was blended with ethanol. By December 2025, it had hit 20%, five years ahead of the original 2030 target.

THE GIST

Biogas is a mixture of methane, CO₂ and small quantities of other gases produced by anaerobic digestion of organic matter. It can be processed and compressed to get Compressed Biogas (CBG).

In 2023, the National Biofuels Coordination Committee approved a mandatory blending obligation. Gas distributors have been mandated to blend CBG into their supply from FY26. It would start at 1% and rise to 5% by FY29.

14J7. Can biogas aid India's energy security?

क्या बायोगैस भारत की ऊर्जा सुरक्षा को सुदृढ़ करने में सहायक हो सकती है?

- **Tensions in West Asia** continue to keep global **energy markets** on edge. **पश्चिम एशिया** में जारी तनाव वैश्विक ऊर्जा बाजारों को लगातार अनिश्चितता की स्थिति में बनाए हुए है।
- **India** imports nearly **85%** of its **crude oil** needs, much of it from **West Asia**, and supplies faced disruptions due to the **Israel-U.S.-Iran war**. **भारत** अपनी **कच्चे तेल** की आवश्यकता का लगभग **85%** आयात करता है, जिसका अधिकांश भाग **पश्चिम एशिया** से आता है, और **इज़राइल-अमेरिका-ईरान युद्ध** के कारण इसकी आपूर्ति बाधित हुई।
- While the government has diversified its **crude oil suppliers**, around **90%** of **India's LPG imports** still transit through the **Strait of Hormuz**, making any instability in the region a potential risk to **India's energy security**. **यद्यपि सरकार ने कच्चे तेल के आपूर्तिकर्ताओं में विविधता लाई है, फिर भी भारत के एलपीजी आयात का लगभग 90% हॉर्मुज़ जलडमरूमध्य से होकर गुजरता है, जिससे इस क्षेत्र में किसी भी प्रकार की अस्थिरता भारत की ऊर्जा सुरक्षा के लिए संभावित जोखिम बन जाती है।**
- **Over the years, India** has pushed several initiatives to promote alternate fuels like **compressed biogas** to reduce dependence on imported fuel, tackle **agricultural waste** and support **rural incomes**. **पिछले कुछ वर्षों में भारत ने आयातित ईंधन पर निर्भरता कम करने, कृषि अपशिष्ट की समस्या का समाधान करने तथा ग्रामीण आय को बढ़ावा देने के लिए संपीड़ित बायोगैस जैसे वैकल्पिक ईंधनों को प्रोत्साहित करने हेतु अनेक पहलें की हैं।**
- But despite ambitious targets and **policy support**, progress has remained limited. **किन्तु महत्वाकांक्षी लक्ष्यों और नीतिगत समर्थन के बावजूद प्रगति सीमित रही है।**

The search for an alternative fuel

वैकल्पिक ईंधन की खोज

- Biogas** is a mixture of **methane**, **CO₂** and small quantities of other gases produced by **anaerobic digestion of organic matter**.
बायोगैस मीथेन, कार्बन डाइऑक्साइड (CO₂) तथा अन्य गैसों की अल्प मात्रा का मिश्रण है, जो कार्बनिक पदार्थ के अवायवीय अपघटन से उत्पन्न होती है।
- It can be processed and compressed to get **Compressed Biogas (CBG)**.
इसे संसाधित और संपीड़ित करके **संपीड़ित बायोगैस (CBG)** प्राप्त की जा सकती है।
- It is chemically identical to **CNG**; renewable, **carbon-neutral** and can be produced from **waste**.
यह रासायनिक रूप से सीएनजी के समान होती है, नवीकरणीय, कार्बन-तटस्थ होती है तथा अपशिष्ट से निर्मित की जा सकती है।
- It can be used directly to produce **electricity**, **heating** or as an energy source for **cooking**.
इसका उपयोग सीधे बिजली उत्पादन, तापन अथवा खाना पकाने के लिए ऊर्जा स्रोत के रूप में किया जा सकता है।
- India** has also been trying to blend **biogas** into its **gas supply** for at least a decade.
भारत पिछले लगभग एक दशक से अपनी गैस आपूर्ति में बायोगैस के मिश्रण का प्रयास कर रहा है।
- The **push gathered pace in 2018**, when the **Sustainable Alternative Towards Affordable Transportation (SATAT)** initiative was launched with a target of establishing **5,000 plants by 2023**.
इस प्रयास को 2018 में गति मिली, जब सस्टेनेबल अल्टरनेटिव ट्रान्सपोर्टेशन (SATAT) पहल शुरू की गई, जिसका लक्ष्य 2023 तक 5,000 संयंत्रों की स्थापना करना था।
- Only **132** are completed as of **June 3, 2026**.
3 जून, 2026 तक केवल 132 संयंत्र ही पूर्ण हो सके हैं।
- The **Centre** launched the **GOBARDhan (Galvanising Organic Bio-Agro Resources Dhan)** scheme to increase **CBG production**.
केंद्र सरकार ने सीबीजी उत्पादन बढ़ाने के लिए गोबरधन (Galvanising Organic Bio-Agro Resources Dhan) योजना प्रारंभ की।
- Under this '**waste to wealth**' programme, the government offered **grants** of up to **₹50 lakh per district for community biogas plants**.
इस 'अपशिष्ट से संपदा' कार्यक्रम के अंतर्गत सरकार ने सामुदायिक बायोगैस संयंत्रों के लिए प्रति ज़िला ₹50 लाख तक का अनुदान प्रदान किया।
- ₹564 crore** was earmarked for the purchase of **biomass collection machinery**, while **₹994 crore** was allocated to build **pipelines** connecting **biogas plants** directly to the **gas grid**.
बायोमास संग्रहण मशीनरी की खरीद के लिए ₹564 करोड़ निर्धारित किए गए, जबकि बायोगैस संयंत्रों को सीधे गैस ग्रिड से जोड़ने हेतु पाइपलाइन निर्माण के लिए ₹994 करोड़ आवंटित किए गए।
- However, progress on the ground has remained limited.
हालाँकि, ज़मीनी स्तर पर प्रगति सीमित रही है।
- The lack of **infrastructure**, poor **private investment**, difficulties in accessing **formal credit** and high **upfront cost** of technologies have stalled progress.
अवसंरचना की कमी, अपर्याप्त निजी निवेश, औपचारिक ऋण प्राप्त करने में कठिनाइयाँ तथा प्रौद्योगिकियों की उच्च प्रारंभिक लागत के कारण प्रगति बाधित हुई है।
- Financial support** from the government can make **biogas projects** economically viable.
सरकार द्वारा प्रदान किया गया वित्तीय समर्थन बायोगैस परियोजनाओं को आर्थिक रूप से व्यवहार्य बना सकता है।
- Other incentives, like **accelerated depreciation** and **tax holidays**, would also help attract **private players**.

त्वरित मूल्यहास तथा कर अवकाश जैसे अन्य प्रोत्साहन भी निजी क्षेत्र की भागीदारी को आकर्षित करने में सहायक होंगे।

Impact on cultivation patterns

फसल प्रतिरूपों पर प्रभाव

- The development of **biogas** has been uneven across the world, with **Europe, China** and the **United States** accounting for **90%** of global production.
विश्वभर में बायोगैस का विकास असमान रहा है, जहाँ यूरोप, चीन और संयुक्त राज्य अमेरिका मिलकर वैश्विक उत्पादन का लगभग 90% हिस्सा रखते हैं।
- Germany** is one of the largest producers in **Europe**, along with **France, Denmark** and the **U.K.**
जर्मनी, फ्रांस, डेनमार्क तथा यूनाइटेड किंगडम के साथ यूरोप के सबसे बड़े बायोगैस उत्पादकों में से एक है।
- The fillip for the sector came in **2000**, when **Germany** introduced the **Renewable Energy Sources Act** to incentivise production.
इस क्षेत्र को प्रमुख प्रोत्साहन 2000 में मिला, जब जर्मनी ने उत्पादन को बढ़ावा देने के लिए नवीकरणीय ऊर्जा स्रोत अधिनियम (**Renewable Energy Sources Act**) लागू किया।
- Over the years, it introduced schemes to guarantee income to producers, gave bonuses to help operators increase their income and encouraged **small-scale biogas plants**.
समय के साथ सरकार ने उत्पादकों की आय सुनिश्चित करने के लिए विभिन्न योजनाएँ शुरू कीं, संचालकों को अतिरिक्त प्रोत्साहन राशि प्रदान की तथा लघु बायोगैस संयंत्रों को बढ़ावा दिया।
- However, the country's push for **biogas** triggered a "**corn mania**", with **maize cultivation** rising sharply because it was highly profitable for farmers.
किन्तु बायोगैस को बढ़ावा देने की इस नीति ने "मक्का उन्माद (कॉर्न मेनिया)" को जन्म दिया, जिसके कारण मक्का की खेती में तीव्र वृद्धि हुई क्योंकि यह किसानों के लिए अत्यधिक लाभदायक सिद्ध हुई।
- Maize** slowly started to replace other **food crops**.
धीरे-धीरे मक्का ने अन्य खाद्यान्न फसलों का स्थान लेना प्रारम्भ कर दिया।
- Over a decade later, the government was forced to step in and control this by introducing a cap on the use of **maize** in **biogas plants**.
एक दशक से अधिक समय बाद सरकार को हस्तक्षेप करना पड़ा और बायोगैस संयंत्रों में मक्का के उपयोग पर सीमा निर्धारित करनी पड़ी।
- This danger hits close to home.
यह जोखिम भारत के लिए भी अत्यंत प्रासंगिक है।
- The **Economic Survey 2026** noted that **maize cultivation** in **India** has increased sharply, potentially affecting **crop diversity** and **food security**.
आर्थिक सर्वेक्षण 2026 में उल्लेख किया गया है कि भारत में मक्का की खेती में तीव्र वृद्धि हुई है, जिससे फसल विविधता तथा खाद्य सुरक्षा प्रभावित हो सकती है।
- It noted that while the national **maize yield** increased from approximately **2.56 tonnes per hectare** in **FY16** to roughly **3.78 tonnes per hectare** by **FY25**, the yields for **soybeans, sunflower, rapeseed, peanuts** and **millet**s, among other crops, have either stagnated or declined.
सर्वेक्षण के अनुसार, जहाँ राष्ट्रीय मक्का उत्पादकता वित्त वर्ष 2015-16 में लगभग 2.56 टन प्रति हेक्टेयर से बढ़कर वित्त वर्ष 2024-25 तक लगभग 3.78 टन प्रति हेक्टेयर हो गई, वहीं सोयाबीन, सूरजमुखी, रेपसीड, मूंगफली, मोटे अनाज (मिलेट्स) तथा अन्य फसलों की उत्पादकता या तो स्थिर रही है अथवा घट गई है।
- While this trend could be attributed to **technological advancements**, **ethanol pricing** can be an important factor.
यद्यपि इस प्रवृत्ति का एक कारण तकनीकी प्रगति हो सकता है, फिर भी एथेनॉल मूल्य निर्धारण भी एक महत्वपूर्ण कारक हो सकता है।



- The government fixes administered **per-litre ethanol prices** based on the **feedstock** used. सरकार प्रयुक्त **फीडस्टॉक** के आधार पर प्रति लीटर **एथेनॉल की प्रशासित कीमत** निर्धारित करती है।
- The price for **maize-based ethanol** is higher, while the price for **rice-based ethanol** is lower. **मक्का-आधारित एथेनॉल** की कीमत अधिक निर्धारित की जाती है, जबकि **चावल-आधारित एथेनॉल** की कीमत अपेक्षाकृत कम होती है।
- The price for **molasses-based ethanol** is fixed between the two. **शीरे (मोलासेस)-आधारित एथेनॉल** की कीमत इन दोनों के बीच निर्धारित की जाती है।
- Between **FY22** and **FY25**, the administered price of **maize-based ethanol** grew at a **compound annual growth rate (CAGR)** of **11.7%**, making **maize** more lucrative for farmers. **वित्त वर्ष 2021-22 से वित्त वर्ष 2024-25 के बीच मक्का-आधारित एथेनॉल की प्रशासित कीमत में चक्रवृद्धि वार्षिक वृद्धि दर (CAGR) 11.7%** रही, जिससे **मक्का** किसानों के लिए अधिक लाभदायक बन गया।
- While **maize's area under cultivation** and **production** jumped between **FY22** and **FY25**, **pulses** output declined, while **oilseeds** and other **cereals** registered only modest growth. **वित्त वर्ष 2021-22 से वित्त वर्ष 2024-25 के बीच मक्का के खेती क्षेत्र और उत्पादन में उल्लेखनीय वृद्धि हुई, जबकि दालों का उत्पादन घट गया तथा तिलहनों और अन्य अनाजों में केवल सीमित वृद्धि दर्ज की गई।**
- India** imports large quantities of **pulses** and **edible oils** to meet demand. **भारत** अपनी घरेलू मांग को पूरा करने के लिए बड़ी मात्रा में **दालों और खाद्य तेलों** का आयात करता है।
- Yet, instead of focusing on increasing production, the government's policy might inadvertently disincentivise farmers from cultivating them. **फिर भी, उत्पादन बढ़ाने पर ध्यान केंद्रित करने के बजाय, सरकार की नीति अनजाने में किसानों को इन फसलों की खेती से हतोत्साहित कर सकती है।**
- Over time, this could increase **India's** dependence on imports and expose domestic **food prices** to greater volatility during **supply shocks**. **समय के साथ इससे भारत की आयात पर निर्भरता बढ़ सकती है तथा आपूर्ति संबंधी झटकों के दौरान घरेलू खाद्य कीमतों में अधिक अस्थिरता आ सकती है।**
- Denmark**, which is targeting to use only **biomethane** in its gas system by **2030**, offers a solution. **डेनमार्क**, जिसने **2030** तक अपनी गैस प्रणाली में केवल **बायोमीथेन** के उपयोग का लक्ष्य निर्धारित किया है, एक संभावित समाधान प्रस्तुत करता है।
- The government discouraged the use of **crops** as **feedstock**, and the primary source is **livestock manure** and **agricultural waste**. **वहाँ की सरकार ने फसलों को फीडस्टॉक के रूप में उपयोग करने को हतोत्साहित किया तथा पशुधन का गोबर और कृषि अपशिष्ट को मुख्य स्रोत बनाया।**

