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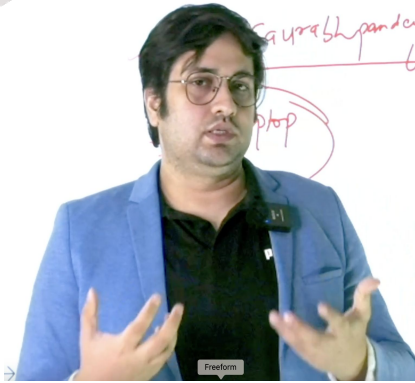

By saurabh Pandey

THE HINDU

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**BY SAURABH PANDEY SIR**

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# Indian scientists develop novel gene therapy for haemophilia

**Jacob Koshy**
NEW DELHI

Scientists in India have reported success with using gene therapy to treat severe haemophilia A, a rare hereditary condition resulting from a faulty gene which triggers severe, spontaneous, and potentially fatal bleeding episodes.

Though only tested on five patients in Tamil Nadu so far, none of them have reported bleeding episodes over an average follow-up period of 14 months. It is not unusual for those with haemophilia to have weekly bleeding episodes, requiring frequent treatment. The results of the study were reported in the peer-reviewed *New England Journal of Medicine* (NEJM) earlier this week.

The trial was led by Alok Srivastava of the Centre for Stem Cell Research (CSCR) at the Christian Medical College in Vellore, and financially supported by the Union Department of Biotechnology.

## One-time solution

The typical treatment for the condition requires injections at frequent intervals, with infusions of a "clotting factor" to prevent bleeding. Gene therapy treatments, however, promise to be a one-time solution. A gene introduced into the body teaches it to create enough of the clotting factor that can prevent such haemorrhage.

Haemophilia can be classified as minor or severe depending on the percentage of clotting factor present in those afflicted. Haemophilia A, the more common version of the condition, is caused by the absence of a blood-clotting factor called Factor VIII. Even though haemophilia is a rare disorder, India has the world's second-largest patient pool, with an estimated 40,000 to 1,00,000 patients.

**Costly affair:** Per-patient cost of treating haemophilia in India is reported to be ₹2.54 crore over a 10-year period. GETTY IMAGES

Those with Severe Hemophilia A have less than 1% of the clotting factor, and manage the condition with repeated Factor VIII replacement, monoclonal antibodies, or injecting substances that mimic Factor VIII to stop or prevent bleeding.

Because of the nature of the condition and the relatively low numbers of patients, treatment can be expensive. A March 2024 research study in the journal *Heliyon* estimates the per-patient cost of treating a haemophilia patient in India to be $3,00,000 (or ₹2.54 crore) over a 10-year period.

There is only one gene therapy – Roctavian – which was approved by the U.S. Food and Drug Administration for commercial use in 2023. Its effectiveness was established based on results from a cohort of 112 patients followed up for at least three years after Roctavian treatment. Following the infusion, the average bleeding incidents decreased from 5.4 bleeds per year at baseline to 2.6 bleeds per year.

The majority of patients who received Roctavian also received corticosteroids to suppress their immune systems for the gene therapy to be effective and safe, according to the U.S. FDA.

Roctavian works by transporting the therapeutic gene into the body by using an adenovirus as a carrier or vector and involves the liver in producing Factor VIII.

The new approach, the authors say in their paper, is safer than using an adenovirus, and potentially opens up the gene therapy treatment to children.

An independent expert described the study as "ground-breaking".

"This ground-breaking study is notable for several reasons. First, it establishes that initiating and executing studies involving new gene therapy is possible even in resource-constrained settings such as India," said Johny Mahlangu, in an editorial in the NEJM.

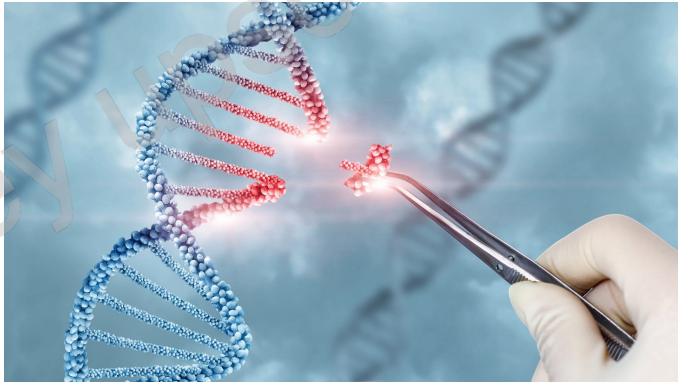
# Topic →Gene Therapy for Severe Haemophilia A in India

## Overview of Gene Therapy

**Condition: Severe Haemophilia A**

Faulty gene causing severe bleeding episodes

Affects 40,000 to 100,000 patients in India



**Recent Success:**

Study conducted in Tamil Nadu

5 patients showed no bleeding episodes over 14 months

**Research Publication: Results reported in NEJM**

Lead Researcher: Alok Srivastava, CSCR, Vellore

Support: Union Department of Biotechnology

Typical Treatment: Frequent injections of clotting factor

Gene Therapy Advantage: One-time solution for long-term management

# Mechanism of Gene Therapy

**Target:** Factor VIII deficiency

Absence of blood-clotting factor

**Method:**

Gene introduced to teach body to produce Factor VIII

Safer approach than using adenovirus vector

**Future Implications:** Potential for pediatric treatments

**Cost Estimation:** $300,000 over 10 years per patient

**Current Treatment:**

Repeated Factor VIII replacement

Monoclonal antibodies

**New Treatment**: Roctavian, FDA approved in 2023

Effectiveness: Reduction of bleeding incidents from 5.4 to 2.6 per year

# Challenges and Opportunities

**Cost of Treatment:** High cost may limit accessibility

**Resource Constraints**: Conducting research in developing regions

**Expert Commentary:**

Johny Mahlangu describes the study as "ground-breaking"

Establishes feasibility of gene therapy in resource-limited settings

# No-confidence motion on V-P a bid to 'insult' Jats, says BJP

**The Hindu Bureau**
NEW DELHI

The BJP on Wednesday accused the Congress of attempting to "not just defame" Vice-President Jagdeep Dhankar but also "insult" the Jat community after the Opposition initiated a motion of no-confidence against him.

The move, the BJP said, was aimed at deflecting attention from the Gandhi family's alleged links with businessman George Soros.

Addressing a press conference at the BJP's national headquarters in New Delhi, BJP MP and spokesperson Sambit Patra termed the Opposition parties' notice for a "no-confidence motion" against Mr. Dhankar and the INDIA bloc's decision to move the Supreme Court on the EVM issue as "painful and disturbing".

"The Congress takes the issue of EVM to the Supreme Court again and again and returns defeated. Every time it tried to curse and drag the Election Commission, it faced embarrassment... Yet, the Congress is going to move the Supreme Court on the issue," Mr. Patra said.

