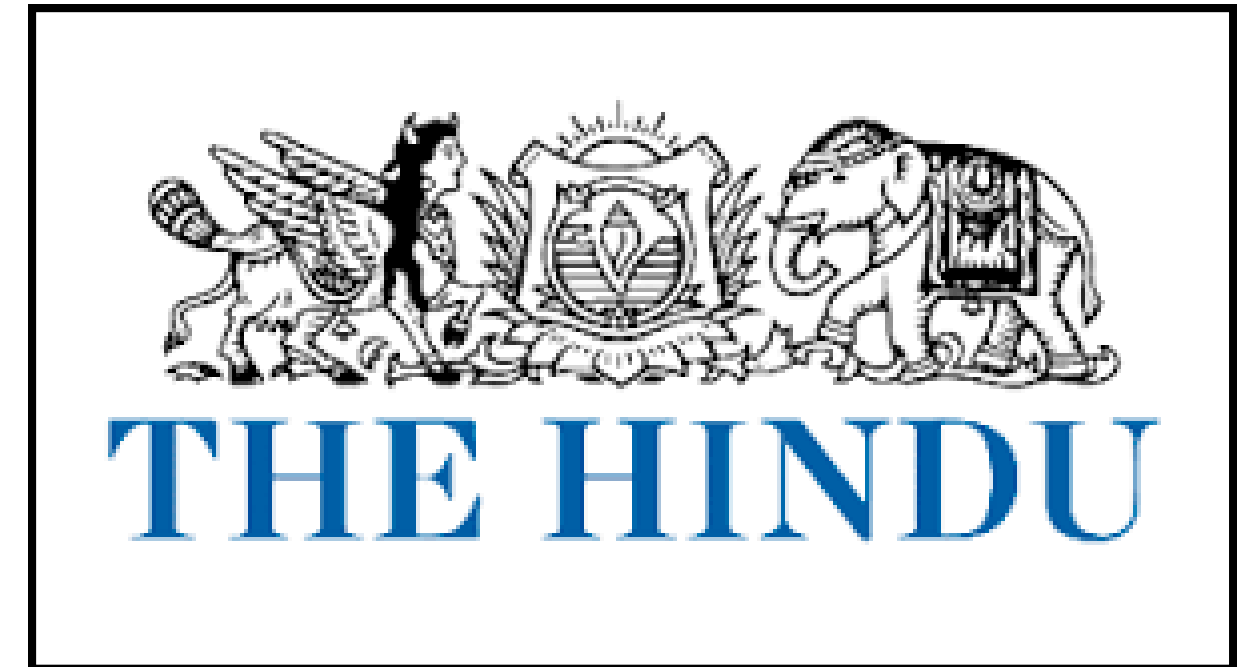




Topics



- Marine heatwaves
- Moon far side -tidal locking ,
Lunar liberation
- Unclassed forest
- Mains



By saurabh pandey sir.



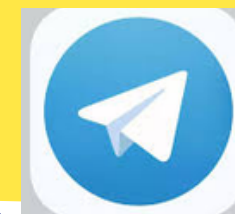
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Q' Marine heatwave will transform oceanic phenomena "Elucidate

प्रश्न'समुद्री हीटवेव समुद्री घटनाओं को बदल देगी'"स्पष्ट करें

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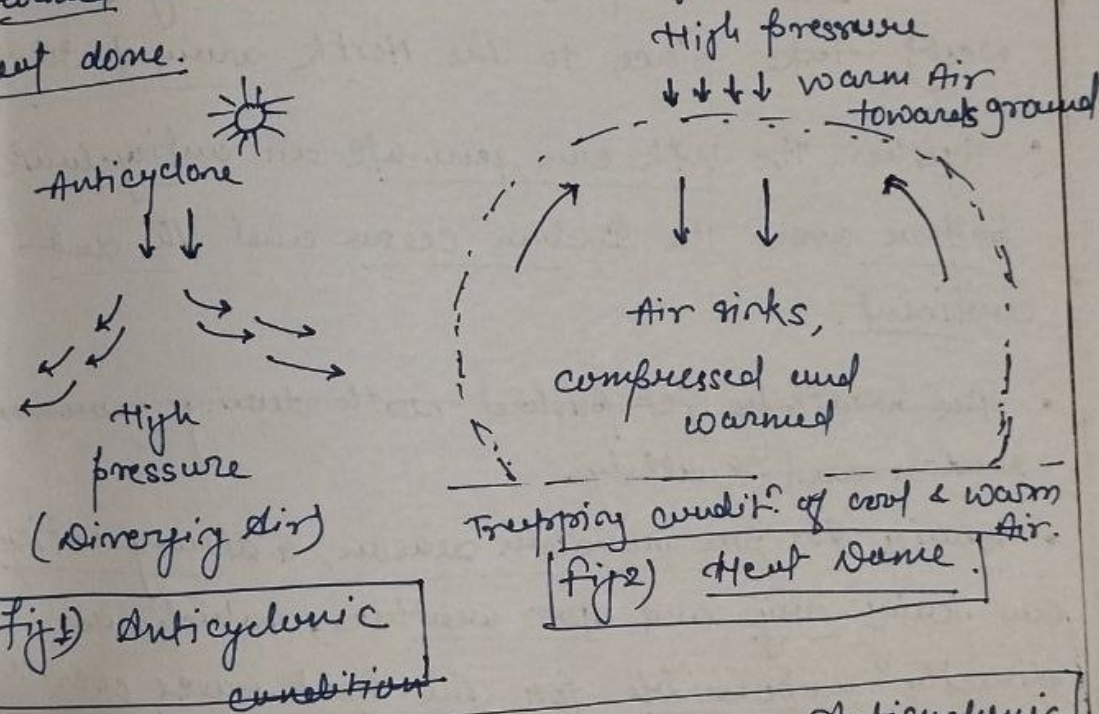