Government's action plan

सरकार की कार्ययोजना

- In **2023**, the **National Biofuels Coordination Committee** approved a mandatory **blending obligation**. **2023 में राष्ट्रीय जैव ईंधन समन्वय समिति ने अनिवार्य मिश्रण दायित्व (Blending Obligation) को स्वीकृति प्रदान की।**
- Gas distributors** have been mandated to blend **CBG** into their supply from **FY26**. **गैस वितरकों को वित्त वर्ष 2025-26 से अपनी आपूर्ति में संपीड़ित बायोगैस (CBG) का मिश्रण करना अनिवार्य किया गया है।**
- It would start at **1%** and rise to **5%** by **FY29**. **यह मिश्रण 1% से प्रारम्भ होगा और वित्त वर्ष 2028-29 तक बढ़कर 5% हो जाएगा।**
- In her **Budget** speech in **February 2024**, **Finance Minister Nirmala Sitharaman** said the phased blending of **CBG** in **CNG** for transport and **Piped Natural Gas (PNG)** for domestic



purposes “will be mandated.”

फरवरी 2024 में अपने बजट भाषण के दौरान वित्त मंत्री निर्मला सीतारमण ने कहा कि परिवहन के लिए सीएनजी (CNG) तथा घरेलू उपयोग के लिए पाइप्ड नेचुरल गैस (PNG) में सीबीजी (CBG) का चरणबद्ध मिश्रण “अनिवार्य किया जाएगा।”

- To meet these targets, the government is ramping up the establishment of **plants**. इन लक्ष्यों को प्राप्त करने के लिए सरकार संयंत्रों की स्थापना की गति तेज कर रही है।
- The question is whether the government can replicate **India’s ethanol blending programme** with **CBG**. मुख्य प्रश्न यह है कि क्या सरकार **भारत के एथेनॉल मिश्रण कार्यक्रम** जैसी सफलता **सीबीजी (CBG)** के क्षेत्र में भी दोहरा सकेगी।
- In **2014**, just **1.5%** of **petrol** was blended with **ethanol**. **2014** में पेट्रोल में केवल **1.5%** एथेनॉल का मिश्रण किया जाता था।
- By **December 2025**, it had hit **20%**, five years ahead of the original **2030** target. **दिसंबर 2025** तक यह अनुपात बढ़कर **20%** हो गया, जो मूल **2030** लक्ष्य से **पाँच वर्ष पहले** प्राप्त कर लिया गया।

What is the India-Australia uranium supplies agreement?

What do the administrative arrangements mean for India’s nuclear energy sector?

SS III: Economy
Kallol Bhattacharjee

The story so far:

During Prime Minister Narendra Modi’s visit to Australia last week, India and Australia “finalised the administrative arrangements” required to enable export of uranium from Australia to India. These exports will be “exclusively for peaceful purposes and under International Atomic Energy Agency (IAEA) watch” under the Australia-India Nuclear Cooperation Agreement, 2015.

What does the latest development mean?

The finalisation of the “administrative arrangements” means that private Australian mining entities involved in uranium extraction will be able to conclude commercial contracts with Indian private sector companies and joint ventures. The participation of private

Indian entities in uranium exports from Australia adds a new chapter to India’s energy journey, which was recently boosted by the SHANTI Act passed in December 2025, opening the nuclear sector to private players.

The timing of the announcement is significant, as it has come at a time when India’s energy sector is under severe stress due to the U.S.-Israel attack on Iran. India is being forced to diversify and explore options to cope with short-term requirements by buying hydrocarbons from Russia, the United States, and Venezuela, while also planning for the future. The arrangements with Australia for uranium export are expected to help India meet its energy requirements in the future.

Why is this significant?

Australia holds more than a quarter of the global uranium reserves and has traditionally maintained a strict policy

regarding the supply or export of uranium to non-NPT member countries. According to the World Nuclear Association the countries that have received Australia’s uranium include the United States, Japan, South Korea, France, Sweden, Belgium, Finland, the United Kingdom, and Germany. India is among the non-signatories, which are countries that chose not to sign the Nuclear Non-Proliferation Treaty.

Australia has been exporting uranium to countries with which it has “bilateral safeguards agreements”, as it maintains that support for nuclear non-proliferation is among its “paramount” considerations. The “administrative arrangements” can be interpreted as further firming up of “bilateral safeguards” that were part of the Australia-India Nuclear Cooperation Agreement 2015.

India has an unblemished nuclear supply chain record and an ambitious nuclear energy programme. Though it is

not a signatory to the NPT, it signed a safeguards agreement with the IAEA in 2008 after India and the U.S. signed the nuclear deal, which was presided over by Prime Minister Manmohan Singh and President George W. Bush. Subsequently, the 48-member Nuclear Suppliers Group made a major move by exempting India from the list of countries with which they are prohibited from engaging in nuclear-energy-related business, thereby opening the gates for nuclear-energy-related supplies to India. This exemption has been the basis of several civil nuclear agreements that India has signed with partner countries.

What negotiations made this arrangement possible in 2026?

While Canberra and New Delhi have finalised the “administrative arrangements” now, negotiations between the two sides have been ongoing for nearly two decades. On November 12, 2009, during Prime Minister Kevin Rudd’s visit to India, the two issues were addressed.

A joint statement issued during this visit said, “Mr. Rudd noted India’s plans to meet its future energy requirements by exploring and developing all sources of energy, including nuclear, renewable and non-conventional resources. Both sides recognised the benefits of enhancing bilateral commercial exchanges of renewable and non-renewable energy

resources. The two Prime Ministers also agreed that energy security concerns are best met by reconciling the long-term interests of both energy-producing and energy-consuming countries through a truly open and competitive energy market. Both sides also expressed their willingness to join efforts which promote a cooperative response to any global energy crisis.” The same joint statement also mentioned mutual commitment to oppose nuclear weapons. These negotiations led to the Australia-India Nuclear Cooperation Agreement, which was signed in 2014 and came into force in 2015.

According to World Nuclear Association, the “administrative arrangement” between India and Australia was “finalised and became operational” after the signing of the Australia-India Nuclear Cooperation Agreement of 2015 and at least 300 tonnes of uranium were exported to India since 2018.

But it is understood, that uranium export was part of a “test drive” as there were lingering concerns about Indian entities receiving Australian uranium. The latest announcement on the “administrative arrangements” and the emphasis on “exclusively peaceful purposes and under International Atomic Energy Agency (IAEA) safeguards” indicates that the “test run” has paved the way for bigger commercial deliveries.

14J7. What is the India-Australia uranium supplies agreement?

भारत-ऑस्ट्रेलिया यूरेनियम आपूर्ति समझौता क्या है?

- During **Prime Minister Narendra Modi’s** visit to **Australia** last week, **India** and **Australia** “finalised the administrative arrangements” required to enable export of **uranium** from **Australia** to **India**. पिछले सप्ताह प्रधानमंत्री नरेंद्र मोदी की ऑस्ट्रेलिया यात्रा के दौरान भारत और ऑस्ट्रेलिया ने ऑस्ट्रेलिया से भारत को **यूरेनियम** के निर्यात को सक्षम बनाने हेतु आवश्यक **प्रशासनिक व्यवस्थाओं** को “अंतिम रूप” दिया।
- These exports will be “exclusively for **peaceful purposes** and under **International Atomic Energy Agency (IAEA)** watch” under the **Australia-India Nuclear Cooperation Agreement, 2015**. ये निर्यात ऑस्ट्रेलिया-भारत परमाणु सहयोग समझौता, 2015 के अंतर्गत “केवल शांतिपूर्ण उद्देश्यों के लिए तथा अंतर्राष्ट्रीय परमाणु ऊर्जा एजेंसी (IAEA) की निगरानी में” किए जाएंगे।

What does the latest development mean?

नवीनतम घटनाक्रम का क्या अर्थ है?



- The finalisation of the “**administrative arrangements**” means that private Australian mining entities involved in **uranium** extraction will be able to conclude commercial contracts with **Indian private sector companies** and **joint ventures**.
“प्रशासनिक व्यवस्थाओं” को अंतिम रूप दिए जाने का अर्थ है कि यूरेनियम के खनन में संलग्न ऑस्ट्रेलिया की निजी खनन कंपनियाँ अब भारतीय निजी क्षेत्र की कंपनियों तथा संयुक्त उपक्रमों के साथ वाणिज्यिक अनुबंध कर सकेंगी।
- The participation of private **Indian entities** in **uranium** exports from **Australia** adds a new chapter to **India’s energy journey**, which was recently boosted by the **SHANTI Act** passed in **December 2025**, opening the **nuclear sector** to private players.
ऑस्ट्रेलिया से यूरेनियम आयात में निजी भारतीय संस्थाओं की भागीदारी भारत की ऊर्जा यात्रा में एक नया अध्याय जोड़ती है, जिसे दिसंबर 2025 में पारित शांति अधिनियम (SHANTI Act) द्वारा और गति मिली, जिसने परमाणु क्षेत्र को निजी भागीदारी के लिए खोल दिया।
- The timing of the announcement is significant, as it has come at a time when **India’s energy sector** is under severe stress due to the **U.S.-Israel attack on Iran**.
इस घोषणा का समय महत्वपूर्ण है, क्योंकि यह ऐसे समय में हुई है जब ईरान पर अमेरिका-इज़राइल के हमले के कारण भारत का ऊर्जा क्षेत्र गंभीर दबाव का सामना कर रहा है।
- India is being forced to diversify and explore options to cope with short-term requirements by buying **hydrocarbons** from **Russia**, the **United States**, and **Venezuela**, while also planning for the future.
भारत को अपनी अल्पकालिक ऊर्जा आवश्यकताओं की पूर्ति के लिए रूस, संयुक्त राज्य अमेरिका और वेनेजुएला से हाइड्रोकार्बन खरीदकर ऊर्जा स्रोतों का विविधीकरण करना पड़ रहा है, साथ ही भविष्य की योजना भी बनानी पड़ रही है।
- The arrangements with **Australia** for **uranium** export are expected to help **India** meet its energy requirements in the future.
ऑस्ट्रेलिया के साथ यूरेनियम आपूर्ति संबंधी व्यवस्थाओं से भविष्य में भारत की ऊर्जा आवश्यकताओं की पूर्ति में सहायता मिलने की अपेक्षा है।

Why is this significant?

यह क्यों महत्वपूर्ण है?

- Australia** holds more than a quarter of the global **uranium reserves** and has traditionally maintained a strict policy regarding the supply or export of **uranium** to **non-NPT member countries**.
ऑस्ट्रेलिया के पास विश्व के कुल यूरेनियम भंडार का एक-चौथाई से अधिक हिस्सा है और उसने परंपरागत रूप से परमाणु अप्रसार संधि (NPT) के गैर-सदस्य देशों को यूरेनियम की आपूर्ति या निर्यात के संबंध में कठोर नीति अपनाई है।
- According to the **World Nuclear Association**, the countries that have received **Australia’s uranium** include the **United States**, **Japan**, **South Korea**, **France**, **Sweden**, **Belgium**, **Finland**, the **United Kingdom**, and **Germany**.
वर्ल्ड न्यूक्लियर एसोसिएशन के अनुसार, ऑस्ट्रेलिया से यूरेनियम प्राप्त करने वाले देशों में संयुक्त राज्य अमेरिका, जापान, दक्षिण कोरिया, फ्रांस, स्वीडन, बेलजियम, फिनलैंड, यूनाइटेड किंगडम तथा जर्मनी शामिल हैं।
- India** is among the **non-signatories**, which are countries that chose not to sign the **Nuclear Non-Proliferation Treaty (NPT)**.
भारत उन गैर-हस्ताक्षरकर्ता देशों में शामिल है जिन्होंने परमाणु अप्रसार संधि (NPT) पर हस्ताक्षर नहीं किए हैं।
- Australia** has been exporting **uranium** to countries with which it has “**bilateral safeguards agreements**”, as it maintains that support for **nuclear non-proliferation** is among its “paramount” considerations.