This shows that the Congress does not have "any respect" for the Constitution of India, he said.

# Topic → PROVISIONS IN CONSTITUTION TO REMOVE RAJYA SABHA CHAIRMAN

- The process for the removal of the Vice President, which is different from the **President's impeachment (Article 61),** is detailed and involves specific steps under **Articles 67(b), 92 and 100 of the Indian Constitution**.
- The resolution to remove the Chairman has to be introduced in the Rajya Sabha, and requires at **least 14 days of notice before it is moved.**
- So, on Tuesday, a notice was submitted, and the motion to remove the Rajya Sabha Chairman can be tabled only after 14 days.

- The motion, after being tabled, requires the support of an absolute majority (more than half of the total votes) of the total membership of the Rajya Sabha and not just a majority of the MPs present and voting.
- Just not the Rajya Sabha, **the Lok Sabha also has a say in the matter of the removal of the Chairman of the Upper House**.
- Once the resolution is passed by the Rajya Sabha, it must then be approved by the Lok Sabha. **The House of the People must pass the resolution with a simple majority of members present and voting.**
- Only after both Houses of Parliament approve the resolution does the Chairman lose his position.
- Thus, **the Vice President retains his office until the entire removal process, involving both Houses of Parliament,** is completed. And, as soon as the motion to remove the Rajya Sabha Chairman passes in both houses of the Parliament, he loses the post and also that of the Vice President of India.

# ILO report asks nations to uphold freedom of association at work

**A.M. Jigeesh**
NEW DELHI

The Social Dialogue Report of the International Labour Organisation (ILO), released in Geneva on Wednesday, has recommended the governments to uphold fundamental principles and rights at work, especially freedom of association and the effective recognition of the right to collective bargaining.

The report, focusing on 'peak-level social dialogue' (PLSD), also asked the member countries to equip labour administrations and social partners with the necessary resources and technical capacities for effective participation in PLSD.

It found that countries' compliance with freedom of association and the effective recognition of the right to collective bargaining had deteriorated by 7% between 2015 and 2022. "This decline was driven by an increase in violations of the fundamental civil liberties and bargaining rights of employers, workers, and their representative organisations," the report said.


**Workers' rights:** The ILO has said that governments must recognise the right to collective bargaining. FILE PHOTO

The report argues that social dialogue can enable countries to pursue economic development alongside social progress, while ensuring fair and inclusive low-carbon and digital transitions.

The report adds that PLSD involves processes that bring together representatives of governments, employers' and business membership organisations (EBMOs) and workers' organisations (the social partners) at the national and sectoral levels. "These processes are designed to facilitate negotiation, consultation and information exchange on issues relating to labour, economic and social policy. PLSD includes bipartite processes – where only the social partners engage, notably for reaching collective agreements – as well as tripartite processes, which also involve government representatives," the report said.

"This edition of the Social Dialogue Report is published amid economic and geopolitical instability," said ILO's Assistant Director-General for Governance, Rights and Dialogue Manuela Tomei. "In a context where technological advances, climate change and demographic shifts are deeply transforming labour markets, social dialogue remains a credible governance model for navigating complexity and identifying fair solutions." .

# Topic →ILO's Social Dialogue Report Overview

## Key Highlights

📜 **Fundamental Work Principles: The report emphasizes the importance of upholding fundamental work principles, particularly `freedom of association` and `collective bargaining rights`.**

📉 **Decline in Compliance: There has been a 7% decrease in compliance with these rights from 2015 to 2022, attributed to increased violations of civil liberties and bargaining rights.**

🛠️ **Call to Action: Member countries are urged to enhance resources and technical capacities for effective participation in `peak-level social dialogue` (PLSD).**

🤝 **PLSD Collaboration:** Involves collaboration among government representatives employers, and workers' organizations to negotiate and consult on labor and social policies.

🌍 **Economic and Social Impact:** Social dialogue is highlighted as a means to support economic development, promote social progress, and facilitate low-carbon and digital transitions.

⚖️ **Bipartite and Tripartite Processes:** The significance of both bipartite (social partners only) and tripartite (including government) processes in achieving collective agreements and policy discussions is noted.

🌐 **Context of Instability:** Released during a time of economic and geopolitical instability, the report stresses the need for social dialogue to address challenges posed by technological, climate, and demographic changes.

# India accounts for half of malaria cases in Southeast Asia in 2023

**Bindu Shajan Perappadan**
NEW DELHI

The World Health Organisation (WHO) South East Asia Region contributes about 1.5% of the burden of malaria cases globally and India accounted for about half of all estimated cases in 2023, followed by Indonesia, which carried just under one-third.

Estimated malaria deaths in the region fell by 82.9%, from 35,000 in 2000 to 6,000 in 2023. Together, India and Indonesia accounted for about 88% of malaria deaths in the region.

This is according to the WHO's latest World Malaria Report (2024) released on Wednesday.

The report notes that since 2000, the WHO South-East Asia Region has made remarkable progress against malaria and estimated malaria cases in the region fell from 22.8 million in 2000 to 4 million in 2023 - a reduction of 82.4%.

**Preventive mode:** A health employee gives a malaria injection to a child in Abidjan of Ivory Coast in West Africa. FILE PHOTO

"In the period 2022-2023, four countries achieved reductions in their malaria caseload – Bangladesh (-9.2%), India (-9.6%), Indonesia (-5.7%) and Nepal (-58.3%). Meanwhile, three countries saw case increases – Democratic People's Republic of Korea (+47.9%), Thailand (+46.4%) and Myanmar (45.1%).

In 2023, both Timor-Leste and Bhutan reported zero indigenous cases of malaria.

A reduction in case incidence of 87% was achieved between 2000 and 2023, from 17.7 to 2.3 per 1000 population at risk.

"These gains have been largely attributed to progress in India, which saw 17.7 million fewer estimated cases and a 93% decrease in case incidence since 2000," the report said.

Meanwhile, new data from the WHO revealed that an estimated 2.2 billion cases of malaria and 12.7 million deaths have been averted since 2000, but the disease remains a serious global health threat, particularly in the WHO African Region.

According to WHO's latest World malaria report, there were an estimated 263 million cases and 5,97,000 malaria deaths worldwide in 2023. This represents about 11 million more cases in 2023 compared to 2022, and nearly the same number of deaths. Meanwhile, as of November 2024, 44 countries and one territory had been certified malaria-free by WHO.

# Topic → WHO South East Asia Region Malaria Report 2024

## Key Highlights

🌍 **Regional Contribution:** The WHO South East Asia Region accounts for approximately 1.5% of global malaria cases, with India contributing to about half of these cases in 2023.

📉 **Reduction in Deaths:** Malaria deaths in the region decreased by 82.9%, from 35,000 in 2000 to 6,000 in 2023. India and Indonesia were responsible for 88% of these deaths.