Ques

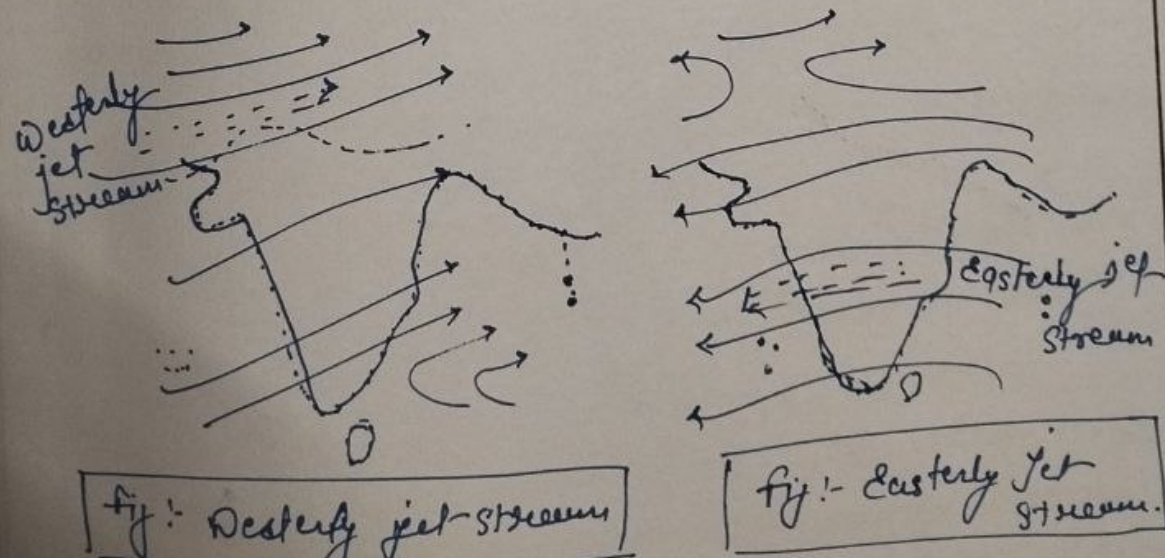
"Anticyclonic condition is the responsible factor for heat waves." Elucidate. (150 words)

Ans

An anticyclonic condition occurs when winds moving in a clockwise direction, with air sinking down in the middle of it. When air hits the ground, it is compressed and warmed and can create a high pressure heat dome.



Responsible factor for Heat waves: Anticyclonic condition



i) During the pre-monsoon, the upper level Indian Easterly Jet (strong winds coming from the east) begins to take place in the upper atmosphere, around 10° N latitude, across Bay of Bengal, Indian Peninsular and Arabian sea.

ii) A strong westerly jet (coming from west) take place to the North around 30° N.

iii) Together can generate an anticyclonic pattern over Indian ocean and subcontinent.

iv) A strong anticyclone can bring dry and hot weather, which is directly responsible for the intense heat waves over many parts of Indian.

Early Warning System to mitigate Heat Waves:-

Three-step approach - To mitigate and for recovery from extreme heat waves, requires location-specific information.

→ Ready - set - go → Ready to disaster response system.
 → set - Resource allocation and identifying hotspot to ensure disaster preparedness.
 → go - short and medium range forecast to manage disaster.

Way forward - To build resilience for the future by better predict and early warning systems. Govt, Departments and people need to be trained.

Warming of Indian Ocean set to accelerate: study

Jacob Koshy

NEW DELHI

From 1950 to 2020, the Indian Ocean had become warmer by 1.2 degrees Celsius, and climate models expect it to heat up a further 1.7 degrees Celsius to 3.8 degrees Celsius from 2020 to 2100. While we are familiar with heatwaves on land, “marine heatwaves”, their counterparts in the sea and linked to the rapid formation of cyclones, are expected to increase ten-fold from the current average of 20 days per year to 220-250 days per year.

Mostly attributable to global warming, the tropical Indian Ocean will likely be in a “near-permanent heatwave state” and accelerate coral bleaching, sea-grass destruction, and loss of kelp forests, affecting the fisheries sector adversely, said an analysis led by scientists at the Indian Institute of Tropical Meteorology (IITM), Pune.



The tropical Indian Ocean will likely be in a ‘near-permanent heatwave state’. FILE PHOTO

rology (IITM), Pune.

‘One Hiroshima bomb’

The heating of the ocean was not merely restricted to the surface but went deeper and increased the overall “heat content” of the ocean. The heat content of the Indian Ocean, when measured from surface to a depth of 2,000 metres, is currently increasing at the rate of 4.5 zetta-joules per decade, and is predicted to increase at a rate of 16-22 zetta-joules per decade in the future. Joule is a unit of energy and one zetta-joule is equal to one billion-trillion joules (10^{21}). “The future increase in heat content is comparable to adding the energy equivalent of one Hiroshima atomic bomb detonation every second, all day, every day, for a decade,” said Roxy Mathew-Koll, scientist at IITM and lead author of the study.