ऑस्ट्रेलिया केवल उन देशों को यूरेनियम निर्यात करता रहा है जिनके साथ उसके द्विपक्षीय सुरक्षा समझौते (Bilateral Safeguards Agreements) हैं, क्योंकि वह परमाणु अप्रसार के समर्थन को अपनी सर्वोच्च प्राथमिकताओं में से एक मानता है।

- The “administrative arrangements” can be interpreted as further firming up of “bilateral safeguards” that were part of the Australia-India Nuclear Cooperation Agreement 2015. “प्रशासनिक व्यवस्थाओं” को ऑस्ट्रेलिया-भारत परमाणु सहयोग समझौता, 2015 के अंतर्गत पहले से विद्यमान “द्विपक्षीय सुरक्षा प्रावधानों” को और अधिक सुदृढ़ करने के रूप में देखा जा सकता है।
- India has an unblemished nuclear supply chain record and an ambitious nuclear energy programme.

भारत का परमाणु आपूर्ति श्रृंखला का रिकॉर्ड निष्कलंक रहा है तथा उसका परमाणु ऊर्जा कार्यक्रम अत्यंत महत्वाकांक्षी है।

- Though it is not a signatory to the NPT, it signed a safeguards agreement with the IAEA in 2008 after India and the United States signed the civil nuclear deal, which was presided over by Prime Minister Manmohan Singh and President George W. Bush. यद्यपि भारत NPT का हस्ताक्षरकर्ता नहीं है, फिर भी 2008 में भारत और संयुक्त राज्य अमेरिका के बीच हुए असैनिक परमाणु समझौते के बाद उसने IAEA के साथ एक सुरक्षा समझौते (Safeguards Agreement) पर हस्ताक्षर किए, जिसकी अगुवाई प्रधानमंत्री मनमोहन सिंह और राष्ट्रपति जॉर्ज डब्ल्यू. बुश ने की थी।
- Subsequently, the 48-member Nuclear Suppliers Group (NSG) made a major move by exempting India from the list of countries with which they are prohibited from engaging in nuclear-energy-related business, thereby opening the gates for nuclear-energy-related supplies to India. इसके पश्चात 48 सदस्यीय न्यूक्लियर सप्लायर्स ग्रुप (NSG) ने एक महत्वपूर्ण निर्णय लेते हुए भारत को उन देशों की सूची से छूट प्रदान की जिनके साथ परमाणु ऊर्जा से संबंधित व्यापार प्रतिबंधित था, जिससे भारत के लिए परमाणु ऊर्जा संबंधी आपूर्ति का मार्ग खुल गया।
- This exemption has been the basis of several civil nuclear agreements that India has signed with partner countries. यही छूट विभिन्न साझेदार देशों के साथ भारत द्वारा किए गए अनेक असैनिक परमाणु सहयोग समझौतों का आधार बनी है।

What negotiations made this arrangement possible in 2026?

वर्ष 2026 में इस व्यवस्था को संभव बनाने वाली वार्ताएँ कौन-सी थीं?

- While Canberra and New Delhi have finalised the “administrative arrangements” now, negotiations between the two sides have been ongoing for nearly two decades. यद्यपि कैनबरा और नई दिल्ली ने अब “प्रशासनिक व्यवस्थाओं” को अंतिम रूप दे दिया है, फिर भी दोनों पक्षों के बीच वार्ताएँ लगभग दो दशकों से चल रही थीं।
- On November 12, 2009, during Prime Minister Kevin Rudd’s visit to India, the two issues were addressed. 12 नवंबर, 2009 को प्रधानमंत्री केविन रड की भारत यात्रा के दौरान इन दोनों मुद्दों पर चर्चा की गई।
- A joint statement issued during this visit said, “Mr. Rudd noted India’s plans to meet its future energy requirements by exploring and developing all sources of energy, including nuclear, renewable and non-conventional resources.” इस यात्रा के दौरान जारी संयुक्त वक्तव्य में कहा गया कि श्री रड ने भारत की भविष्य की ऊर्जा आवश्यकताओं को पूरा करने के लिए परमाणु, नवीकरणीय तथा गैर-पारंपरिक ऊर्जा संसाधनों सहित सभी प्रकार के ऊर्जा स्रोतों के अन्वेषण और विकास की योजनाओं पर ध्यान दिया।
- Both sides recognised the benefits of enhancing bilateral commercial exchanges of renewable and non-renewable energy resources.



दोनों पक्षों ने नवीकरणीय तथा गैर-नवीकरणीय ऊर्जा संसाधनों के द्विपक्षीय वाणिज्यिक आदान-प्रदान को बढ़ाने के लाभों को स्वीकार किया।

- The two **Prime Ministers** also agreed that **energy security** concerns are best met by reconciling the long-term interests of both **energy-producing** and **energy-consuming countries** through a truly open and competitive **energy market**.
दोनों **प्रधानमंत्रियों** ने इस बात पर भी सहमति व्यक्त की कि **ऊर्जा सुरक्षा** संबंधी चिंताओं का सर्वोत्तम समाधान वास्तव में खुले और प्रतिस्पर्धी **ऊर्जा बाज़ार** के माध्यम से **ऊर्जा उत्पादक** तथा **ऊर्जा उपभोक्ता देशों** के दीर्घकालिक हितों में संतुलन स्थापित करके किया जा सकता है।
- Both sides also expressed their willingness to join efforts which promote a cooperative response to any **global energy crisis**.
दोनों पक्षों ने किसी भी वैश्विक **ऊर्जा संकट** के प्रति सहयोगात्मक प्रतिक्रिया को बढ़ावा देने वाले प्रयासों में सम्मिलित होने की अपनी इच्छा भी व्यक्त की।
- The same **joint statement** also mentioned mutual commitment to oppose **nuclear weapons**. उसी **संयुक्त वक्तव्य** में **परमाणु हथियारों** का विरोध करने की पारस्परिक प्रतिबद्धता का भी उल्लेख किया गया।
- These negotiations led to the **Australia-India Nuclear Cooperation Agreement**, which was signed in **2014** and came into force in **2015**.
इन वार्ताओं के परिणामस्वरूप **ऑस्ट्रेलिया-भारत परमाणु सहयोग समझौता** हुआ, जिस पर **2014** में हस्ताक्षर किए गए और जो **2015** में प्रभावी हुआ।
- According to the **World Nuclear Association**, the “**administrative arrangement**” between **India** and **Australia** was “**finalised and became operational**” after the signing of the **Australia-India Nuclear Cooperation Agreement** of **2015**, and at least **300 tonnes** of **uranium** were exported to **India** since **2018**.
विश्व परमाणु संघ (World Nuclear Association) के अनुसार, **भारत** और **ऑस्ट्रेलिया** के बीच “**प्रशासनिक व्यवस्था**” **2015** के **ऑस्ट्रेलिया-भारत परमाणु सहयोग समझौते** पर हस्ताक्षर होने के बाद “**अंतिम रूप से लागू और क्रियाशील**” हो गई, तथा **2018** से अब तक कम-से-कम **300 टन यूरेनियम** का निर्यात **भारत** को किया गया है।
- But it is understood that **uranium export** was part of a “**test drive**” as there were lingering concerns about **Indian entities** receiving **Australian uranium**.
किन्तु यह समझा जाता है कि **यूरेनियम का निर्यात** एक “**परीक्षण चरण**” का हिस्सा था, क्योंकि **भारतीय संस्थाओं** द्वारा **ऑस्ट्रेलियाई यूरेनियम** प्राप्त किए जाने को लेकर कुछ चिंताएँ बनी हुई थीं।
- The latest announcement on the “**administrative arrangements**” and the emphasis on “**exclusively peaceful purposes and under International Atomic Energy Agency (IAEA) safeguards**” indicates that the “**test run**” has paved the way for bigger **commercial deliveries**.

“**प्रशासनिक व्यवस्थाओं**” पर नवीनतम घोषणा तथा “**विशेष रूप से शांतिपूर्ण उद्देश्यों और अंतर्राष्ट्रीय परमाणु ऊर्जा एजेंसी (IAEA) की सुरक्षा व्यवस्था के अंतर्गत**” दिए गए बल से यह संकेत मिलता है कि “**परीक्षण चरण**” ने बड़े पैमाने पर व्यावसायिक आपूर्ति का मार्ग प्रशस्त कर दिया है।



Trade deficit jumps fourfold in June on surging imports

Commerce Ministry data showed India's overall exports, including goods and services, grew 9.5% to \$73.4 billion in June 2026; total imports, on the other hand, grew nearly 27% to \$88.8 billion

GS III: Economy
T.C.A. Sharad Raghavan
NEW DELHI

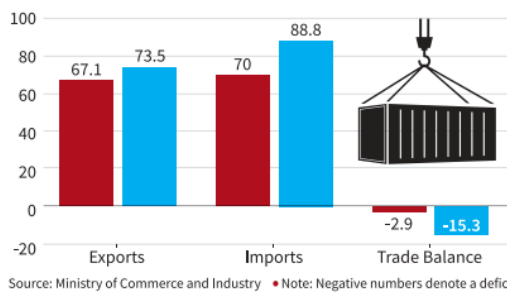
India's trade deficit grew over fourfold to \$15.3 billion in June 2026 primarily due to high growth in merchandise imports, which were skewed by a spurt in the value of imports of crude oil, electronic and electrical goods, and gold, according to official data.

Data released by the Ministry of Commerce and Industry on Monday showed India's overall exports, including both goods and services, grew 9.5% to \$73.4 billion in June 2026. Total imports, on the other hand, grew nearly 27% to \$88.8 billion.

"Looking at the data, you would see that merchandise imports in particular have grown by a signif-

Unbalanced trade

A surge in imports meant that the overall trade deficit grew sharply in June 2026



icant amount and think that this is a matter of concern, but the fact is that these imports are being driven by just a few commodities such as petroleum products and crude oil, gold, and electronics," Commerce Secretary Rajesh Agrawal said during a

press briefing.

"Gold and oil have increased in value because of higher prices due to the prevailing geopolitical situation, and electronics imports are rising because of higher consumption within the economy and also inputs being used for ma-

nufacturing," he added.

Merchandise imports grew 31% to \$70.8 billion as opposed to exports, which grew at a relatively slower 15.5% to \$40.4 billion in June 2026. As a result, the merchandise trade deficit stood at \$30.4 billion, about 59% higher than in June 2025. On the services front, India's trade surplus shrank in June 2026 as imports outpaced exports. Services exports grew 2.9% in June 2026 to \$33 billion, while imports grew 12.7% to \$17.9 billion. As a result, the services trade surplus fell 6.8% in June 2026 to \$15.1 billion.

"The widening of the June trade deficit is largely led by higher net imports of oil and electronics," said Upasna Bhardwaj, Chief Economist, Kotak Mahindra Bank.

14J7. Trade deficit jumps fourfold in June on surging imports

आयात में तेज़ वृद्धि के कारण जून में व्यापार घाटा चार गुना बढ़ा

- India's trade deficit grew over fourfold to \$15.3 billion in June 2026 primarily due to high growth in merchandise imports, which were skewed by a spurt in the value of imports of crude oil, electronic and electrical goods, and gold, according to official data.

आधिकारिक आँकड़ों के अनुसार, जून 2026 में भारत का व्यापार घाटा चार गुना से अधिक बढ़कर 15.3 अरब अमेरिकी डॉलर हो गया। इसका प्रमुख कारण वस्तु आयात में तेज़ वृद्धि रही, जो कच्चे तेल, इलेक्ट्रॉनिक एवं विद्युत उपकरणों तथा सोने के आयात मूल्य में हुई तेज़ बढ़ोतरी से प्रभावित थी।

- Data released by the Ministry of Commerce and Industry on Monday showed India's overall exports, including both goods and services, grew 9.5% to \$73.4 billion in June 2026.

सोमवार को वाणिज्य एवं उद्योग मंत्रालय द्वारा जारी आँकड़ों के अनुसार, जून 2026 में भारत का कुल निर्यात, जिसमें वस्तुएँ और सेवाएँ दोनों शामिल हैं, 9.5% बढ़कर 73.4 अरब अमेरिकी डॉलर हो गया।

- Total imports, on the other hand, grew nearly 27% to \$88.8 billion. दूसरी ओर, कुल आयात लगभग 27% बढ़कर 88.8 अरब अमेरिकी डॉलर हो गया।
- "Looking at the data, you would see that merchandise imports in particular have grown by a significant amount and think that this is a matter of concern, but the fact is that these imports are being driven by just a few commodities such as petroleum products and crude oil, gold, and electronics," Commerce Secretary Rajesh Agrawal said during a press briefing.