📊 **Decrease in Cases:** The region saw a significant reduction in estimated malaria cases, dropping from 22.8 million in 2000 to 4 million in 2023, marking a decrease of 82.4%.

🇮🇳 **India's Progress:** India achieved a remarkable 93% decrease in malaria case incidence since 2000, with 17.7 million fewer estimated cases.

🚫 **Zero Cases:** In 2023, Timor-Leste and Bhutan reported zero indigenous malaria cases, showcasing successful control efforts.

📈 **Country Trends**: Between 2022 and 2023, four countries (Bangladesh, India, Indonesia, and Nepal) reduced their malaria cases, while three countries (DPR Korea, Thailand, and Myanmar) experienced increases.

🌐 **Global Context:** Globally, there were an estimated 263 million malaria cases and 597,000 deaths in 2023, with a notable increase of 11 million cases compared to 2022.

**Summary:** The WHO's 2024 report highlights significant progress in malaria control in the South East Asia Region, particularly in India, while global malaria remains a serious health threat.

# Climate impact of exploring space passing below the radar

Making satellites is an energy-intensive process. Every launch also releases carbon dioxide, black carbon, and water vapour. Rocket propellants deplete the ozone layer and disrupt atmospheric circulation. Satellites burning up in the air release ash into the atmosphere's middle layers

Shrawani Shagun

As the world becomes more reliant on space technology for vital functions like climate monitoring, the environmental consequences of space activities also become increasingly urgent and in need of more attention. The rapid growth of the number of satellites in orbit has led to concerns about interference with climate monitoring systems and the accumulation of orbital debris. With no specific international regulations addressing these challenges, it is crucial the world's governments act quickly to ensure space exploration doesn't drift into unsustainability.

## How rockets affect the environment

Every rocket launch releases carbon dioxide, black carbon, and water vapour into the atmosphere. Black carbon is of particular concern because it absorbs sunlight 500 times more effectively than carbon dioxide does, amplifying global warming. As commercial space ventures become more common, the cumulative impact of these emissions will worsen.

Rocket propellants, especially those using chlorine-based chemicals, deplete the ozone layer at high altitudes, increasing exposure to ultraviolet radiation on the ground as well as disrupting atmospheric circulation – both of which affect the global climate. According to a December 9 article in *MIT Tech Review*, when satellites "burn up in the atmosphere" once their missions end, they release "satellite ash in the middle layers of the earth's atmosphere. This metallic ash can harm the atmosphere and potentially alter the climate."

Next, like many other forms of manufacturing, the production of satellites demands energy-intensive processes involving metals and composite materials, whose extraction and preparation have large carbon footprints of their own. Satellites also use propulsion systems to adjust their location and orientation in orbit, and their emissions add to the overall count. Equally, the rise of space mining – e.g. extracting valuable (on the earth) minerals from asteroids – could lead to increased industrial activity both in space and on the ground. Such mining activities haven't begun yet, but they are sure to be part of the future.

While space technology supports essential climate monitoring and disaster management, the environmental costs for the earth's atmosphere and space are escalating, requiring urgent redressal.

## Dangers of orbital debris

Orbital debris, or space junk, refers to defunct satellites, spent rocket stages, and pieces of satellites produced when they break apart in low earth orbit (LEO). According to the European Space Agency, as of September 2024, there had been around 6,740 rocket launches since 1957 that placed 19,590 satellites in orbit. Around 13,230 are still in space, and of them 10,200 are still functional.

Since the space in earth's orbit is a resource just like water bodies and land masses on the ground, the occupation of orbits by non-functional objects constitutes a form of pollution as well – with the added threat of risk magnification.

For example, space surveillance networks have catalogued around 36,860 space objects thus far, including those produced in the 650+ fragmentation events (break-ups, explosions, and collisions). The total mass of all space objects in orbit exceeds 13,000 tonnes. As this mass continues to increase, the collision risks to satellites increase as well. Most space junk can reach speeds of up to 29 km/hr. When moving so fast, even a minuscule piece of metal can smash through a satellite like a bullet, damaging critical components, including those used for communication, navigation, and to monitor climate parameters of merit.

A SpaceX Falcon 9 rocket lifts off from Cape Canaveral Space Force Station, Florida. The rocket carried 23 Starlink satellites. AP

Orbital debris also poses an indirect threat by interfering with scientists' ability to collect data about the earth – from tracking disasters to monitoring weather – from space, such as by interfering with radio waves. Such threats also obligate satellite operators to invest in shielding satellites and actively perform costly manoeuvres to avoid collisions; both requirements drive up mission cost.

The risks are even more significant for human-crewed missions. For example, the International Space Station frequently adjusts its orbit to avoid debris.

## Barriers to space sustainability

Regulation is key to ensuring space remains accessible and space activities remain environmentally sustainable. Without clear guidelines, the unchecked growth of emissions and debris will harm the earth's climate and increase the barriers to future space exploration.

Space activities currently fall outside international sustainability instruments like the Paris Agreement, so governments need to establish standards for emissions from rockets and satellites to prevent them from becoming overlooked contributors to global warming.

Without regulations, the increasing number of satellites and debris will overcrowd LEO, rendering future missions more expensive, which in turn would subtract from space's identity as a shared global resource that needs to be equally accessible to everyone.

**The mass of objects in orbit exceeds 13,000 tonnes. As this increases, the collision risks increase as well. Most space junk can reach speeds of up to 29 km/hr. Even a minuscule piece can smash through a satellite**

International cooperation through bodies like the Committee on the Peaceful Use of Outer Space (COPUOS) is necessary to create enforceable standards in this context.

Governments can also ensure such frameworks align with the Outer Space Treaty's principles of responsible use of space while addressing the treaty's current lack of binding provisions. This unity is particularly crucial if countries are to address the environmental impacts of space activities.

## Achieving sustainability

Achieving sustainability in space exploration requires innovative solutions, which also present challenges of their own. For example, reusable rockets like those developed by SpaceX and Blue Origin reduce manufacturing waste and lower costs by allowing engineers to reuse rocket components in multiple missions. But the reusable parts are often heavier, which increases fuel consumption. These also have limited applicability for high-orbit missions, and their wear and tear invokes costly refurbishments. Thus scaling this technology while maintaining efficiency remains a hurdle.

Second, transitioning to cleaner fuels like liquid hydrogen and/or biofuels can minimise harmful emissions during liftoffs. However, hydrogen is currently produced with non-renewable energy, negating its environmental benefits. Cryogenic fuels – which provide more thrust for the same mass – are more expensive and more complex to handle, keeping them out of reach of smaller operators. Electric propulsion is another option, but its low thrust restricts its use to specific missions like in-orbit manoeuvres.

Third, designing satellites with biodegradable materials that naturally disintegrate during re-entry can prevent long-term debris accumulation. On the flip side, these materials currently lack the durability required for the extreme conditions of space. High development costs and limited adoption further slow progress. Autonomous debris removal (ADR) technologies such as robotic arms and laser systems also offer hope for cleaning up orbital debris, but again, they are currently expensive as well as need more legal clarity before they can begin to operate safely.