The study constitutes a chapter in a forthcoming publication *The Indian Ocean and its role in the global climate system* by Elsevier.

Rising heat content contributes to sea-level rise also. Heat causes the volume of water to increase, called the thermal expansion of water, and this is responsible for more than half of the sea-level rise in the Indian Ocean – larger than the changes arising from glacier and sea-ice melting.



Marine heatwave

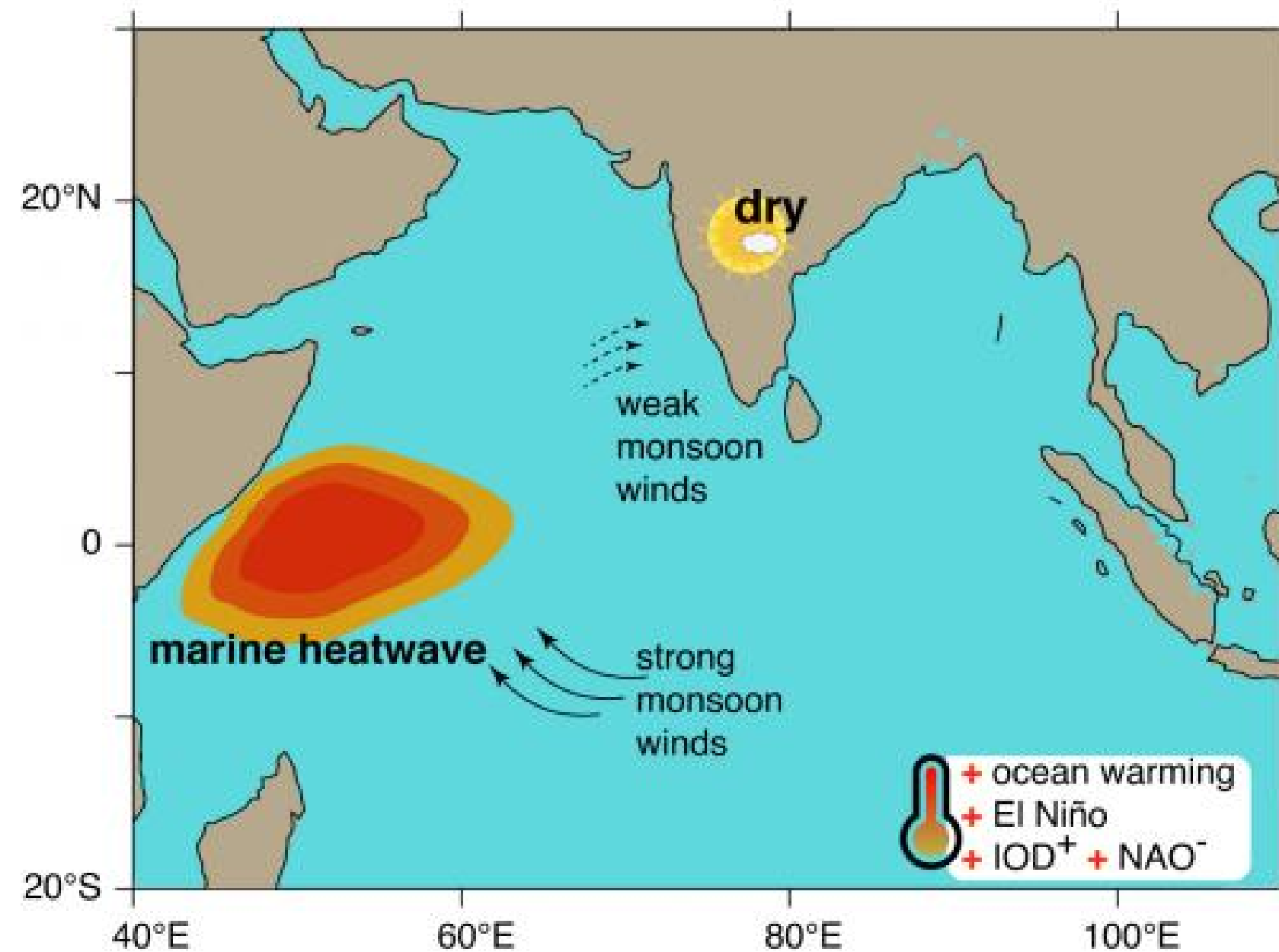
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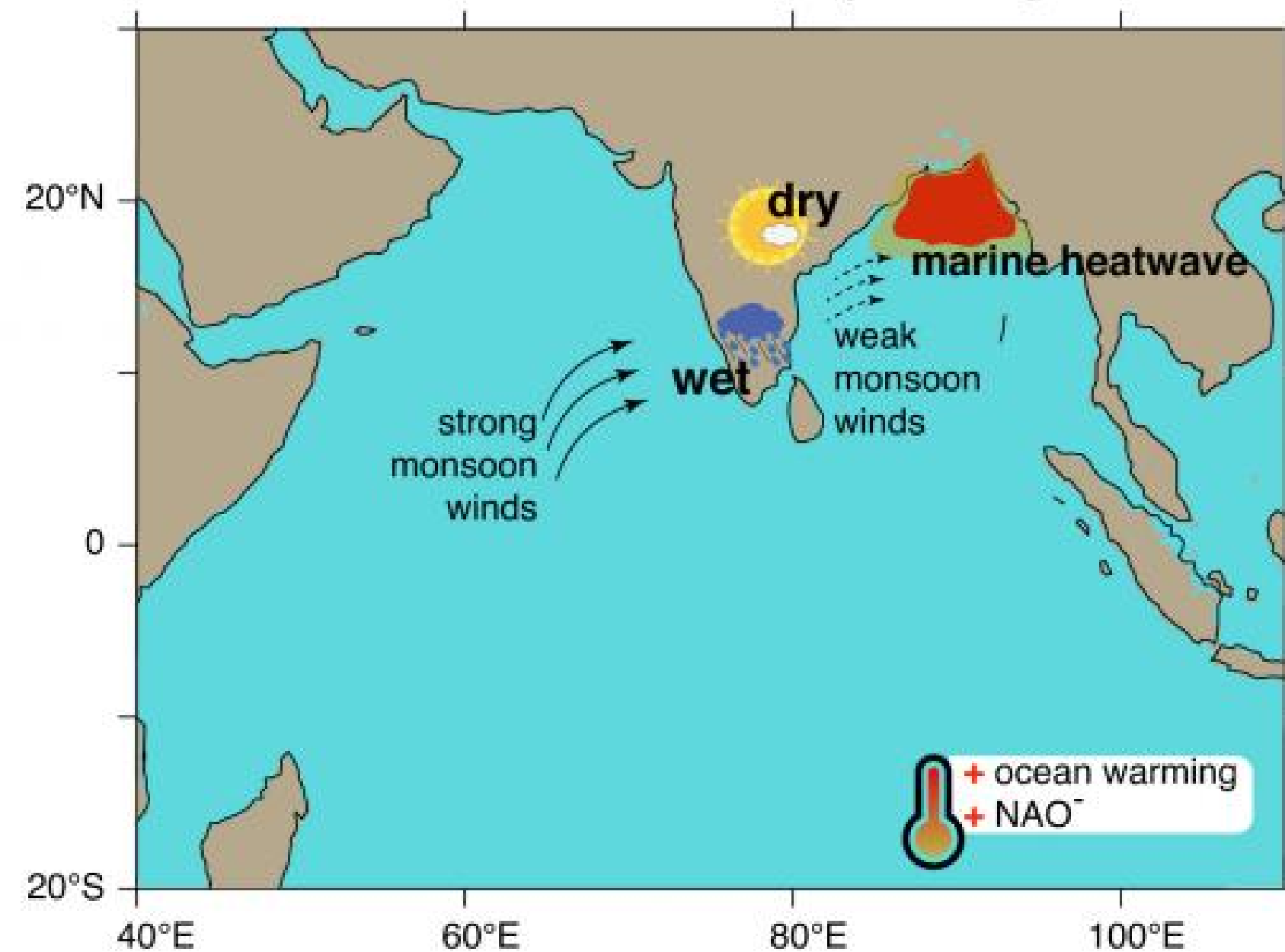