प्रेस वार्ता के दौरान वाणिज्य सचिव राजेश अग्रवाल ने कहा, "आँकड़ों को देखने पर ऐसा प्रतीत हो सकता है कि



विशेष रूप से वस्तु आयात में उल्लेखनीय वृद्धि चिंता का विषय है, किन्तु वास्तविकता यह है कि यह वृद्धि केवल कुछ वस्तुओं, जैसे पेट्रोलियम उत्पादों, कच्चे तेल, सोने तथा इलेक्ट्रॉनिक्स के आयात के कारण हुई है।"

- "Gold and oil have increased in value because of higher prices due to the prevailing geopolitical situation, and electronics imports are rising because of higher consumption within the economy and also inputs being used for manufacturing," he added. उन्होंने आगे कहा, "वर्तमान भू-राजनीतिक परिस्थितियों के कारण कीमतें बढ़ने से सोने और तेल का मूल्य बढ़ा है, जबकि इलेक्ट्रॉनिक्स का आयात अर्थव्यवस्था में बढ़ती खपत तथा विनिर्माण में प्रयुक्त इनपुट्स की अधिक मांग के कारण बढ़ रहा है।"
- Merchandise imports grew 31% to \$70.8 billion as opposed to exports, which grew at a relatively slower 15.5% to \$40.4 billion in June 2026. जून 2026 में वस्तु आयात 31% बढ़कर 70.8 अरब अमेरिकी डॉलर हो गया, जबकि वस्तु निर्यात अपेक्षाकृत धीमी गति से 15.5% बढ़कर 40.4 अरब अमेरिकी डॉलर रहा।
- As a result, the merchandise trade deficit stood at \$30.4 billion, about 59% higher than in June 2025.

Higher Russian oil imports a deliberate strategy, says govt.

GS III: Economy
The Hindu Bureau
NEW DELHI

The Indian government's decision to import more oil from Russia is part of a longer strategy it deployed following the start of the West Asia crisis and was part of a broader strategy to diversify sources of oil, the Ministry of Petroleum and Natural Gas said in response to an editorial by *The Hindu*.

The Hindu had on July 9 reported Russia's share in India's oil imports had risen to more than 40% in May 2026. The editorial, 'Oil conundrum,' was published on July 13. In its response, the Ministry further said Russia accounted for "more than half" of India's oil imports in June 2026.

"The timeline the article omits is the one that matters: Hormuz effectively closed at the end of February 2026," it said.

As a result of this, almost one-fifth of the world's oil and gas that passed through the Strait of Hormuz was shut, with the exposure for India being even sharper as roughly 45-50% of crude oil imports were transiting that single waterway, it said.

"So, if the corridor is shut, who exactly is India supposed to buy from," the Ministry said. "Within weeks, non-Hormuz crude

sourcing was raised from 55% to 70% of imports."

By June Russian supplies rose further to about 2.6 million barrels per day or "more than half of that month's overall imports".

"The May figure *The Hindu* cites is not a stand-alone data point; it is one frame inside a sequence that was deliberately engineered, month by month, as the Strait remained shut," the Ministry said.

India's diplomatic outreach to Qatar, UAE and Saudi Arabia enabled it to secure alternative crude and LPG volumes and crude sourcing widened from 27 countries a decade ago to 41 plus countries by 2026, the government said.

Venezuelan oil import

On sourcing of Venezuelan oil, the government said the relationship had been presented in the editorial as a "new, risky bet".

"We have maintained intensive bilateral engagement with Venezuela initiated well before the crisis and sustained throughout," it said.

"What *The Hindu* reads as sudden over-reliance is, on the record, a pre-existing channel simply activated at scale when the crisis demanded it – one of several such channels, not the only one."

इसके परिणामस्वरूप वस्तु व्यापार घाटा 30.4 अरब अमेरिकी डॉलर रहा, जो जून 2025 की तुलना में लगभग 59% अधिक था।

- On the services front, India's trade surplus shrank in June 2026 as imports outpaced exports.

सेवा क्षेत्र में जून 2026 के दौरान भारत का व्यापार अधिशेष घट गया, क्योंकि आयात की वृद्धि निर्यात से अधिक रही।

- Services exports grew 2.9% in June 2026 to \$33 billion, while imports grew 12.7% to \$17.9 billion.

जून 2026 में सेवा निर्यात 2.9% बढ़कर 33 अरब अमेरिकी डॉलर हो गया, जबकि सेवा आयात 12.7% बढ़कर 17.9 अरब अमेरिकी डॉलर हो गया।

- As a result, the services trade surplus fell 6.8% in June 2026 to \$15.1 billion.

इसके परिणामस्वरूप सेवा व्यापार अधिशेष जून 2026 में 6.8% घटकर 15.1 अरब अमेरिकी डॉलर रह गया।

- "The widening of the June trade deficit is largely led by higher net imports of oil and electronics," said Upasna Bhardwaj, Chief Economist, Kotak Mahindra Bank.

कोटक महिंद्रा बैंक की मुख्य अर्थशास्त्री उपासना भारद्वाज ने कहा, "जून के व्यापार घाटे में वृद्धि का मुख्य कारण तेल और इलेक्ट्रॉनिक्स के शुद्ध आयात में बढ़ोतरी है।"

14J7. Higher Russian oil imports are a deliberate strategy, says the government.

रूस से अधिक तेल आयात एक सुनियोजित रणनीति है, सरकार का कहना

- The Indian government's decision to import more oil from Russia is part of a longer strategy it deployed following the start of the West Asia crisis and was part of a broader strategy to diversify sources of oil, the Ministry of Petroleum and Natural Gas said in response to an editorial by *The*

Hindu.

भारत सरकार का रूस से अधिक तेल आयात करने का निर्णय पश्चिम एशिया संकट की शुरुआत के बाद अपनाई गई दीर्घकालिक रणनीति का हिस्सा है तथा यह तेल के स्रोतों में विविधता लाने की व्यापक नीति का अंग है। यह बात पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय ने द हिंदू के एक संपादकीय के उत्तर में कही।

- The Hindu had on July 9 reported Russia's share in India's oil imports had risen to more than 40% in May 2026.

द हिंदू ने 9 जुलाई को प्रकाशित अपनी रिपोर्ट में बताया था कि मई 2026 में भारत के तेल आयात में रूस की हिस्सेदारी 40% से अधिक हो गई थी।

- The editorial, 'Oil conundrum,' was published on July 13.

'ऑयल कॉनड्रम' शीर्षक वाला संपादकीय 13 जुलाई को प्रकाशित हुआ था।

- In its response, the Ministry further said Russia accounted for "more than half" of India's oil imports in June 2026.

अपने उत्तर में मंत्रालय ने आगे कहा कि जून 2026 में भारत के तेल आयात में रूस की हिस्सेदारी "आधे से अधिक" थी।

- "The timeline the article omits is the one that matters: Hormuz effectively closed at the end of February 2026," it said.

मंत्रालय ने कहा, "लेख जिस समयरेखा का उल्लेख नहीं करता, वही सबसे महत्वपूर्ण है। फरवरी 2026 के अंत में हॉर्मुज जलडमरूमध्य प्रभावी रूप से बंद हो गया था।"

- As a result of this, almost one-fifth of the world's oil and gas that passed through the Strait of Hormuz was shut, with the exposure for India being even sharper as roughly 45-50% of crude oil imports were transiting that single waterway, it said.

मंत्रालय के अनुसार, इसके परिणामस्वरूप हॉर्मुज जलडमरूमध्य से होकर गुजरने वाले विश्व के लगभग एक-पाँचवें तेल और गैस की आपूर्ति बाधित हो गई। भारत के लिए यह प्रभाव और अधिक गंभीर था, क्योंकि उसके लगभग 45-50% कच्चे तेल का आयात इसी एक समुद्री मार्ग से होता था।

- "So, if the corridor is shut, who exactly is India supposed to buy from," the Ministry said.

मंत्रालय ने कहा, "यदि यह मार्ग बंद हो जाए, तो भारत आखिर तेल किससे खरीदे?"

- "Within weeks, non-Hormuz crude sourcing was raised from 55% to 70% of imports."

"कुछ ही सप्ताहों में हॉर्मुज मार्ग के बाहर से कच्चे तेल की खरीद का हिस्सा आयात के 55% से बढ़ाकर 70% कर दिया गया।"

- By June, Russian supplies rose further to about 2.6 million barrels per day or "more than half" of that month's overall imports.

जून तक रूस से तेल की आपूर्ति बढ़कर लगभग 26 लाख बैरल प्रतिदिन हो गई, जो उस महीने के कुल आयात का "आधे से अधिक" था।

- "The May figure The Hindu cites is not a stand-alone data point; it is one frame inside a sequence that was deliberately engineered, month by month, as the Strait remained shut," the Ministry said.

मंत्रालय ने कहा, "द हिंदू द्वारा उद्धृत मई का आँकड़ा कोई अलग-थलग आँकड़ा नहीं है, बल्कि वह उस क्रम का एक हिस्सा है जिसे जलडमरूमध्य बंद रहने के दौरान महीने-दर-महीने सुनियोजित ढंग से विकसित किया गया।"

- India's diplomatic outreach to Qatar, UAE and Saudi Arabia enabled it to secure alternative crude and LPG volumes and crude sourcing widened from 27 countries a decade ago to 41 plus countries by 2026, the government said.

सरकार ने कहा कि भारत की कतर, संयुक्त अरब अमीरात (यूएई) और सऊदी अरब के साथ कूटनीतिक पहल के कारण वैकल्पिक कच्चे तेल और एलपीजी की आपूर्ति सुनिश्चित हुई तथा कच्चे तेल के स्रोत एक दशक पहले 27 देशों से बढ़कर 2026 तक 41 से अधिक देशों तक विस्तृत हो गए।

Venezuelan oil import वेनेजुएला से तेल आयात

- On sourcing Venezuelan oil, the government said the relationship had been presented in the editorial as a “new, risky bet”.
वेनेजुएला से तेल आयात के संबंध में सरकार ने कहा कि संपादकीय में इस संबंध को "नया और जोखिमपूर्ण दाँव" के रूप में प्रस्तुत किया गया है।
- “We have maintained intensive bilateral engagement with Venezuela initiated well before the crisis and sustained throughout,” it said.
सरकार ने कहा, "हमने संकट शुरू होने से बहुत पहले ही वेनेजुएला के साथ गहन द्विपक्षीय संपर्क स्थापित किया था और उसे पूरे समय बनाए रखा।"
- “What The Hindu reads as sudden over-reliance is, on the record, a pre-existing channel simply activated at scale when the crisis demanded it — one of several such channels, not the only one.”
सरकार ने कहा, "जिसे द हिंदू अचानक अत्यधिक निर्भरता के रूप में देख रहा है, वह वास्तव में पहले से मौजूद एक व्यवस्था थी, जिसे संकट की आवश्यकता के अनुसार बड़े पैमाने पर सक्रिय किया गया। यह ऐसी अनेक व्यवस्थाओं में से केवल एक थी, एकमात्र नहीं।"

GS Paper III: Science and Technology		14 July 2026
TOPICS COVERED		
14J7	Why engineering evolution is a contest between cure and chaos विकासवादी प्रक्रिया का अभियांत्रिकीकरण उपचार और अराजकता के बीच एक संघर्ष क्यों है	
14J7	OpenAI launches Work agent in ChatGPT in India ओपनएआई ने भारत में चैटजीपीटी में 'वर्क' एजेंट लॉन्च किया	



Why engineering evolution is a contest between cure and chaos

Humans have acquired great power in the ability to manipulate cells and organisms, helping address major problems; however, understanding nature's journey over evolutionary time is both illustrative of what an engineered future can look like and a cautionary tale about its complexities

K. VijayRaghavan

A single mosquito carrying malaria parasites can infect dozens of people. A single gene in that mosquito can spread slowly through its population. Gene drives aim to favourably bend this inheritance by ensuring that a particular genetic change passes to far more than half of the offspring, helping reduce the disease burden.

Whether through applications in health, diagnostics, drug discovery, and development or agriculture, today's gene engineers can seem to have nature in the palm of their hands. Yet this misplaced view of unbridled human capacity has raised the false sense that any problem related to life on our planet can be addressed or solved by genetic engineering.

Humans have acquired great power in the ability to manipulate cells and organisms. This capacity has helped, and will continue to help, address major problems. Yet our abilities are still modest compared to what nature itself has achieved over billions of years. Manipulating nature in a predictable manner is not straightforward: it involves trade-offs. Understanding nature's journey over evolutionary time is both illustrative of what an engineered future can look like and a cautionary tale about the complexities that human-driven genetic engineering will face.

A drive to proliferate
Of the many applications of genetic engineering, 'gene drives' have received much attention. Gene drives are stretches of DNA engineered into the genome of an organism, say a mosquito. The stretches expand their presence in the population from generation to generation until eventually the inserted DNA is present in almost all the animals in that ecosystem.

Suppose the DNA has the effect of making mosquito males sterile. Males that do not carry the gene drive can mate with females that do, but the progeny, both males and females, will carry the gene drive. This could, in principle, drive the population of mosquitoes to sterility or collapse.