A global traffic system to monitor satellites and debris in real time could reduce collisions and optimise orbit use. Resistance to data sharing, including due to security and commercial concerns, and the lack of a unified international authority hinder its development, however.

None of these hurdles are permanent, of course. Moreover, whereas individual solutions face significant challenges, a combined approach may be more feasible.

For example, binding agreements through COPUOS can standardise emission limits, debris mitigation, and data-sharing practices; governments and private entities can prioritise funding for green technologies, ADR systems, and satellite biodegradability; and financial rewards, subsidies, or penalties can nudge private actors towards sustainable practices.

At the intersection of technological advancement and environmental responsibility, the choices we make today will define the future of space exploration.

*(Shrawani Shagun is pursuing a PhD at National Law University, Delhi, focusing on environmental sustainability and space governance. shrawani.shagun@gmail.com)*

# Topic → How Rockets Affect the Environment

## Introduction

While space exploration is undeniably thrilling, it's essential to consider the environmental impact of these rocket launches. Every time a rocket blasts off, it releases a cocktail of emissions into our atmosphere, and the consequences can be far-reaching. Let's dive into how rockets affect the environment and what we can do about it.

## Emissions from Rocket Launches

### Carbon Dioxide and Water Vapor

When rockets launch, they emit carbon dioxide ($CO_2$) and water vapor, both of which contribute to greenhouse gas emissions. While we often think of cars and factories as the primary culprits of $CO_2$ emissions, rockets are becoming a significant player in this game. As commercial space ventures increase, the cumulative impact of these emissions is set to worsen.

## The Impact of Black Carbon

This substance absorbs sunlight 500 times more effectively than $CO_2$, amplifying global warming. Imagine a sponge soaking up water; that's what black carbon does with heat. As more rockets launch, the amount of black carbon in our atmosphere could rise, further exacerbating climate change.

‘

## Rocket Propellants and Ozone Depletion

### Chlorine-Based Chemicals

Many rocket propellants contain chlorine-based chemicals, which are notorious for depleting the ozone layer. The ozone layer is our planet's protective shield against harmful ultraviolet (UV) radiation. When rockets release these chemicals at high altitudes, they disrupt atmospheric circulation and increase UV exposure on the ground. This not only affects human health but also has broader implications for global climate patterns.

## The Lifecycle of Satellites

## Satellite Ash and Its Effects

Once satellites complete their missions, they often burn up in the atmosphere, releasing what's known as "satellite ash." This metallic residue can linger in the middle layers of the atmosphere, potentially altering climate patterns. It's a reminder that even after their operational life, satellites can continue to impact our environment.

## The Environmental Cost of Satellite Production

## Energy-Intensive Manufacturing

The production of satellites is no walk in the park either. It involves energy-intensive processes that require metals and composite materials, which have their own significant carbon footprints. So, while satellites help us monitor climate change, their creation contributes to the very problem they aim to address.

## The Rise of Space Mining

As we look to the future, space mining is on the horizon. Extracting valuable minerals from asteroids could lead to increased industrial activity both in space and on Earth. While this may sound exciting, it raises questions about the environmental impact of such endeavors.

## Dangers of Orbital Debris

### What is Orbital Debris?

Orbital debris, often referred to as space junk, includes defunct satellites, spent rocket stages, and fragments from collisions. As of September 2024, there have been around 6,740 rocket launches, resulting in approximately 19,590 satellites in orbit. With around 13,230 still floating in space, the risk of collision is growing.

## Collision Risks and Their Consequences

Most space junk travels at speeds of up to 29 km/hr. At such velocities, even a tiny piece of debris can cause catastrophic damage to functional satellites. This not only threatens communication and navigation systems but also complicates our ability to monitor climate parameters from space.

## Barriers to Space Sustainability

## The Need for Regulation

To ensure that space remains accessible and activities are environmentally sustainable, regulation is crucial. Without clear guidelines, the unchecked growth of emissions and debris could harm our climate and hinder future exploration.

## International Cooperation

International bodies like the Committee on the Peaceful Use of Outer Space (COPUOS) must work together to create enforceable standards. This cooperation is vital to address the environmental impacts of space activities and ensure that space remains a shared resource.

# Achieving Sustainability in Space Exploration

## Innovative Solutions and Their Challenges

Achieving sustainability in space exploration requires innovative solutions. Reusable rockets, like those developed by SpaceX, can reduce waste and costs. However, they often come with increased fuel consumption and limited applicability for high-orbit missions. Transitioning to cleaner fuels, designing biodegradable satellites, and developing autonomous debris removal technologies are all steps in the right direction, but they come with their own set of challenges.

## Conclusion

As we continue to explore the cosmos, it’s essential to consider the environmental impact of our actions. The choices we make today will shape the future of space exploration and our planet. By prioritizing sustainability and international cooperation, we can ensure that our quest for knowledge doesn’t come at the expense of our environment.

Spiral galaxy NGC 628, located 32 million light-years away, in an image taken by the James Webb Space Telescope. REUTERS

# *Webb confirms the cosmos is expanding at unexpected rate*

**Reuters**

Fresh corroboration of the perplexing observation that the universe is expanding more rapidly than expected has scientists pondering the cause – perhaps some unknown factor involving the mysterious cosmic components – dark energy and dark matter.

Two years of data from NASA's James Webb Space Telescope have now validated the Hubble Space Telescope's earlier finding that the rate of the universe's expansion is faster – by about 8% – than would be expected based on what astrophysicists know of the initial conditions in the cosmos and its evolution over billions of years. The discrepancy is called the Hubble Tension.

The observations by Webb, the most capable space telescope ever deployed, appear to rule out the notion that the data from its forerunner Hubble was somehow flawed due to instrument error.

"This is the largest sample of Webb Telescope data – its first two years in space – and it confirms the puzzling finding from the Hubble Space Telescope that we have been wrestling with for a decade – the universe is now expanding faster than our best theories can explain," said astrophysicist Adam Riess of Johns Hopkins University in Maryland, lead author of the study published on Monday (December 9, 2024) in the Astrophysical Journal.

"Yes, it appears there is something missing in our understanding of the

**The observations by Webb, the most capable space telescope ever deployed, appear to rule out the notion that the data from its forerunner Hubble was somehow flawed due to instrument error**

universe," added Riess, a 2011 Nobel laureate in physics for the co-discovery of the universe's accelerating expansion. "Our understanding of the universe contains a lot of ignorance about two elements – dark matter and dark energy – and these make up 96% of the universe, so this is no small matter."

"The Webb results can be interpreted to suggest there may be a need to revise our model of the universe, although it is very difficult to pinpoint what this is at the moment," said Siyang Li, a Johns Hopkins doctoral student in astronomy and astrophysics and a study co-author.