Marine heatwaves in the Indian Ocean and their impact on the monsoon

Marine heatwaves in the western Indian Ocean



Marine heatwaves in the north Bay of Bengal



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The Chang'e 6 lunar probe and the Long March-5 YB carrier rocket combination at the launch pad at the Wenchang Space Launch Site in Hainan province, China on Saturday. REUTERS

China all set for launch of mission to far side of moon

Reuters

China will send a robotic spacecraft in the coming days on a round trip to the moon's far side in the first of three technically demanding missions that will pave the way for an inaugural Chinese crewed landing and a base on the lunar south pole.

Since the first Chang'e mission in 2007, China has made big leaps in its lunar exploration programme, narrowing the technological chasm with the U.S.

In 2020, China brought back samples from the moon's near side in the first sample retrieval in more than four decades, confirming for the first time it could safely return an uncrewed spacecraft to the earth from the lunar surface.

This week, China is expected to launch Chang'e-6 using the backup spacecraft from the 2020 mission, and collect soil and rocks from the side of the moon that permanently faces away from the earth.

With no direct line of sight with the earth, Chang'e-6 must rely on a recently deployed relay satellite orbiting the moon during its 53-day mission, including a

China is expected to launch Chang'e-6 using the backup spacecraft from the 2020 mission, and collect soil and rocks from the side of the moon that faces away from the earth

never-before attempted ascent from the moon's "hidden" side on its return journey home.

The same relay satellite will support the uncrewed Chang'e-7 and 8 missions in 2026 and 2028, respectively, when China starts to explore the south pole for water and build a rudimentary outpost with Russia. China aims to put its astronauts on the moon by 2030.

Beijing's polar plans have worried NASA, whose administrator, Bill Nelson, has repeatedly warned that China would claim any water resources as its own. Beijing says it remains committed to cooperation with all nations on building a "shared" future.

On Chang'e-6, China will carry payloads from France, Italy, Sweden and Pakistan, and on Chang'e-7, payloads from Russia, Switzerland and Thailand.

NASA is banned by U.S. law from any collaboration, direct or indirect, with China. Under the separate NASA-led Artemis programme, U.S. astronauts will land near the south pole in 2026, the first humans on the moon since 1972.

Chang'e 6 will attempt to land on the northeastern side of the vast South Pole-Aitken Basin, the oldest known impact crater in the solar system.

The southernmost landing ever was carried out in February by IM-1, a joint mission between NASA and the Texas-based private firm Intuitive Machines.

The south pole has been described by scientists as the "golden belt" for lunar exploration.