Proponents point to how this can greatly reduce, or even eliminate, disease-carrying vectors such as mosquitoes that transmit malaria or dengue. Critics point to possible failure through the development of resistance, environmental concerns, and the potential for unanticipated biological consequences. If we are to form a considered opinion on this, it will be useful to understand the past, present, and likely future of gene drives.

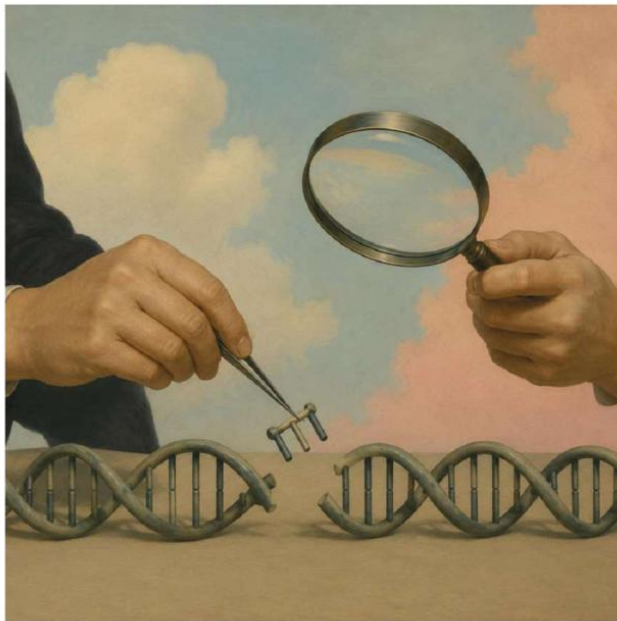
From viruses to whales, the stretches of DNA called genes share a common feature: the drive to replicate successfully and amplify in populations. For genes, the organism is merely the vehicle to achieve this goal. The reproductive success of the organism is essential to serve this purpose. A virus that infects a host, multiplies several thousand times, exits, and infects hundreds of other hosts is successful at this game. If it is so virulent or the host so weak that it kills the host before it can replicate and spread, it will have failed.

An infection may weaken the host but that does not matter for the genes in the virus. For example, a person with COVID-19 may suffer severe complications that render them incapacitated or even dead. The virus does not care: it has used its human host, amplified its genome, and gone on to propagate elsewhere. But if the incapacitated person is of reproductive age, their genes may not be transmitted to progeny. So while genes may be selfish, they are also selected against gluttony.

Viruses are not gene drives in the strict sense yet they are useful illustrations of the selfish logic of genes – and of the many ways in which genetic material can use living hosts to amplify itself. Smallpox, measles, mumps, and rubella are examples that can devastate human populations while viruses carried by whiteflies and the papaya ringspot virus affect agriculture.

While SARS-CoV-2 adopted a 'hit-and-run' strategy, many other viruses are more surreptitious. The human papillomavirus (HPV), for example, can integrate parts of its genome into our cells while also replicating and being transmitted through sexual contact. Once integrated, viral elements can sometimes persist and amplify within cells. But unless such elements enter the sperm or egg, they usually face an evolutionary dead end.

Viral, bacterial, fungal, and parasite infections are not the only ways genes amplify themselves. Our genome, and



Humans have acquired great power in their ability to manipulate cells and organisms. This capacity has helped, and will continue to help, address major problems. Yet they are also modest compared to what nature has achieved over billions of years. IMAGE CREDIT: WITH A

that of most organisms, is loaded with stretches of DNA called transposable elements (earlier called jumping genes). These elements replicate and increase their number within genomes. They are typically distributed in the regions between genes, using the host's machinery to amplify themselves without fatally disrupting survival.

Sometimes, these elements can land within genes and cause the host problems such as cancer, or land in regions that regulate a gene and confer a new function. Current estimates suggest about a quarter of human regulatory elements have signs of originating in transposable elements. These elements have become 'domesticated' and repurposed to regulate host genes. The placenta, the immune system, and some brain functions all bear such signs.

When naturally occurring elements use their hosts to amplify themselves, they can weaken their hosts as they use the hosts' resources. But they cannot do this in an unbridled manner. The host also fights back, developing powerful resistance, silencing, and immune systems. Often, the invasive genes become beneficial residents whose sequences the host co-opts to develop new functions. This evolutionary balance is important. Natural 'drivers' are constrained by selection, host resistance, and the wider biological context in which they operate. Engineered drives, if we build them, seek to harness the same logic – but for our ends and at our pace.

A profound insight

We know all this thanks to advances in molecular biology and genetic engineering. A substantial part of our understanding of human biology comes from studies on organisms such as bacteria, yeast, fruit flies, and mice. Germ-line transformation is a tool by which DNA from the same species or from other species can be inserted into an organism so that it can be transmitted from generation to generation.

Scientists have deployed this ability in many organisms (excluding humans) to reveal the function of genes, transforming our understanding of biology. Today, genetic systems based on transposable elements are also used in gene therapy vectors and in CAR T-cell therapy to treat cancers.

In 2003, the evolutionary biologist Austin Burt published an important theoretical paper in which he suggested something that seems obvious in hindsight. Most genes in animals and plants come in two copies, one on each of the two chromosomes. If a site-specific

The safest aircraft is one that does not take off. How we balance the risks and benefits of the flight of gene drives is a challenge that each country will address in different ways. The reality is that we will soon have field data on both the concerns and the benefits, and our discussions and debates need to be prepared for this future

selfish element inserted on one chromosome also had a way to cut the matching sequence on the homologous chromosome and then copy itself into that cut site, it would transform the way the element was transmitted from generation to generation.

That is, instead of being inherited by only half the progeny – as Mendel's rules would predict – it could bias inheritance in its favour and spread rapidly through a population. Burt proposed that such "super-Mendelian" inheritance could be used either to collapse populations by targeting essential or fertility-related genes or to alter populations, for example by making mosquitoes unable to transmit malaria parasites.

Together with advances such as improvements to the CRISPR/Cas9 technology, synthetic gene drives have become practically feasible. When the drive's chromosome pairs with a non-drive chromosome, it can cut the corresponding sequence and copy itself across. It is today possible to build, on the computer and in the laboratory, several kinds of gene drives: those that reduce or collapse populations of organisms and others that make the mosquito resistant to the malaria parasite, thus reducing disease burden without killing off mosquitoes.

Preparing our debates

There are potential dangers, real, and exaggerated, with the release of gene drives. Unlike pesticides, there is no simple 'recall' button. As with drugs, target populations can evolve resistance. Rare events could, in principle, transmit the drive beyond the intended target, resulting in unintended consequences. Some experts have also raised biosecurity concerns, including the possibility of misuse. Finally, as we have seen with genetically modified crops, social and political acceptability varies with country and context.

Researchers and policymakers have widely discussed these concerns and have

developed (or are developing) technologies to address them. For example, 'daisy-chain' or other self-limiting drives, which require several elements to propagate and therefore have a lower chance of spreading indefinitely, are in the works. Drives with greater control of the CRISPR/Cas9 system are being built. Scientists are also working on 'reversal drives' to undo the spread, if required, and on split-drive systems that separate key components of the machinery.

To be clear, these concerns have legitimate bases. We know of how invasive species and naturally occurring inheritance-biasing elements have caused population bottlenecks and ecological disruption. Engineered drives are not immune to such concerns, and we need to keep a few points in mind.

First, how do the risks compare with the benefits? If gene drives can be used against parasite vectors such as mosquitoes, how many lives will be saved, and can the risks be minimised? Other methods will also need to be used, and the risk-benefit analysis is complex.

Second, are the technologies to deal with unintended consequences in place? Is the regulatory system required to take a composite view of value in place before one moves from laboratory demonstration to the field?

The U.S. National Academies of Sciences and the World Health Organization have proposed phased testing frameworks, with each stage requiring ecological data and community consent before proceeding.

We are in the same position with gene drives as humankind has found itself with other transformative technologies. The speed with which the capability arrives is often faster than social, political, and regulatory understanding. The selfish gene evolved remarkable mechanisms to propagate itself over billions of years. We now have the ability to use our understanding of how such elements work to make our own drives.

What we do and how we do it will say less about the gene's selfishness than about our own wisdom. The safest aircraft is one that does not take off. How we balance the risks and benefits of the flight of gene drives is a challenge that each country will address in different ways. The reality is that we will soon have field data on both the concerns and the benefits, and our discussions and debates need to be prepared for this future.

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14J7. Why engineering evolution is a contest between cure and chaos विकासवादी प्रक्रिया का

अभियांत्रिकीकरण उपचार और अराजकता के बीच एक संघर्ष क्यों है

• **Gene drives are stretches of DNA engineered into the genome of an organism, say a mosquito.**

जीन ड्राइव किसी जीव, जैसे कि मच्छर, के जीनोम में अभिकल्पित रूप से प्रविष्ट कराए गए डीएनए के खंड होते हैं।

• **The stretches expand their presence in the population from generation to generation until eventually the inserted DNA is present in almost all the animals in that ecosystem.**

ये खंड पीढ़ी-दर-पीढ़ी जनसंख्या में अपनी उपस्थिति का विस्तार करते हैं, जब तक कि अंततः प्रविष्ट किया गया डीएनए उस पारिस्थितिकी तंत्र के लगभग सभी जीवों में उपस्थित न हो जाए।

• **Suppose the DNA has the effect of making mosquito males sterile.**

मान लीजिए कि यह डीएनए मच्छरों के नर को बाँझ बनाने का प्रभाव उत्पन्न करता है।

• **Males that do not carry the gene drive can mate with females that do, but the progeny, both males and females, will carry the gene drive.**

जो नर जीन ड्राइव को वहन नहीं करते, वे उन मादाओं के साथ संयोग कर सकते हैं जो इसे वहन करती हैं, किंतु उनकी संतति, चाहे नर हो या मादा, जीन ड्राइव को वहन करेगी।

- This could, in principle, drive the population of mosquitoes to sterility or collapse. सैद्धांतिक रूप से, इससे मच्छरों की जनसंख्या बाँझपन या पतन की ओर बढ़ सकती है।
- Proponents point to how this can greatly reduce, or even eliminate, disease-carrying vectors such as mosquitoes that transmit **malaria** or **dengue**.



समर्थकों का कहना है कि इससे **मलेरिया** अथवा **डेंगू** फैलाने वाले मच्छरों जैसे रोग-वाहक **वेक्टरों** की संख्या में अत्यधिक कमी लाई जा सकती है या उन्हें पूर्णतः समाप्त भी किया जा सकता है।

- Critics point to possible failure through the development of resistance, environmental concerns, and the potential for unanticipated biological consequences.
आलोचक प्रतिरोध विकसित होने के कारण संभावित विफलता, पर्यावरणीय चिंताओं तथा अप्रत्याशित जैविक परिणामों की संभावना की ओर संकेत करते हैं।
- If we are to form a considered opinion on this, it will be useful to understand the past, present, and likely future of **gene drives**.

यदि हमें इस विषय पर सुविचारित मत बनाना है, तो **जीन ड्राइव** के अतीत, वर्तमान और संभावित भविष्य को समझना उपयोगी होगा।

- From **viruses** to whales, the stretches of **DNA** called **genes** share a common feature: the drive to replicate successfully and amplify in populations.

विषाणुओं से लेकर व्हेल तक, **जीन** कहलाने वाले **डीएनए** के खंडों में एक समान विशेषता होती है—

सफलतापूर्वक प्रतिकृति बनाना और जनसंख्या में स्वयं का विस्तार करना।

- For **genes**, the organism is merely the vehicle to achieve this goal.
जीनों के लिए जीव मात्र इस उद्देश्य की प्राप्ति का माध्यम होता है।
- The reproductive success of the organism is essential to serve this purpose.
इस उद्देश्य की पूर्ति के लिए जीव की प्रजनन सफलता अत्यंत आवश्यक होती है।
- A **virus** that infects a host, multiplies several thousand times, exits, and infects hundreds of other hosts is successful at this game.

कोई **विषाणु** जो एक पोषक को संक्रमित करता है, हजारों गुना बढ़ता है, बाहर निकलता है और सैकड़ों अन्य पोषकों को संक्रमित करता है, वह इस प्रक्रिया में सफल माना जाता है।

- If it is so virulent or the host so weak that it kills the host before it can replicate and spread, it will have failed.
यदि वह इतना अधिक विषाणुकारी हो, अथवा पोषक इतना दुर्बल हो कि प्रतिकृति बनाने और फैलने से पहले ही पोषक की मृत्यु हो जाए, तो वह असफल माना जाएगा।

- An infection may weaken the host but that does not matter for the **genes** in the **virus**.
संक्रमण पोषक को कमजोर कर सकता है, किंतु **विषाणु** के **जीनों** के लिए इसका कोई महत्व नहीं होता।

- For example, a person with **COVID-19** may suffer severe complications that render them incapacitated or even dead.