Dark matter, thought to comprise about 27% of the universe, is a hypothesised form of matter that is invisible but is inferred to exist based on its gravitational effects on ordinary matter - stars, planets, moons, all the stuff on Earth - which accounts for roughly 5% of the universe.

Dark energy, believed to comprise approximately 69% of the universe, is a hypothesised form of energy permeating vast swathes of space that counteracts gravity and drives the universe's accelerating expansion.

What might explain the anomalous expansion rate? "There are many hypotheses that involve dark matter, dark energy, dark radiation – for example, neutrinos (a type of ghostly subatomic particle) – or gravity itself having some exotic properties as possible explanations," Riess said.

The researchers employed three different methods to measure a specific telltale metric – distances from the earth to galaxies where a type of pulsating star called Cepheids has been documented. The Webb and Hubble measurements

# Topic → James Webb Space Telescope and Hubble space telescope

🔭 **Comparison of Telescopes:** The James Webb Space Telescope (JWST) and the Hubble Space Telescope (HST) are both significant astronomical observatories but serve different purposes and operate in different wavelengths.

🌌 **Wavelengths:** JWST primarily observes infrared light, allowing it to see through dust clouds and study cooler objects in space, while HST observes mainly in the visible and ultraviolet spectra.

🚀 **Launch Dates**: HST was launched in 1990, while JWST was launched much later, in December 2021.

🌠 **Location:** HST orbits Earth at an altitude of about 547 kilometers (340 miles), whereas JWST is positioned at the second Lagrange point (L2), approximately 1.5 million kilometers (about 930,000 miles) from Earth.

🔍 **Scientific Goals:** JWST aims to study the formation of stars and galaxies, the atmospheres of exoplanets, and the early universe, while HST has contributed to a wide range of astronomical discoveries, including the expansion of the universe and the existence of dark energy.

💡 **Technology:** JWST features a larger primary mirror (6.5 meters) compared to HS (2.4 meters), enhancing its light-gathering capability and resolution.

📈 **Future of Astronomy:** Both telescopes complement each other, with JWST expected to provide deeper insights into cosmic phenomena that HST has observed.

Summary: The James Webb Space Telescope and Hubble Space Telescope differ in design, capabilities, and scientific objectives, with JWST focusing on infrared observations and HST on visible and ultraviolet light.

## Neutrinos: The Ghostly Particles

Neutrinos, often dubbed as "ghost particles," are fundamental to understanding the universe's fabric. Here's why:

- **Abundance**: They are produced in vast quantities during stellar processes and nuclear reactions.
- **Interaction**: Neutrinos barely interact with matter, which makes them elusive and difficult to detect.
- **Cosmological Significance**: Their study can unravel mysteries related to dark matter and energy.

## Dark Matter: The Invisible Force

Dark matter constitutes about 27% of the universe yet remains largely mysterious.

- **Detection**: Although invisible, its presence is inferred through gravitational effects on visible matter.
- **Composition**: The exact nature of dark matter particles is still unknown, posing significant questions for physicists.
- **Role in Structure Formation**: Dark matter influences the formation of galaxies and large-scale structures.

Figure 2.1 Dark Matter Distribution:

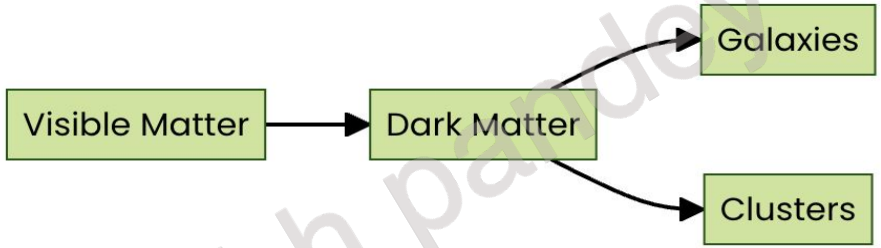



Figure 2.2 Dark Matter Candidates:

| Candidate Type | Description |
|---|---|
| WIMPs | Weakly Interacting Massive Particles |
| Axions | Hypothetical particles proposed as dark matter |
| Sterile Neutrinos | A type of neutrino that doesn't interact through standard forces |

## Dark Energy: The Universe's Accelerating Force

Dark energy is a mysterious force driving the accelerated expansion of the universe.

- **Cosmological Constant**: Proposed by Einstein, this concept is central to the understanding of dark energy.
- **Impact on Universe**: It affects the fate of the cosmos, suggesting a future dominated by dark energy.
- **Current Research**: Observations from telescopes continue to refine our understanding of dark energy's role.

# Vaikom — two States, two leaders and a tale of reform

**Manuraj Shunmuga-sundaram**

an advocate practising before the Madras High Court and Spokesperson of the Dravida Munnetra Kazhagam (DMK)

A little over a 100 years ago was a landmark socio-political moment like no other. The Vaikom Struggle, which culminated in the lifting of the barriers to the entry of backward caste Hindus to the local temple in the erstwhile Travancore princely state, would be the first of many mass movements that brought political attention to religious reform. Since then, the Dravidian Movement founded by Periyar E.V. Ramasamy and its self-respect principles have enabled wider reforms within the Hindu religion and paved the way for a more egalitarian society. What is less understood is that this was made possible only due to the insertion of a key clause in the Constitution by Dr. B.R. Ambedkar. Celebrating the centenary of Vaikom is not just a tribute to Periyar's persistence and B.R. Ambedkar's acumen but also a re-assertion of the strong reformist tendencies that continue to pervade through modern-day politik in South India.

**The evolution of a mass movement**

The Vaikom Struggle was fought against the prohibition of backward caste Hindus from walking on the streets adjacent to the Vaikom Mahadeva temple. When leaders of Kerala State Congress Committee and other social activist leaders began agitating against the injustice, they faced a clamp down by the administration. With the entry of Periyar in 1924, it slowly became a mass movement, bringing people from all classes within its fold. In November 1925, when the restrictions to walk on the streets finally lifted, the long arc of political movement began tilting towards social justice. In the decade that followed, movements erupted in other parts of the country, with B.R. Ambedkar leading protests to enter the Ambadevi Temple and Kalaram Mandir, where Dalits were denied entry.

However, the trajectory of reform in South India was progressing at a faster pace with the Legislative Assembly introducing a Bill to allow temple entry in 1932, followed by the Travancore Temple Entry Proclamation in 1936, the Malabar Temple Entry Bill 1938. There was also the entry of backward castes in the Madurai Meenakshi Sundareswarar Temple and the Thanjavur Brihadeeswara Temple in 1939. The Madras Temple Entry Authorization Act 1947 enabled Hindus of all castes to enter and offer worship in all temples within the then Madras Presidency.