Polar ice could sustain long-term research bases without relying on expensive resources transported from the earth. India's Chandrayaan-1 launched in 2008 confirmed the existence of ice inside polar craters.

Chang'e-6's sample return could also shed more light on the early evolution of



Moon far side , tidal locking and Lunar liberation



- **Chang'e-6 is set to blast off on May 3 aboard a Long March 5 rocket from the Wenchang Satellite Launch Center on Hainan Island.**
- **The spacecraft will embark on a 53-day journey to the far side of the Moon and back, returning lunar soil and rocks to Earth that will help us understand the Moon's history.**
- **The mission will target the Moon's South Pole-Aitken (SPA) basin, where an ancient impact may have blasted part of the Moon's mantle up to the surface.**

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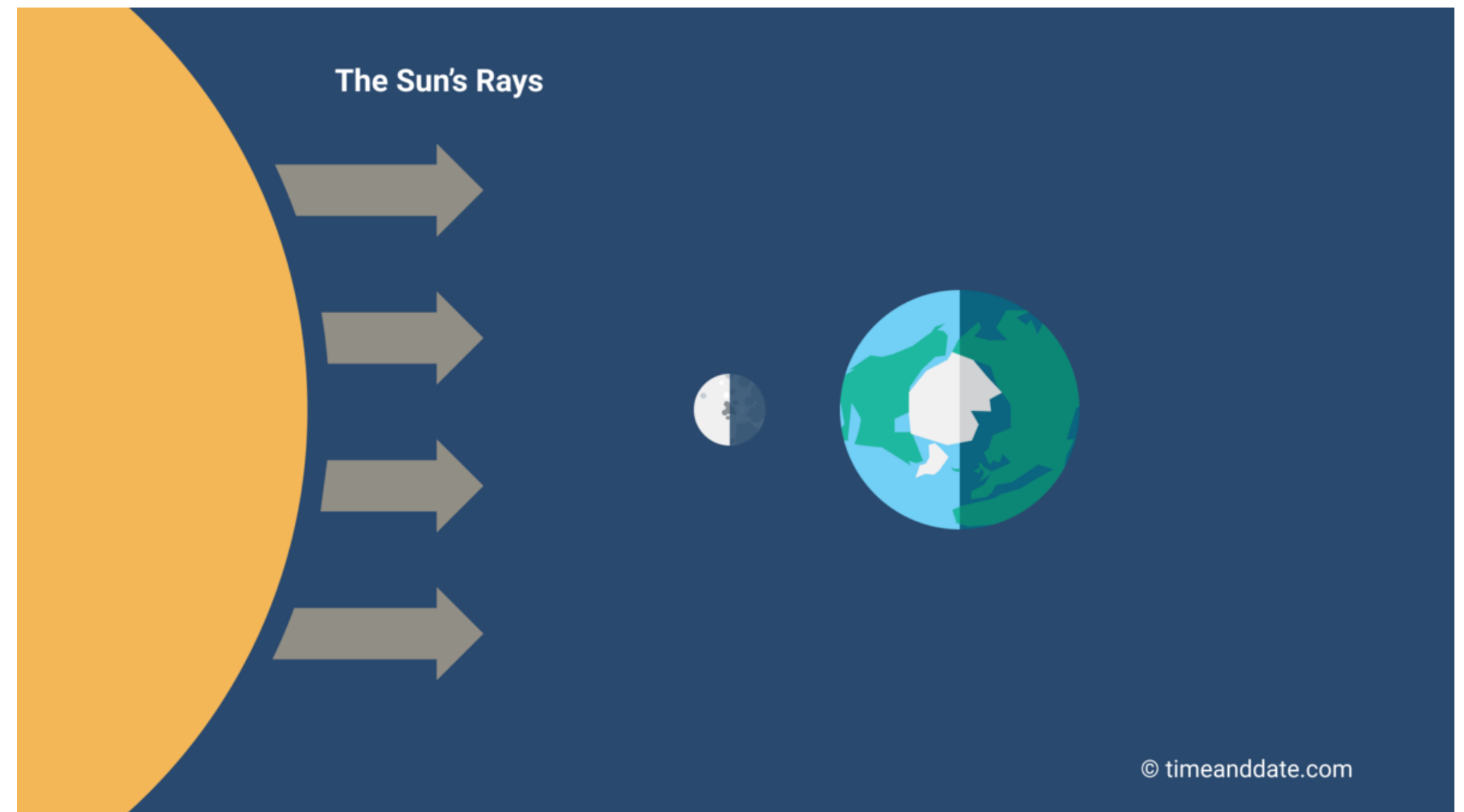
- The region has long been thought of as a keystone to understanding how and when massive objects pelted the Moon and Earth billions of years ago, and why the far side of the Moon is so different from the near side.
- Many missions have returned samples of the Moon to Earth over the years, most recently Chang'e-5 in 2020.
- But all have been from the near side, where line-of-sight communications with Earth simplify operations.
- Landing on the far side requires a communications relay satellite, of which China now has two.
- The country made the first successful lunar far-side landing in 2019 with Chang'e-4, and will follow that achievement with a sample return.

•

Far side of moon and Tidal Locking

- From Earth, we always see the same side of the Moon. This side is known as the near side. We can never see the other side of the Moon—the far side—from Earth .

•



The Hindu analysis by saurabh pandey sir



Why Do We Never See the Far Side?