उदाहरण के लिए, **कोविड-19** से संक्रमित व्यक्ति गंभीर जटिलताओं का शिकार हो सकता है, जिससे वह अक्षम हो जाए या उसकी मृत्यु भी हो सकती है।

- The **virus** does not care: it has used its human host, amplified its genome, and gone on to propagate elsewhere.

विषाणु को इससे कोई सरोकार नहीं होता; वह मानव पोषक का उपयोग कर अपने जीनोम का विस्तार करता है और अन्यत्र फैल जाता है।

- But if the incapacitated person is of reproductive age, their **genes** may not be transmitted to progeny.

किन्तु यदि वह अक्षम व्यक्ति प्रजनन आयु का है, तो उसके **जीन** अगली पीढ़ी तक नहीं पहुँच पाएँगे।

- So while **genes** may be selfish, they are also selected against gluttony.

अतः यद्यपि **जीन** स्वार्थी हो सकते हैं, फिर भी अत्यधिक लालच के विरुद्ध प्राकृतिक चयन कार्य करता है।

- **Viruses** are not **gene drives** in the strict sense yet they are useful illustrations of the selfish logic of **genes** — and of the many ways in which genetic material can use living hosts to amplify itself.

यद्यपि **विषाणु** कठोर अर्थों में **जीन ड्राइव** नहीं हैं, फिर भी वे **जीनों** के स्वार्थी तर्क तथा उन अनेक तरीकों का उपयोगी उदाहरण प्रस्तुत करते हैं जिनसे आनुवंशिक पदार्थ जीवित पोषकों का उपयोग कर स्वयं का विस्तार करता है।

- **Smallpox, measles, mumps, and rubella** are examples that can devastate human populations while **viruses** carried by **whiteflies** and the **papaya ringspot virus** affect agriculture.
चेचक, खसरा, गलसुआ तथा रूबेला ऐसे उदाहरण हैं जो मानव जनसंख्या को गंभीर रूप से प्रभावित कर सकते हैं, जबकि **श्वेत मक्खियों** द्वारा वहन किए जाने वाले विषाणु तथा **पपीता रिंगस्पॉट विषाणु** कृषि को प्रभावित करते हैं।
- While **SARS-CoV-2** adopted a 'hit-replicate-run' strategy, many other **viruses** are more **surreptitious**.
जहाँ **SARS-CoV-2** ने 'प्रहार करो-प्रतिकृति बनाओ-आगे बढ़ो' रणनीति अपनाई, वहीं अनेक अन्य विषाणु अधिक **गुप्त रूप से कार्य करते हैं।**
- The **human papillomavirus (HPV)**, for example, **can integrate parts of its genome into ours while also replicating and being transmitted through sexual contact**.
उदाहरण के लिए, **ह्यूमन पैपिलोमावायरस (एचपीवी)** अपने जीनोम के कुछ भागों को हमारे जीनोम में समाहित कर सकता है तथा साथ ही अपनी प्रतिकृति बनाते हुए यौन संपर्क के माध्यम से प्रसारित भी हो सकता है।
- Once integrated, viral elements can sometimes persist and amplify within cells.
एक बार समाहित हो जाने पर, विषाणु संबंधी तत्व कभी-कभी कोशिकाओं के भीतर बने रहते हैं और अपनी संख्या बढ़ाते हैं।
- But unless such elements enter the sperm or egg, they usually face an evolutionary dead end.
किन्तु जब तक ऐसे तत्व शुक्राणु या अंडाणु में प्रवेश नहीं करते, तब तक वे सामान्यतः विकासवादी दृष्टि से अंतिम स्थिति का सामना करते हैं।
- **Viral, bacterial, fungal, and parasite** infections are not the only way **genes** amplify themselves.
विषाणुजनित, जीवाणुजनित, कवकीय तथा परजीवी संक्रमण ही जीनों के स्वयं का विस्तार करने का एकमात्र माध्यम नहीं हैं।
- Our genome, and that of most organisms, is loaded with **stretches of DNA called transposable elements (earlier called jumping genes)**.
हमारा जीनोम तथा अधिकांश जीवों का जीनोम **डीएनए** के उन खंडों से भरा हुआ है जिन्हें **ट्रांसपोजेबल एलिमेंट्स** (पूर्व में **जंपिंग जीन** कहा जाता था) कहा जाता है।
- These elements replicate and increase their number within genomes.
ये तत्व जीनोम के भीतर अपनी प्रतिकृति बनाते हैं और अपनी संख्या बढ़ाते हैं।
- They are typically distributed in the regions between genes, using the host's machinery to amplify themselves without fatally disrupting survival.
ये सामान्यतः जीनों के बीच के क्षेत्रों में पाए जाते हैं तथा पोषक की जैविक प्रणाली का उपयोग करते हुए स्वयं का विस्तार करते हैं, बिना उसके अस्तित्व को घातक रूप से प्रभावित किए।
- Sometimes, these elements can land within genes and cause the host problems such as **cancer**, or land in regions that regulate a gene and confer a new function.
कभी-कभी ये तत्व जीनों के भीतर पहुँचकर **कैंसर** जैसी समस्याएँ उत्पन्न कर सकते हैं, अथवा उन क्षेत्रों में पहुँच सकते हैं जो किसी जीन का नियमन करते हैं और उसे नया कार्य प्रदान कर सकते हैं।
- Current estimates suggest about a quarter of human regulatory elements have signs of originating in **transposable elements**.
वर्तमान आकलनों के अनुसार, मानव के लगभग एक-चौथाई नियामक तत्वों की उत्पत्ति **ट्रांसपोजेबल एलिमेंट्स** से होने के संकेत मिलते हैं।
- These elements have become '**domesticated**' and repurposed to regulate host genes.
ये तत्व '**घरेलूकृत**' हो गए हैं और पोषक के जीनों के नियमन के लिए नए उद्देश्य से उपयोग में लाए गए हैं।
- The **placenta**, the **immune system**, and some **brain functions** all bear such signs.
अपरा (प्लेसेंटा), प्रतिरक्षा तंत्र, तथा मस्तिष्क की कुछ कार्यप्रणालियाँ ऐसे संकेत प्रदर्शित करती हैं।

- When naturally occurring elements use their hosts to amplify themselves, they can weaken their hosts as they use the hosts' resources.
जब प्राकृतिक रूप से विद्यमान तत्व स्वयं का विस्तार करने के लिए अपने पोषकों का उपयोग करते हैं, तब वे पोषकों के संसाधनों का उपयोग करते हुए उन्हें कमजोर कर सकते हैं।
- But they cannot do this in an unbridled manner.
किन्तु वे ऐसा अनियंत्रित रूप से नहीं कर सकते।
- The host also fights back, developing powerful **resistance, silencing, and immune systems**.
पोषक भी प्रतिकार करता है तथा शक्तिशाली प्रतिरोध, जीन मौनकरण, और प्रतिरक्षा तंत्र विकसित करता है।
- Often, the invasive genes become beneficial residents whose sequences the host co-opts to develop new functions.
अनेक बार, आक्रामक जीन लाभकारी निवासी बन जाते हैं, जिनके अनुक्रमों का उपयोग पोषक नई कार्यप्रणालियाँ विकसित करने के लिए करता है।
- This **evolutionary balance** is important.
यह विकासवादी संतुलन अत्यंत महत्वपूर्ण है।
- Natural '**drivers**' are constrained by **selection, host resistance**, and the wider biological context in which they operate.
प्राकृतिक 'ड्राइवर' प्राकृतिक चयन, पोषक प्रतिरोध, तथा उस व्यापक जैविक संदर्भ द्वारा सीमित रहते हैं जिसमें वे कार्य करते हैं।
- Engineered drives**, if we build them, seek to harness the same logic — but for our ends and at our pace.
यदि हम अभिकल्पित जीन ड्राइव विकसित करते हैं, तो उनका उद्देश्य इसी तर्क का उपयोग करना होगा— किन्तु हमारे उद्देश्यों और हमारी गति के अनुसार।

A profound insight एक गहन अंतर्दृष्टि

- We know all this thanks to advances in **molecular biology** and **genetic engineering**.
हम यह सब आणविक जीवविज्ञान तथा आनुवंशिक अभियांत्रिकी में हुई प्रगति के कारण जानते हैं।
- A substantial part of our understanding of **human biology** comes from studies on organisms such as **bacteria, yeasts, fruit flies, and mice**.
मानव जीवविज्ञान के बारे में हमारी समझ का एक बड़ा भाग जीवाणुओं, यीस्ट, फल मक्खियों तथा चूहों जैसे जीवों पर किए गए अध्ययनों से प्राप्त हुआ है।
- Germ-line transformation** is a tool by which **DNA** from the same species or from other species can be inserted into an organism so that it can be transmitted from generation to generation.
जर्म-लाइन रूपांतरण एक ऐसी तकनीक है, जिसके माध्यम से उसी प्रजाति अथवा अन्य प्रजातियों का डीएनए किसी जीव में प्रविष्ट कराया जा सकता है, ताकि वह एक पीढ़ी से दूसरी पीढ़ी तक स्थानांतरित हो सके।
- Scientists have deployed this ability in many organisms (excluding **humans**) to reveal the function of **genes**, transforming our understanding of **biology**.
वैज्ञानिकों ने मनुष्यों को छोड़कर अनेक जीवों में इस क्षमता का उपयोग जीनों के कार्यों को समझने के लिए किया है, जिससे जीवविज्ञान के प्रति हमारी समझ में परिवर्तन आया है।
- Today, **genetic systems** based on **transposable elements** are also used in **gene therapy vectors** and in **CAR T-cell therapy** to treat **cancers**.
आज स्थानांतरित होने वाले आनुवंशिक तत्वों पर आधारित आनुवंशिक प्रणालियों का उपयोग जीन थेरेपी वेक्टरों तथा CAR T-कोशिका चिकित्सा में कैंसर के उपचार के लिए भी किया जाता है।
- In 2003, the **evolutionary biologist Austin Burt** published an important theoretical paper in which he suggested something that seems obvious in hindsight.



2003 में विकासवादी जीवविज्ञानी ऑस्टिन बर्ट ने एक महत्वपूर्ण सैद्धांतिक शोध-पत्र प्रकाशित किया, जिसमें उन्होंने ऐसी अवधारणा प्रस्तुत की जो बाद में स्पष्ट और स्वाभाविक प्रतीत होती है।

- Most **genes** in **animals** and **plants** come in two copies, one on each of the two **chromosomes**.
- पशुओं और पौधों में अधिकांश जीन दो प्रतियों में पाए जाते हैं, जिनमें से प्रत्येक दो गुणसूत्रों में से एक पर स्थित होती है।
- If a **site-specific selfish element** inserted on one **chromosome** also had a way to cut the matching sequence on the **homologous chromosome** and then copy itself into that cut site, it would transform the way the element was transmitted from generation to generation. यदि एक गुणसूत्र पर स्थित स्थल-विशिष्ट स्वार्थी आनुवंशिक तत्व के पास समजात गुणसूत्र पर स्थित समान अनुक्रम को काटने तथा स्वयं को उस कटे हुए स्थान पर प्रतिलिपित करने की क्षमता हो, तो यह उस तत्व के एक पीढ़ी से दूसरी पीढ़ी तक स्थानांतरण के तरीके को परिवर्तित कर देगा।
- That is, instead of being inherited by only half the **progeny** — as **Mendel's rules** would predict — it could bias **inheritance** in its favour and spread rapidly through a **population**. अर्थात्, मेंडल के नियमों के अनुसार केवल आधी संतानों में विरासत में मिलने के बजाय, यह वंशानुक्रम को अपने पक्ष में मोड़ सकता है और किसी जनसंख्या में तीव्र गति से फैल सकता है।
- Burt proposed that such "**super-Mendelian**" **inheritance** could be used either to collapse **populations** by targeting essential or **fertility-related genes** or to alter populations, for example by making **mosquitoes** unable to transmit **malaria parasites**. बर्ट ने प्रस्तावित किया कि इस प्रकार का "सुपर-मेंडेलियन" वंशानुक्रम आवश्यक अथवा प्रजनन-संबंधी जीनों को लक्षित करके जनसंख्या को समाप्त करने या उसमें परिवर्तन लाने के लिए उपयोग किया जा सकता है, उदाहरणस्वरूप मच्छरों को मलेरिया परजीवियों का संचरण करने में असमर्थ बनाकर।
- Together with advances such as improvements to the **CRISPR/Cas9 technology**, **synthetic gene drives** have become practically feasible. **CRISPR/Cas9 प्रौद्योगिकी** में हुए सुधारों जैसी प्रगतियों के साथ कृत्रिम जीन ड्राइव का व्यावहारिक उपयोग संभव हो गया है।
- When the drive's **chromosome** pairs with a **non-drive chromosome**, it can cut the corresponding sequence and copy itself across. जब ड्राइव वाला गुणसूत्र किसी गैर-ड्राइव गुणसूत्र के साथ युग्मित होता है, तो वह संबंधित अनुक्रम को काटकर स्वयं की प्रतिलिपि वहाँ स्थापित कर सकता है।
- It is today possible to build, on the **computer** and in the **laboratory**, several kinds of **gene drives**: those that reduce or collapse **populations** of organisms and others that make the **mosquito** resistant to the **malaria parasite**, thus reducing **disease burden** without killing off mosquitoes.