Though many of these reforms took place prior to the adoption of the Constitution of India, the Constituent Assembly took great care in delimiting the right to freedom of religion. During discussions on December 7, 1948, B.R. Ambedkar included the prefix 'subject to public order, morality and health' restricting the extent of the fundamental right and thereby enabling state intervention when necessary.

These seven words went on to form the legal and legitimate basis for reforms within the fold of religion, thereby enabling constitutional courts to intercede when there was a contestation of fundamental rights, namely between those of equality and religion.

**State and the issue of regulation**

The larger issue has always been whether temples, and religion at large, can be regulated by the state. If this is allowed, some argue, then the government will lose its secular character. There can be nothing further from the truth or logic. The intervention of the State to regulate temples, which are public spaces, is to ensure equality and access. A long history, beginning with the enactment of the Madras Hindu Religious Endowments Act 1927 to the present-day Tamil Nadu Hindu Religious and Charitable Endowments Act 1959, would make it apparent the legislative intent to manage religious affairs in consonance with public order and morality. This position has been confirmed through various judgments beginning from *The Commissioner, Hindu Religious Endowments, Madras vs Sri Lakshmindra Thirtha Swamiar of Sri Shirur Mutt* 1954 (Shirur Mutt case), where the Supreme Court of India upheld the proposition that the state can manage the secular affairs of the temple and propounded the test of essential religious practice.

Since then, successive governments in Tamil Nadu, beginning in 1970, have enacted laws to enable backward caste Hindus to be appointed as *archakas* (priests), which some have regarded as a contentious act of interference in religious affairs. In such instances, the Court has upheld the right of the State to manage secular matters in temples while carving out a special category of 'Agamic temples'.

**Change and resistance**

Over the last few years, Governments of Kerala and Tamil Nadu have appointed hundreds of trained *archakas*, Odhuvaars and Bhattacharyas from non-Brahmin castes. These have been met with resistance within and outside the courts of law. These reforms challenge orthodox religious beliefs and entrenched social diktats. Nevertheless, the push for reforms is stronger than before. One hundred years after Vaikom and over 75 years since the Constituent Assembly debate on this issue, there is a compelling moral consensus that is emerging. While the Governments of Tamil Nadu and Kerala have collaborated to commemorate the centenary of the Vaikom Struggle on December 12, 2024, they are also celebrating a historic event that brought together two States. They are paying tribute to the start of a social reform trajectory that was made possible due to the coming together of two of the greatest leaders.

The Vaikom Struggle was a landmark socio-political moment like no other

# Topic → The Vaikom Struggle: A Turning Point in India's Social Reforms

## Introduction

The Vaikom Struggle, a monumental event in the annals of Indian history, encapsulates the relentless fight against caste-based discrimination.

It began as a local agitation against the prohibition of backward caste Hindus from traversing the streets adjacent to the Vaikom Mahadeva temple.

However, it transcended its origins, evolving into a mass movement that united diverse communities in a quest for social justice.

## The Origins of the Vaikom Struggle

The roots of the Vaikom Struggle can be traced back to the rigid caste hierarchies that permeated Indian society. In the early 20th century, backward caste Hindus were denied access to certain public spaces, including the streets around the revered Vaikom temple. This blatant discrimination sparked outrage among social reformers.

**Key Figures:** The movement saw the emergence of notable leaders, including K.

**Kelappan and Periyar E.V. Ramasamy.** Their relentless advocacy for equality galvanized support from various sections of society.

**Community Involvement:** The struggle witnessed participation from all strata of society, including women, students, and workers, showcasing a collective yearning for change.

## The Role of Leaders and the Mass Movement

The entry of Periyar in 1924 marked a significant turning point in the struggle. His ideology of rationalism and social justice resonated deeply with the masses, propelling the movement forward.

**Mobilization of Support:** Periyar's fiery speeches and writings attracted widespread attention, drawing individuals from various backgrounds into the fold of the movement.

**Unity Across Classes:** The Vaikom Struggle became a symbol of unity among diverse castes, showcasing that the fight for rights transcended social barriers

# The mosques which face survey petitions

Why has an oral observation made by Former Chief Justice of India D.Y. Chandrachud led to repercussions at the lower judiciary? What is the contestation against the origins of the Adhai Din Ka Jhonpra and the Ajmer dargah? What about the provisions of the Places of Worship Act, 1991?

EXPLAINER

Ziya Us Salam

**The story so far:**

During a hearing of the Gyanvapi petition in 2022, Justice D.Y. Chandrachud made an oral observation that Sections 3 and 4 of the Places of Worship Act, 1991 do not prohibit the "ascertainment of religious character" of any place of worship. His oral observation has had repercussions at the lower judiciary with a number of districts and sessions courts in Uttar Pradesh and Rajasthan admitting petitions seeking to "ascertain the religious character" of mosques and other places of worship built in medieval India and ordering their surveys. Among the places facing calls for survey are the Ajmer Dargah, Adhai Din ka Jhonpra, the Shahi Jama Masjid in Sambhal, the Teelewali Masjid in Lucknow, the Shamsi Jama Masjid in Badaun, the Atala Masjid in Jaunpur besides the better known cases of Gyanvapi Masjid, and Eidgah in Mathura.

**Are calls for surveys increasing?**

Shortly after a civil judge in Sambhal ordered a survey of the town's Jama Masjid on November 19, there has been a slew of petitions calling for surveys of mosques and dargahs. On November 24, there was a repeat survey of the Sambhal mosque which led to violence in which six people were killed. Following the violence, the Supreme Court asked the report of the advocate commissioner to be kept in a sealed cover, and directed the mosque's committee to approach the Allahabad High Court to hear the case.

Around the same time, Ajmer's West Civil Court admitted a petition claiming that the Ajmer dargah was originally a Sankat Mochan Mandir. The demand led to uproar as the dargah is frequented by people of all religions and the Prime Minister himself sends a chador for its annual Urs in January. Disturbed by these petitions, a number of retired bureaucrats and Army personnel wrote to the Prime Minister asking him to curtail what they called, an "ideological assault on India's civilisational heritage".

**Historic site:** People outside the Ajmer Sharif Dargah in Ajmer, Rajasthan, on November 28. PTI

**What about Adhai Din ka Jhonpra?**

The dargah petition triggered demand for the restoration of the 12th century mosque Adhai Din Ka Jhonpra to its alleged pre-Islamic heritage. The mosque, located a few minutes away from the dargah, is an Archaeological Survey of India (ASI) protected site. The demand came from Ajmer's Deputy Mayor Neeraj Jain who reiterated claims that the Adhai Din Ka Jhonpra was originally a Sanskrit college and a temple before being demolished towards the end of 12th century. Earlier the demand for a Sanskrit college and a temple at the site was raised after a Jain monk visited the mosque along with some functionaries of the Vishwa Hindu Parishad. Soon after Rajasthan Assembly speaker Vasudev Devnani demanded an ASI survey at the historic site, arguing, "An ASI survey should immediately be done at Adhai Din Ka Jhonpra to find out whether the Jain delegates' claim is true. It's a subject to research whether it was occupied and converted into a mosque."