- The reason the same side of the Moon always faces Earth is ~~that the Moon rotates around its axis at the same speed as it revolves around Earth.~~ This effect is known as tidal locking, and it is caused by the tidal forces of our planet.
- In the same way as the Moon exerts tidal force on our planet, causing tides on Earth, our planet exerts tidal force on the Moon.
-
-

- Earth is larger than the Moon, so its tidal force is much more powerful. Over time, this force has slowed down the Moon's rotation until it reached a speed matching the speed of its orbit around Earth.
- All of the major moons in the solar system—including the Galilean moons of Jupiter, and Saturn's Titan—are tidally locked to their parent planet.
-
-

Lunar Libration

- However, there is a small variation to this rule. Since the Moon revolves around Earth on an elliptical path, the Moon's distance from Earth varies from day to day. The point of the orbit closest to Earth is called perigee, while the point farthest away is known as apogee.
- Like all celestial objects with elliptical orbits, the Moon's speed varies a little on its path around Earth.
- It speeds up when it is closest and slows down when it is farthest away from us.
- At perigee, the Moon's orbital speed is a little faster than its rotational speed.

- This variation in speed, along with other factors, causes an effect called lunar libration.
- From Earth, the Moon seems to rock slightly from north to south and wobble a little from east to west.
- Over time, it is possible to see up to 59% of the Moon's surface, but only 50% at a time. In other words, over time, we can see up to 9% of the outskirts of the Moon's far side from Earth.

Why are unclassified forests ‘missing’?

What does the Forest (Conservation) Act Amendment (FCAA) 2023 mandate with respect to unclassified forests? What was the criticism against the amended Act? Have all States submitted their State Expert Committee reports as per the Supreme Court directives?

EXPLAINER

Prakriti Srivastava
Krithika Sampath
Prerna Singh Bindra

The story so far:

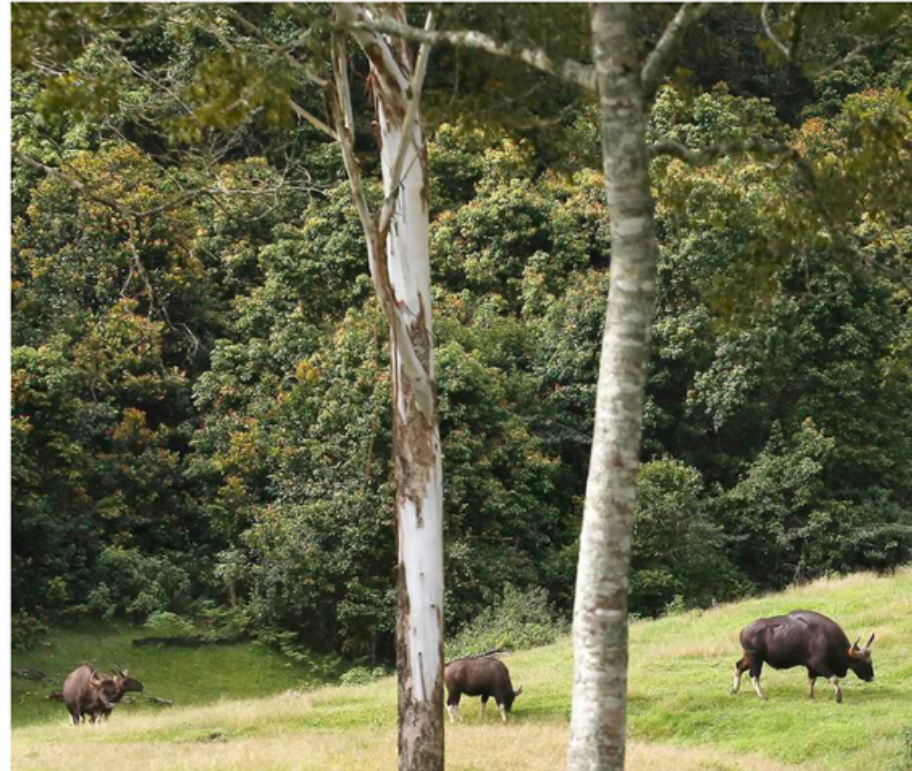
In compliance with a February 19, 2024, Supreme Court order, the Ministry of Environment, Forests and Climate Change (MoEFCC) uploaded the various State Expert Committee (SEC) reports on its website earlier in April. This interim order was in response to a public interest litigation challenging the constitutionality of the Forest (Conservation) Act Amendment (FCAA) 2023. A key concern in the petition was that the status of unclassified forests, which were to be identified by the SEC reports, wasn't known or if they had been identified at all.

What does the FCAA stipulate?

With the enactment of FCAA, unclassified forests – which have legal protection under the landmark *T.N. Godavarman Thirumalpad* (1996) case – would lose this protection, leading to their inevitable diversion. The SEC reports were to be prepared in pursuance of the order, which specified that ‘forests’ as per their dictionary meaning and all categories of forests irrespective of ownership and notification status would be included under the ambit of the Forest (Conservation) Act, 1980. As a result, unclassified forests, also known as deemed forests, would require the Central government's approval in case a project proponent sought to divert that land for non-forest use. Unclassified or deemed forests may belong to forests, revenue, railways and other government entities, community forests or those under private ownership, but are not notified.

Have these forests been identified?