OpenAI launches work agent in ChatGPT in India

GS III: S&T
The Hindu Bureau
BENGALURU

San Francisco-based Artificial Intelligence AI research company OpenAI introduced ChatGPT Work, a new agent in ChatGPT that can take action across apps and files, in India on Monday.

The firm claimed that ChatGPT Work was designed to complete complex, multi-step tasks by working across various connected apps, files and workflows and stay with complex projects for hours.

The work feature is powered by the company's new GPT-5.6 model family which comprises Sol, Terra and Luna. According to OpenAI, ChatGPT Work can generate finished outputs such as documents,



The work feature is powered by the company's new GPT-5.6 model family which comprises Sol, Terra and Luna. REUTERS

spreadsheets, presentations and web applications by using context from apps and files that users choose to connect with it.

The AI firm also redesigned its desktop application, bringing together Chat, Work and Codex all in a single interface. The update included a

plugin support for services such as Slack, Gmail, Google Drive, calendars and CRM platforms, along with Scheduled Tasks, an in-app browser, the company said. OpenAI further said that the roll-out was starting globally and continue gradually towards full availability in a day.

आज कंप्यूटर तथा प्रयोगशाला में अनेक प्रकार के जीन ड्राइव विकसित करना संभव है। इनमें कुछ ऐसे हैं जो जीवों की जनसंख्या को कम या समाप्त कर देते हैं, जबकि अन्य मच्छरों को मलेरिया परजीवी के प्रति प्रतिरोधी बना देते हैं, जिससे रोग का बोझ कम होता है, बिना मच्छरों का उन्मूलन किए।

14J7. OpenAI launches Work agent in ChatGPT in India

ओपनएआई ने भारत में चैटजीपीटी में 'वर्क' एजेंट लॉन्च किया

- San Francisco-based Artificial Intelligence (AI) research company OpenAI introduced ChatGPT Work, a new agent in ChatGPT, that can take action across apps and files, in India on Monday.
सैन फ्रांसिस्को स्थित कृत्रिम बुद्धिमत्ता (AI) अनुसंधान कंपनी ओपनएआई (OpenAI) ने सोमवार को भारत में चैटजीपीटी (ChatGPT) के अंतर्गत चैटजीपीटी वर्क (ChatGPT Work) नामक एक नया एजेंट प्रस्तुत किया, जो विभिन्न ऐप्स और फ़ाइलों में कार्य कर सकता है।
- The firm claimed that ChatGPT Work was designed to complete complex, multi-step tasks by working across various connected apps, files and workflows and stay with complex projects for hours.
कंपनी ने दावा किया कि चैटजीपीटी वर्क को विभिन्न जुड़े हुए ऐप्स, फ़ाइलों और वर्कफ़्लो में कार्य करते हुए जटिल बहु-चरणीय कार्यों को पूरा करने तथा कई घंटों तक जटिल परियोजनाओं पर कार्य करने के लिए डिज़ाइन किया गया है।
- The work feature is powered by the company's new GPT-5.6 model family which comprises Sol, Terra and Luna.
यह वर्क सुविधा कंपनी के नए GPT-5.6 मॉडल परिवार द्वारा संचालित है, जिसमें Sol, Terra और Luna शामिल हैं।
- According to OpenAI, ChatGPT Work can generate finished outputs such as documents, spreadsheets, presentations and web applications by using context from apps and files that users choose to connect with it.
ओपनएआई के अनुसार, चैटजीपीटी वर्क उपयोगकर्ताओं द्वारा इससे जोड़े गए ऐप्स और फ़ाइलों के संदर्भ का उपयोग करके दस्तावेज़, स्प्रेडशीट, प्रस्तुतियाँ तथा वेब अनुप्रयोग जैसे तैयार परिणाम उत्पन्न कर सकता है।
- The AI firm also redesigned its desktop application, bringing together Chat, Work and Codex all in a single interface.
इस एआई कंपनी ने अपने डेस्कटॉप अनुप्रयोग का भी पुनः डिज़ाइन किया है, जिसमें Chat, Work और Codex को एक ही इंटरफ़ेस में एकीकृत किया गया है।
- The update included plugin support for services such as Slack, Gmail, Google Drive, calendars and CRM platforms, along with Scheduled Tasks, an in-app browser, the company said.
कंपनी के अनुसार, इस अद्यतन में Slack, Gmail, Google Drive, कैलेंडर, तथा CRM प्लेटफ़ॉर्म जैसी सेवाओं के लिए प्लगइन समर्थन, Scheduled Tasks, तथा एक इन-ऐप ब्राउज़र भी शामिल किया गया है।
- OpenAI further said that the roll-out was starting globally and continue gradually towards full availability in a day.
ओपनएआई ने आगे कहा कि इस सुविधा का वैश्विक स्तर पर चरणबद्ध रोल-आउट प्रारंभ किया जा रहा है और यह क्रमशः एक दिन के भीतर पूर्ण उपलब्धता की ओर बढ़ेगा।

GS Paper III: Environment		14 July 2026
TOPICS COVERED		
14J7	Study finds efficient way to filter nuclear wastewater अध्ययन में परमाणु अपशिष्ट जल को प्रभावी ढंग से शुद्ध करने की विधि का पता चला	



Study finds efficient way to filter nuclear wastewater

GS III: Environment
Vasudevan Mukunth

In 2023, Japan began a decades-long and controversial process — it began releasing treated wastewater from the ruined Fukushima nuclear power plant into the Pacific Ocean. The water had been filtered to remove most heavy radioactive elements, yet one particular contaminant remained: tritium.

Tritium is a radioactive isotope of hydrogen. When it bonds with oxygen, it forms tritiated water, or HTO. Because tritiated water is chemically almost identical to regular water, it is extremely difficult to separate the two. For many decades, officials in the global nuclear industry have opted to dilute tritiated water, i.e. mixing it in large quantities of regular water.

In absolute terms, the treated wastewater will make up only 0.000000000189% of the Pacific Ocean's volume even after all of it is released. However, the effects of the tritiated water are expected to be more apparent in the waters flanked by South Korea and China. M.V. Ramana, professor at the University of British Columbia, had also told *The Hindu* in 2023 that tritium is "easily absorbed by the bodies of living creatures" and "rapidly distributed ... via blood".

A new study published in *Environmental Science & Technology* may finally offer a way to efficiently clean tritiated water. The research team, from across China, achieved this using a metal-organic framework, work on which won the Nobel Prize for chemistry last year.

जब यह ऑक्सीजन के का निर्माण करता है।

- Because tritiated water is chemically almost identical to regular water, it is extremely difficult to separate the two.

चूँकि ट्रिटिएटेड जल रासायनिक रूप से सामान्य जल के लगभग समान होता है, इसलिए दोनों को अलग करना अत्यंत कठिन होता है।

- For many decades, officials in the global nuclear industry have opted to dilute tritiated water, i.e. mixing it in large quantities of regular water.

कई दशकों से वैश्विक परमाणु उद्योग के अधिकारी ट्रिटिएटेड जल को बड़ी मात्रा में सामान्य जल के साथ मिलाकर पतला करने का विकल्प अपनाते रहे हैं।

- In absolute terms, the treated wastewater will make up only 0.000000000189% of the Pacific Ocean's volume even after all of it is released.

पूर्ण मात्रा के संदर्भ में, संपूर्ण उपचारित अपशिष्ट जल छोड़े जाने के बाद भी वह प्रशांत महासागर के कुल आयतन का केवल 0.000000000189% ही होगा।

The current most practical way to remove tritium from tritiated water is water distillation, i.e. boiling water and separating the components based on their slightly different boiling points. But the difference is so feeble that operators need a distillation tower hundreds of metres tall, which is expensive, uses large amounts of energy, and impractical for the millions of tonnes of water stored at Fukushima.

Current distillation towers use systems called packings — materials inside the tower that provide surfaces where steam and liquid can interact. Until now, these packings were passive: they just sat there and let gravity do the work. In the new study, the researchers made the packing material 'active'. They coated a stainless-steel mesh with a metal-organic framework called NH₂-MIL-101(Cr). A metal-organic framework is like a microscopic sponge. It has a very high surface area: the study found that adding NH₂-MIL-101(Cr) increased the available area of the packing by 32-fold. Second, the chromium-oxygen clusters inside the framework 'grabbed' tritium atoms from the liquid and swapped them with regular hydrogen atoms, with nitrogen and hydrogen attachments also facilitating this swapping.

The results were staggering. In laboratory tests, the team found that the modified packing achieved a separation efficiency of 42.5 theoretical plates per meter — a record-setting figure in the world of chemical engineering. At an industrial height of 10 m, the new material would be 134-times more effective than the current best-reported material. It is also one-million-times more effective than the standard commercial packings in the industry today.

"This strategy provides a new approach for improving the detritiation of tritiated water and reducing tritium releases to natural water bodies," the researchers wrote in the paper. "More broadly, the results highlight the potential of programmable porous materials to address challenging isotope-contaminant separations and contribute to safer and more sustainable management of nuclear energy systems."

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14J7. Study finds efficient way to filter nuclear wastewater

अध्ययन में परमाणु अपशिष्ट जल को प्रभावी ढंग से शुद्ध करने की विधि का पता चला

- In 2023, Japan began a decades-long and controversial process — it began releasing treated wastewater from the ruined Fukushima nuclear power plant into the Pacific Ocean.

2023 में जापान ने दशकों तक चलने वाली एक विवादास्पद प्रक्रिया आरंभ की, जिसके अंतर्गत उसने क्षतिग्रस्त फुकुशिमा परमाणु ऊर्जा संयंत्र से उपचारित अपशिष्ट जल को प्रशांत महासागर में छोड़ना प्रारंभ किया।

- The water had been filtered to remove most heavy radioactive elements, yet one particular contaminant remained: tritium.

इस जल को अधिकांश भारी रेडियोधर्मी तत्वों को हटाने के लिए शुद्ध किया गया था, फिर भी एक विशेष प्रदूषक ट्रिटियम शेष रह गया।

- Tritium is a radioactive isotope of hydrogen.

ट्रिटियम, हाइड्रोजन का एक रेडियोधर्मी समस्थानिक है।

- When it bonds with oxygen, it forms tritiated water, or HTO.

साथ बंध बनाता है, तो ट्रिटिएटेड जल (HTO)



- However, the effects of the **tritiated water** are expected to be more apparent in the waters flanked by **South Korea** and **China**.
फिर भी, ट्रिटिएटेड जल के प्रभाव दक्षिण कोरिया और चीन से लगे समुद्री क्षेत्रों में अधिक स्पष्ट होने की आशंका है।
- **M.V. Ramana**, professor at the **University of British Columbia**, had also told *The Hindu* in **2023** that **tritium** is “easily absorbed by the bodies of living creatures” and “rapidly distributed ... via blood”.
ब्रिटिश कोलंबिया विश्वविद्यालय के प्रोफेसर एम.वी. रमना ने **2023** में द हिंदू से कहा था कि ट्रिटियम “जीवित प्राणियों के शरीर द्वारा आसानी से अवशोषित हो जाता है” तथा “रक्त के माध्यम से तीव्रता से पूरे शरीर में फैल जाता है।”
- A new study published in **Environmental Science & Technology** may finally offer a way to efficiently clean **tritiated water**.
Environmental Science & Technology में प्रकाशित एक नए अध्ययन ने अंततः ट्रिटिएटेड जल को प्रभावी ढंग से शुद्ध करने का एक संभावित उपाय प्रस्तुत किया है।
- The research team, from across **China**, achieved this using a **metal-organic framework**, work on which won the **Nobel Prize for Chemistry** last year.
चीन के विभिन्न संस्थानों के शोधकर्ताओं ने यह उपलब्धि **मेटल-ऑर्गेनिक फ्रेमवर्क** का उपयोग करके प्राप्त की, जिस पर किए गए कार्य को पिछले वर्ष **रसायन विज्ञान का नोबेल पुरस्कार** प्रदान किया गया था।
- The **current most practical way to remove tritium from tritiated water is water distillation, i.e. boiling water and separating the components based on their slightly different boiling points**.
वर्तमान में ट्रिटिएटेड जल से ट्रिटियम हटाने का सबसे व्यावहारिक तरीका **जल आसवन** है, अर्थात् जल को उबालकर उसके घटकों को उनके थोड़े-से भिन्न क्वथनांक के आधार पर अलग करना।
- But the difference is so feeble that operators need a **distillation tower** hundreds of metres tall, which is expensive, uses large amounts of energy, and impractical for the millions of tonnes of water stored at **Fukushima**.
किन्तु यह अंतर इतना सूक्ष्म है कि इसके लिए सैकड़ों मीटर ऊँचे **आसवन टावर** की आवश्यकता होती है, जो अत्यधिक महँगा, ऊर्जा-गहन तथा **फुकुशिमा** में संग्रहीत लाखों टन जल के लिए अव्यावहारिक है।
- Current **distillation towers** use systems called **packings** — materials inside the tower that provide surfaces where steam and liquid can interact.
वर्तमान **आसवन टावरों** में **पैकिंग** नामक प्रणालियों का उपयोग किया जाता है, जो टावर के भीतर ऐसी सतह उपलब्ध कराती हैं जहाँ भाप और द्रव परस्पर संपर्क कर सकें।
- Until now, these **packings** were passive: they just sat there and let gravity do the work. अब तक ये **पैकिंग** निष्क्रिय थीं; वे केवल अपनी जगह बनी रहती थीं और गुरुत्वाकर्षण को कार्य करने देती थीं।
- In the new study, the researchers made the **packing material** ‘active’.
नए अध्ययन में शोधकर्ताओं ने **पैकिंग सामग्री** को ‘सक्रिय’ बना दिया।
- They coated a **stainless-steel mesh** with a **metal-organic framework** called **NH2-MIL-101(Cr)**.
उन्होंने **स्टेनलेस-स्टील जाली** पर **NH2-MIL-101(Cr)** नामक **मेटल-ऑर्गेनिक फ्रेमवर्क** की परत चढ़ाई।
- A **metal-organic framework** is like a **microscopic sponge**.
मेटल-ऑर्गेनिक फ्रेमवर्क एक सूक्ष्म स्पंज के समान होता है।
- It has a very high **surface area**: the study found that adding **NH2-MIL-101(Cr)** increased the available area of the packing by **32-fold**.
इसका **पृष्ठीय क्षेत्रफल** अत्यधिक बड़ा होता है; अध्ययन में पाया गया कि **NH2-MIL-101(Cr)** जोड़ने से पैकिंग का उपलब्ध क्षेत्रफल **32 गुना** बढ़ गया।
- Second, the **chromium-oxygen clusters** inside the framework ‘grabbed’ **tritium** atoms from the liquid and swapped them with regular **hydrogen** atoms, with **nitrogen** and **hydrogen** attachments also facilitating this swapping.
दूसरे, इस फ्रेमवर्क के भीतर स्थित **क्रोमियम-ऑक्सीजन क्लस्टर** द्रव से ट्रिटियम परमाणुओं को ‘पकड़’ लेते हैं