The mosque was built by Qutubddin Aibak around the time he built the Quwwat-ul-Islam Masjid in the Qutub Minar complex in Delhi. Sultan Iltutmish beautified it in AD 1213 with a screen pierced by corbelled engrailed arches which appears in this country for the first time. A protected monument, its name stems from an *Urs* (fair) that used to be held here for two and a half days. Hence the expression *Adhai Din* or two and a half days. However, the claim of the site being a mosque has been disputed by author Har Bilas Sarda who argued in his book, *Ajmer: Historical and Descriptive*, that Seth Viramdeva Kala built a Jain temple here in celebration of the Jain festival Panch Kalyan Mahotsava in 660 AD. The temple was destroyed by Afghans of Ghor in 1192, he claimed.

The ASI doesn't agree with the assertion. About the mosque, the ASI website states, "It was commenced by Qutubuddin Aibak in about 1200 AD with carved pillars used in colonnades... The pillared (prayer) chamber is divided into nine octagonal compartments and has two small minarets on top of the central arch. The three central arches carved with Kufic and Tughra inscriptions make it a splendid architectural masterpiece."

**What about the Shamsi Jama Masjid?**

The 800-year-old Shamsi Jama Masjid is the latest mosque to face contestation. A fast-track court is hearing the claims of Mukesh Patel of the Hindu Mahasabha who filed a claim against the mosque, insisting it was an ancient Neelkanth Mahadev temple. In response, the Shamsi Shahi mosque's intezamia committee argued the suit was non-maintainable. Incidentally, the mosque is built on an elevated area called Sotha Mohalla, and is said to be the highest structure in Badaun town. After Quwwatul Islam and Adhai Din ka jJhonpra, it is the third oldest mosque in north India.

After Badaun, cries are being made about the historic Jama Masjid in Delhi too – that it's built at the site of a Vishnu temple. With the districts and sessions courts continuing to freely admit such petitions, the provisions of the Places of Worship Act 1991 which prohibit changing the character of places of worship as they stood on August 15, 1947, stand ignored. Meanwhile, the All India Muslim Personal Law Board appealed to the Supreme Court to take suo moto notice of such petitions and bar the lower level judiciary from entertaining them in the future.

## THE GIST

- Shortly after a civil judge in Sambhal ordered a survey of the town's Jama Masjid on November 19, there has been a slew of petitions calling for surveys of mosques and dargahs.
- Among the places facing calls for survey are the Ajmer Dargah, Adhai Din ka Jhonpra, the Shahi Jama Masjid in Sambhal, the Teelewali Masjid in Lucknow besides the known cases of Varanasi's Gyanvapi Masjid, and the Eidgah in Mathura.
- The 800-year-old Shamsi Jama Masjid is the latest mosque to face contestation. A fast-track court is hearing the claims of Mukesh Patel of the Hindu Mahasabha who filed a claim against the mosque, insisting it was an ancient Neelkanth Mahadev temple.

# Topic → The Controversy Surrounding Adhai Din Ka Jhonpra: A Historic Perspective

**Introduction:**

Adhai Din Ka Jhonpra

Nestled in Ajmer, this 12th-century mosque has become a center of controversy as demands for its restoration to pre-Islamic heritage intensify.

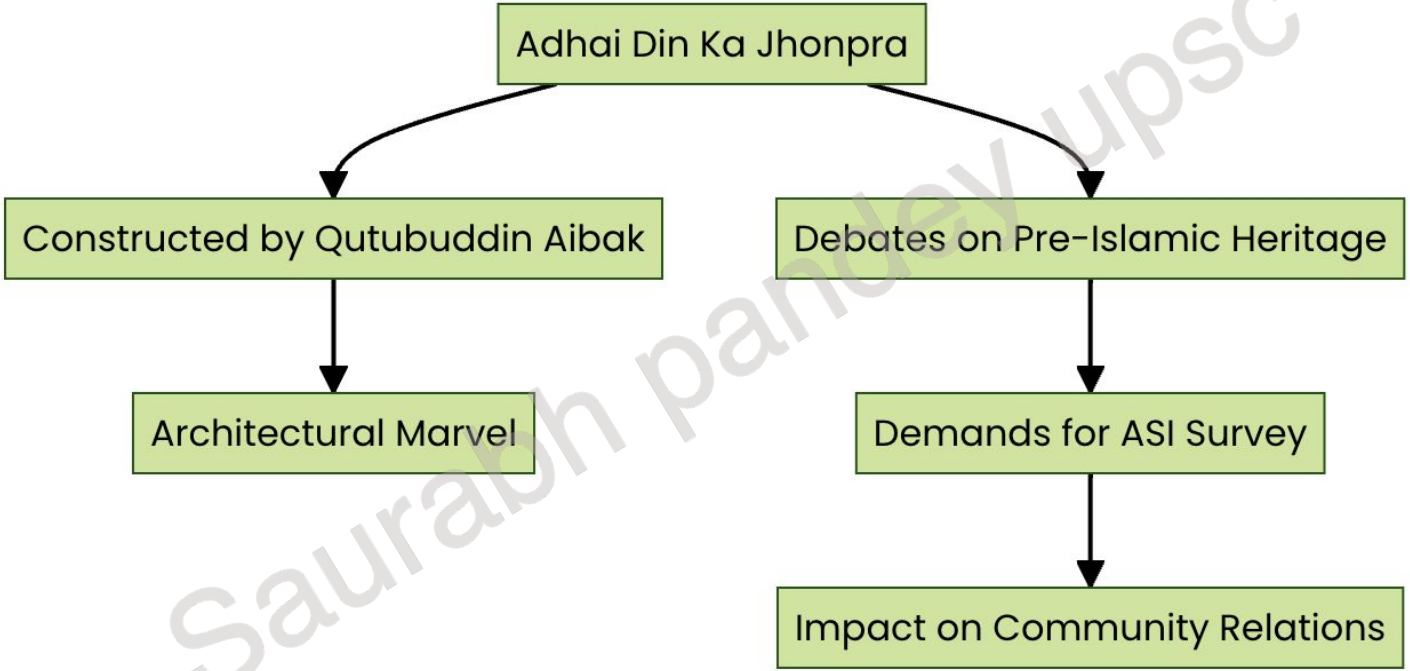
The implications of these demands ripple through cultural discourse, stirring sentiments among various communities.

## Historical Context:

The origins of Adhai Din Ka Jhonpra are steeped in mystery and debate.

**Constructed by Qutubuddin Aibak in approximately 1200 AD**, the mosque features exquisite carved pillars and intricate designs, marking it as an architectural marvel of its time.
Claims have surfaced suggesting that before it became a mosque, the site was a Sanskrit college and possibly a temple.