The status of the reports were unknown from 1996 until they shot back into prominence when the MoEFCC told a Joint Parliamentary Committee that the



Needs protection: Wild gaurs grazing in a forest area under Munnar wildlife division in Idukki. FILE PHOTO

SECs had identified unclassified forests that had been taken on record. This was in response to criticism that the proposed law undermined the *Godavarman* judgment and would exclude all unclassified forest land from its purview. The MoEFCC had assured the Committee that “the amended Act would be applicable” to the SEC-identified unclassified forests. However, in response to an RTI application filed on January 17, the MoEFCC said it “did not have the requisite reports”.

While the MoEFCC has now uploaded the SEC reports on its website, they reveal a grim picture: no State has provided verifiable data on the identification, status, and location of unclassified forests. In fact, seven States and Union Territories – Goa, Haryana, Jammu & Kashmir, Ladakh, Lakshadweep, Tamil Nadu, and West Bengal – appear not to have constituted the SEC at all. Twenty-three

States have shared their reports but only 17 are in line with the Court's directives.

Many States have said the one month provided by the top court was too short and “the nature of work voluminous”, and as a result haven't undertaken physical cadastral surveys nor demarcation of unclassified forest lands.

What do the reports say?

Only nine States have provided the extent of unclassified forests. Most states and UTs only shared the extent of different types of forest areas specified in the order: under government ownership, either with forest or revenue and in a few cases under other government departments.

Also, almost no State or UT specified the geographic locations of forests. Any identifying geographical information of forest land, where given, is only of reserve or protected forests, which isn't useful because this information is already

available with Forest Departments. The SEC reports also question the veracity of the reports of the Forest Survey of India, the only government agency to survey and assess forests. For example Gujarat, whose SEC report says its unclassified forests cover 192.24 sq. km while the Survey has reported it as significantly higher at 4,577 sq. km (1995-1999).

The treatment of SECs without on-ground verification is likely to have resulted in the large-scale destruction of forests – which ought to have been identified, demarcated, and protected 27 years ago. But with no baseline data from 1996-1997, we have no idea how much unclassified forest has been lost. For example, Kerala's SEC didn't include the Pallivasal unreserve, an ecologically fragile area in Munnar; this area was also devastated during the 2018 floods.

What would be the effects of FCAA?

The loss of such forests is likely to be a recurring theme in all States, and needs to be investigated. It is also clear the reports were hastily put together, using incomplete and unverified data collected from readily available records, and submitted to the Supreme Court in order to fulfil their obligations.

The *Godavarman* order of the SC was to be implemented in letter and spirit. The failure to do this is a lost opportunity to achieve the requirements of the Indian Forest Policy, which envisages 33.3% forest cover in plains and 66.6% in the hills. Promulgating the FCAA without examining the SEC reports displays a lack of diligence on the MoEFCC's part and will have consequences for India's ecosystems and ecological security. Those responsible need to be held to account, and the national government needs to take ameliorative action to re-identify, retrieve, and protect forest areas as per the 1996 judgment.

Prakriti Srivastava is an IFS (retd.) officer who has served as DIG (wildlife) in the MoEFCC. Prerna Singh Bindra is former member, National Board for Wildlife. Krithika Sampath is a researcher from the University of Michigan.

THE GIST

With the enactment of FCAA, unclassified forests – which have legal protection under the landmark *T.N. Godavarman Thirumalpad* (1996) case – would lose this protection, leading to their inevitable diversion.