और उन्हें सामान्य हाइड्रोजन परमाणुओं से बदल देते हैं, जिसमें नाइट्रोजन और हाइड्रोजन समूह भी इस अदला-बदली को सुगम बनाते हैं।

- The results were staggering.
परिणाम अत्यंत उल्लेखनीय रहे।
- In laboratory tests, the team found that the modified **packing** achieved a separation efficiency of **42.5 theoretical plates per meter** — a record-setting figure in the world of **chemical engineering**.

प्रयोगशाला परीक्षणों में टीम ने पाया कि संशोधित पैकिंग ने प्रति मीटर 42.5 थ्योरेटिकल प्लेट्स की पृथक्करण दक्षता प्राप्त की, जो रासायनिक अभियांत्रिकी के क्षेत्र में एक रिकॉर्ड स्तर का आँकड़ा है।

- At an industrial height of **10 m**, the new material would be **134-times** more effective than the current best-reported material.

10 मीटर की औद्योगिक ऊँचाई पर यह नई सामग्री वर्तमान में उपलब्ध सर्वश्रेष्ठ सामग्री की तुलना में **134 गुना** अधिक प्रभावी होगी।

- It is also **one-million-times** more effective than the standard commercial **packings** in the industry today.

यह आज उद्योग में प्रयुक्त मानक वाणिज्यिक पैकिंग की तुलना में **दस लाख गुना** अधिक प्रभावी है।

- “This strategy provides a new approach for improving the **detritiation** of **tritiated water** and reducing **tritium** releases to natural water bodies,” the researchers wrote in the paper.
शोधकर्ताओं ने अपने शोधपत्र में लिखा कि “यह रणनीति ट्रिटिएटेड जल के डी-ट्रिटिएशन में सुधार करने तथा प्राकृतिक जल निकायों में ट्रिटियम के उत्सर्जन को कम करने के लिए एक नया दृष्टिकोण प्रदान करती है।”
- “More broadly, the results highlight the potential of **programmable porous materials** to address challenging **isotope-contaminant separations** and contribute to safer and more sustainable management of **nuclear energy systems**.”

“व्यापक रूप से, ये परिणाम प्रोग्राम योग्य छिद्रयुक्त पदार्थों की उस क्षमता को रेखांकित करते हैं, जिसके माध्यम से जटिल समस्थानिक-प्रदूषक पृथक्करण की चुनौतियों का समाधान किया जा सकता है तथा परमाणु ऊर्जा प्रणालियों के अधिक सुरक्षित और सतत प्रबंधन में योगदान दिया जा सकता है।”

GS Paper III: Disaster Management		14 July 2026
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GS III: Disaster Management

Unsafe practices

Safety protocols should not be given short shrift in tourism and adventure

Survivor accounts of the Vietnam boat tragedy last week point to two clearly identifiable contributors. As the weather turned rough and the speedboat took a sharp turn, it tilted to the left. The passengers – all Indian tourists – sitting on the right fell to the left side. Almost all the passenger weight shifted at once, the boat lost balance and turned turtle. As it capsized, the boat captain and guide escaped through the open front door. Others who found an opening also jumped out. Those who could not leave were trapped inside the capsized boat and took in water. Rescuers pulled them ashore where first aid and resuscitation were attempted before they were moved to hospital. All this took precious time and casualties mounted as a result. Some 15 Indians are reported to have died while 17 survived. Four Vietnamese crew also survived. The Indians on the speedboat at Phú Quốc were among more than 100 employees that a mobile company had taken to Vietnam on a corporate incentive tour.

Industry data indicate that some three crore Indians visit foreign countries every year, with a significant proportion of them coming from non-metro cities. Many of the survivors at Phú Quốc were from such cities. South-East Asia has emerged as the preferred destination, with Thailand and Vietnam joining the traditional attractions of Singapore and Malaysia. Many of these new tourist spots are developing rapidly but, like India, have not fully strengthened safety-of-life practices. For instance, just as in India, pleasure boats operators may carry enough life jackets or distribute them but often do not insist that every passenger wears one. Life jackets keep people afloat with their heads above water if they end up in the sea. In Phú Quốc, passengers were reportedly given life jackets, but it is not yet confirmed whether they were all made to wear them before departure. Another basic safety feature should be ensuring that passengers remain securely strapped to their seats so that they do not shift during rough weather or sharp manoeuvres. Even small shifts in passenger weight can significantly affect the stability of a speedboat. This norm was violated in Phú Quốc. Vietnam in particular has witnessed a surge in tourism, with Indians forming a substantial share of visitors. Speedboat rides between the islets of the Phú Quốc archipelago and the main island are especially popular among Indian tourists. The Vietnamese government has promised to review safety standards on such boats and upgrade them where necessary. But Indians, aided by governments and operators, must strengthen their awareness of safety practices, especially those related to fire and water safety.

14J7. Unsafe practices

असुरक्षित प्रथाएँ

- **Safety protocols** should not be given short shrift in **tourism and adventure**.
पर्यटन और साहसिक गतिविधियों में सुरक्षा प्रोटोकॉल की उपेक्षा नहीं की जानी चाहिए।
- Survivor accounts of the **Vietnam** boat tragedy last week point to two clearly identifiable contributors.
पिछले सप्ताह वियतनाम में हुई नौका दुर्घटना के जीवित बचे लोगों के विवरण दो स्पष्ट कारणों की ओर संकेत करते हैं।
- As the weather turned rough and the **speedboat** took a sharp turn, it tilted to the left.
जैसे ही मौसम खराब हुआ और स्पीडबोट ने तीव्र मोड़ लिया, वह बाईं ओर झुक गई।
- The passengers — all **Indian tourists** — sitting on the right fell to the left side.
दाईं ओर बैठे सभी भारतीय पर्यटक बाईं ओर गिर पड़े।
- Almost all the passenger weight shifted at once, the **boat lost balance and turned turtle**.
लगभग सभी यात्रियों का भार एक साथ एक ओर स्थानांतरित हो गया, जिससे नौका का संतुलन बिगड़ गया और वह पलट गई।
- As it capsized, the **boat captain** and **guide** escaped through the open front door.
नौका के पलटते ही नौका कप्तान और मार्गदर्शक सामने के खुले द्वार से बाहर निकल गए।
- Others who found an opening also jumped out.
जिन अन्य लोगों को बाहर निकलने का मार्ग मिला, वे भी कूदकर बाहर निकल गए।
- Those who could not leave were trapped inside the capsized boat and took in water.
जो लोग बाहर नहीं निकल सके, वे पलटी हुई नौका के भीतर फँस गए और पानी में डूबने लगे।
- Rescuers pulled them ashore where **first aid** and **resuscitation** were attempted before they were moved to hospital.
बचावकर्मियों ने उन्हें किनारे लाकर प्राथमिक उपचार तथा पुनर्जीवन

(रेससिटेशन) का प्रयास किया, जिसके बाद उन्हें अस्पताल पहुँचाया गया।

- All this took precious time and casualties mounted as a result.
इन सभी प्रक्रियाओं में बहुमूल्य समय व्यतीत हुआ और परिणामस्वरूप मृतकों की संख्या बढ़ गई।
- Some **15 Indians** are reported to have died while **17 survived**.
रिपोर्टों के अनुसार, लगभग **15 भारतीयों** की मृत्यु हो गई, जबकि **17 लोग जीवित बच गए**।
- Four **Vietnamese crew** also survived.
वियतनामी चालक दल के चार सदस्य भी जीवित बच गए।
- The Indians on the speedboat at **Phú Quốc** were among more than **100 employees** that a **mobile company** had taken to Vietnam on a **corporate incentive tour**.
फू कुओक (Phú Quốc) में स्पीडबोट पर सवार भारतीय उन **100 से अधिक कर्मचारियों** में शामिल थे, जिन्हें एक मोबाइल कंपनी कॉर्पोरेट प्रोत्साहन यात्रा पर वियतनाम लेकर गई थी।



- Industry data indicate that some **three crore Indians** visit foreign countries every year, with a significant proportion of them coming from **non-metro cities**.
उद्योग के आँकड़ों के अनुसार, प्रत्येक वर्ष लगभग **तीन करोड़ भारतीय** विदेश यात्रा करते हैं, जिनमें से एक बड़ा वर्ग **गैर-महानगरीय शहरों** से आता है।
- Many of the survivors at **Phú Quốc** were from such cities.
फू कुओक में जीवित बचे अनेक लोग ऐसे ही शहरों से थे।
- South-East Asia** has emerged as the preferred destination, with **Thailand** and **Vietnam** joining the traditional attractions of **Singapore** and **Malaysia**.
दक्षिण-पूर्व एशिया प्रमुख पर्यटन गंतव्य के रूप में उभरा है, जहाँ **थाईलैंड** और **वियतनाम** भी **सिंगापुर** तथा **मलेशिया** जैसे पारंपरिक आकर्षणों के साथ जुड़ गए हैं।
- Many of these new tourist spots are developing rapidly but, like **India**, have not fully strengthened **safety-of-life practices**.
इनमें से अनेक नए पर्यटन स्थल तीव्र गति से विकसित हो रहे हैं, किंतु **भारत** की भाँति उन्होंने अभी तक **जीवन-सुरक्षा संबंधी व्यवस्थाओं** को पूरी तरह सुदृढ़ नहीं किया है।
- For instance, just as in **India**, pleasure boat operators may carry enough **life jackets** or distribute them but often do not insist that every passenger wears one.
उदाहरण के लिए, **भारत** की तरह मनोरंजन नौकाओं के संचालक पर्याप्त **जीवन रक्षक जैकेट** रखते या वितरित करते हैं, किंतु प्रायः यह सुनिश्चित नहीं करते कि प्रत्येक यात्री उसे पहने।
- Life jackets keep people afloat with their heads above water if they end up in the sea.**
जीवन रक्षक जैकेट समुद्र में गिर जाने की स्थिति में व्यक्ति को पानी पर तैरते रहने और उसका सिर पानी से ऊपर बनाए रखने में सहायता करती हैं।
- In **Phú Quốc**, passengers were reportedly given **life jackets**, but it is not yet confirmed whether they were all made to wear them before departure.
फू कुओक में यात्रियों को **जीवन रक्षक जैकेट** दिए जाने की सूचना है, किंतु यह अभी पुष्टि नहीं हुई है कि प्रस्थान से पूर्व सभी यात्रियों को उन्हें पहनना अनिवार्य किया गया था या नहीं।
- Another basic safety feature should be ensuring that passengers remain securely strapped to their seats so that they do not shift during rough weather or sharp manoeuvres.**
एक अन्य मूलभूत सुरक्षा उपाय यह होना चाहिए कि यात्रियों को उनकी सीटों पर सुरक्षित रूप से बाँधा जाए, ताकि खराब मौसम अथवा तीव्र मोड़ के दौरान उनका स्थान न बदले।