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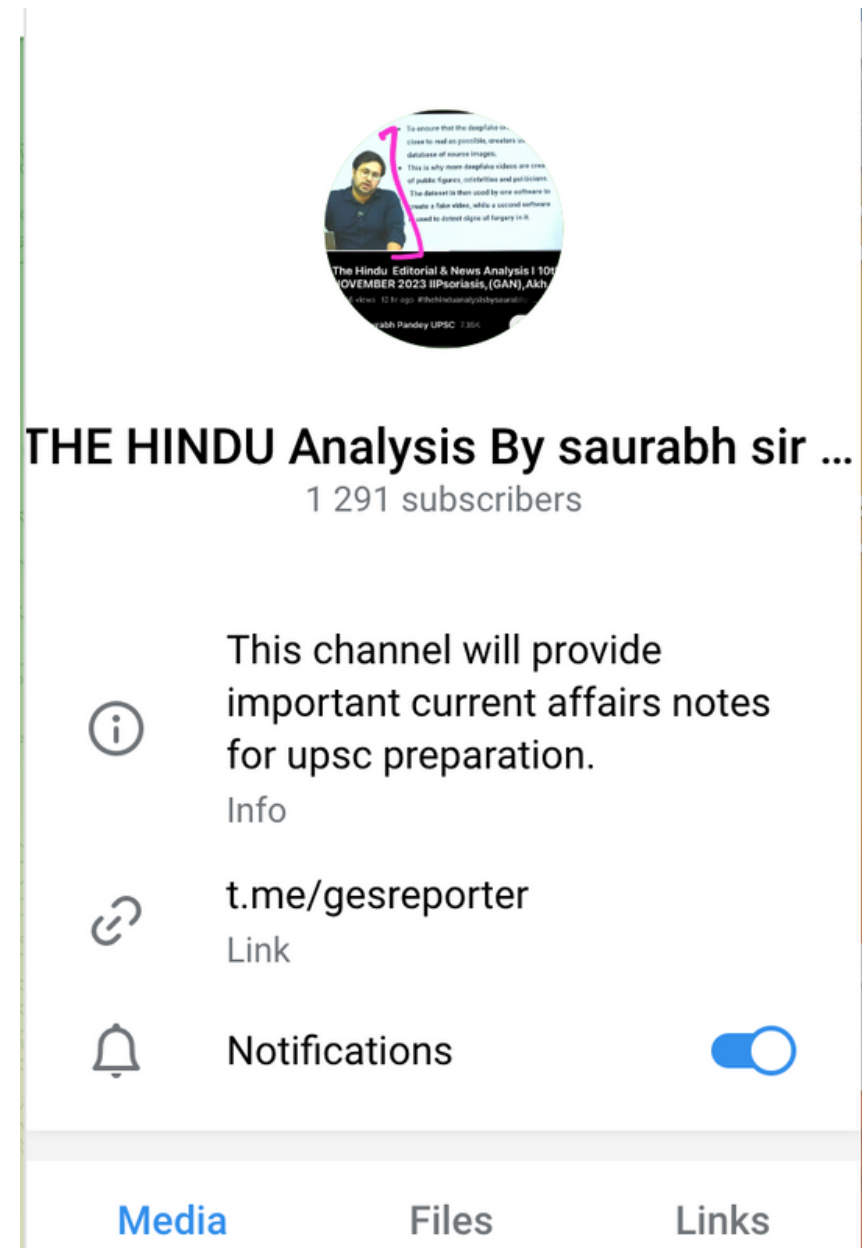
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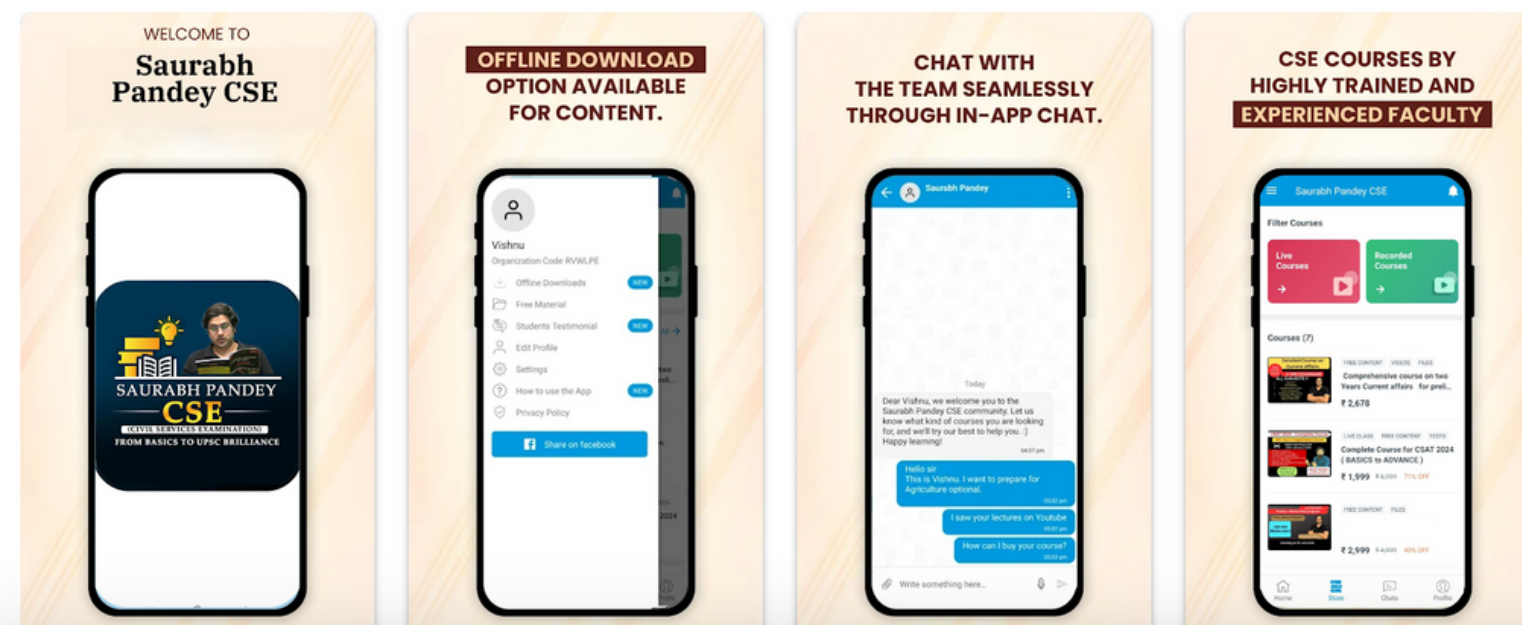
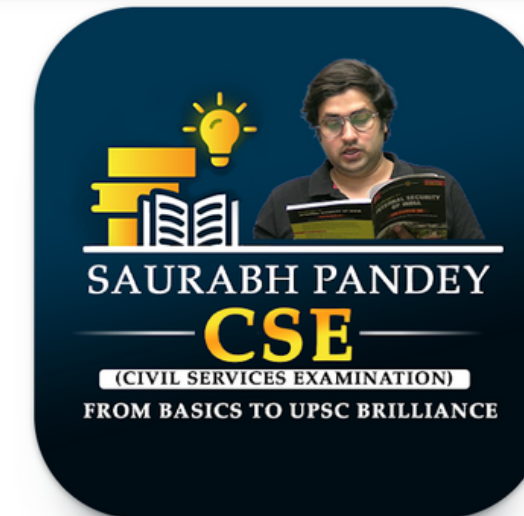
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