Historian Har Bilas Sarda argued in his work, *Ajmer: Historical and Descriptive*, that a Jain temple was erected here in celebration of the Jain festival in 660 AD, only to be demolished by Afghan invaders in 1192.



# Rival LNG supplies, depleting fields give Japan an exit from Russian gas

Since Russia's 2022 invasion of Ukraine triggered fresh sanctions, Japanese buyers have increased reliance on allies such as the U.S. and Australia; new supplies from Alaska and Canada, only a few days further away than Sakhalin and with much lesser geopolitical risk, can benefit from this trend

NEWS ANALYSIS

**Reuters**
TOKYO

As Japan's long-term contracts to secure liquefied natural gas (LNG) from Russia's Sakhalin-2 project near expiration, rival producers see an opportunity to fill the supply gap, even as Tokyo looks to switch to cleaner energy, industry insiders say.

The country's declining demand for gas plus geopolitical pressure on Tokyo to curb its reliance on fuels from Russia mean Japanese buyers may not want to renew all of their contracts with a supplier long favoured for its proximity and reliability.

Japan, the world's second biggest liquefied natural gas (LNG) buyer, depends on Russia for 9% of its LNG, or 6 million metric tons per year, 5 million of which come from the long-term contracts at Sakhalin-2 run by the Kremlin-controlled Gazprom .

The project also has strong ties with Japanese industry, with trading giants Mitsui and Mitsubishi owning a combined 22.5% in the project.

Sakhalin-2's big advantage over rivals is that it is located just a few days away from Japan by sea. By comparison, shipments from Australia, Canada and the U.S. are more than a week away.

**Fragile supply:** Japan depends on Russia for 9% of its LNG, or 6 million metric tons per year. REUTERS

But with Japan's western allies seeking to isolate Moscow over its war on Ukraine, Sakhalin-2 is out of favour, though the project is exempt from U.S. sanctions.

"Maintaining the same level of supply from Russia may prove challenging due to the agreement among G7 members to reduce reliance on Russian energy," an official at Japan's industry ministry said, adding that final decisions rest with buyers.

> Maintaining same level of supply from Russia may prove to be challenging due to the G7 pact to cut reliance on Russian energy
> Official at Japan's industry ministry

At the same time, with Japan's sluggish power demand and its push towards cleaner energy, the need for LNG is all set to fall. Tokyo wants gas to make up 20% of the country's power generation by 2030, down from 33% last year, and renewables to grow to 38% from 26% over the same period.

"There is a lot of renewable energy produced in our region, so the question of whether to renew the contract or not will depend on future renewable energy capacity," an executive at one of the Sakhalin-2 buyers from Japan told Reuters.

Japan's long-term pacts for Sakhalin-2 will expire between 2026 and 2033, starting with top power generator JERA's 0.5 million ton annual supply agreement.

**Rival supply**

Since Russia's 2022 invasion of Ukraine triggered fresh sanctions, Japanese buyers have increased reliance on allies such as the United States and Australia, as well as Malaysia and Oman, securing equity in LNG projects and long-term supply.

Rivals to Russian LNG are looking to build on that trend. Supplies from new projects in Alaska and western Canada are well-positioned, only a few days further away than Sakhalin and with much lesser geopolitical risk.

U.S. Senator Dan Sullivan of Alaska has visited Japan and South Korea four times in the last two years to pitch the yet-to-be-developed Alaska LNG project to Asian buyers, meeting in August with Japanese government officials including then-Prime Minister Fumio Kishida.

"This remarkable resource is a strategic asset, not just for the U.S. and Alaska, but for our allies in Asia. It will help us immensely in fending off an aggressive CCP (Chinese Communist Party) and get our allies in Japan and Korea off of Russian gas," he told Reuters by email.

President-elect Donald Trump, meanwhile, is preparing to approve export permits for new LNG projects that had been halted under the current Biden administration, sources told Reuters.

In May, the Business Council of Canada, an advocacy group, opened a new office in Japan.

"One of the top markets we are looking at is LNG," said special adviser Heather Exner-Pirot, citing the opportunity to displace Russian supplies as Canada prepares to start LNG exports, including to Japan, next year through the Shell-led LNG Canada project.

Two smaller LNG projects are due to start operating in 2027 and 2028.

Canadian gas companies are in talks with Japanese firms to supply more LNG, with production set to begin not far behind the expiration of the Sakhalin-2 contracts, an industry source said.

While those LNG developers court Japan, there is uncertainty over new Russian contracts as Sakhalin-2's main gas field, Lunskoye, nears depletion. Stable production is expected only until 2033, Russian news agency Interfax reported in June, citing Gazprom.

Gazprom has bet on developing the Yuzhno-Kirinshoe offshore field nearby, but the U.S. imposed sanctions on it in 2015. The field was initially expected to start producing in 2021 but Gazprom secured a drilling platform for its first well only in July.

Japan has locked in LNG supply to meet demand through 2030, said Daisuke Harada, a research director at the state-owned Japan Organization for Metals and Energy Security.

"However, there is a possibility that in the early 2030s there could be an LNG shortage ... so some companies don't necessarily need to renew their contracts (with Sakhalin-2), while some may have no choice but to do so," Mr. Harada said.

# Topic → Japan's LNG Contracts and the Shift in Energy Dynamics

As Japan's long-term contracts for liquefied natural gas (LNG) from Russia's Sakhalin-2 project approach expiration, the energy landscape is shifting dramatically. With rival producers eager to fill the potential supply gap, Japan is also navigating its own transition towards cleaner energy sources. Let's dive into the details of this evolving situation.

## Introduction

Japan, the world's second-largest LNG buyer, has relied heavily on Russian gas, particularly from the Sakhalin-2 project. However, as geopolitical tensions rise and Japan's energy policies evolve, the future of these contracts is uncertain.

## Overview of Japan's LNG Dependency

Japan's energy needs are significant, with the country depending on Russia for about 9% of its LNG supply, translating to around 6 million metric tons annually. This reliance has been a cornerstone of Japan's energy strategy, but the tides are changing.

## The Role of Sakhalin-2 Project

The Sakhalin-2 project, operated by Gazprom, has been a reliable source of LNG for Japan due to its proximity—just a few days away by sea. This geographical advantage has made it a preferred choice for Japanese buyers.

## Key Players in Sakhalin-2

Notably, Japanese trading giants Mitsui and Mitsubishi hold a combined 22.5% stake in the Sakhalin-2 project, further intertwining Japan's energy security with Russian gas supplies.

## The Changing Landscape of LNG Supply

However, the geopolitical landscape is shifting. With Japan's allies pushing to isolate Russia due to its actions in Ukraine, the future of Sakhalin-2 is in jeopardy.

## Geopolitical Pressures

An official from Japan's industry ministry highlighted the challenges of maintaining the same level of supply from Russia, especially with G7 agreements aimed at reducing reliance on Russian energy.

## japan's Energy Transition Goals

Japan is also on a path to reduce its dependence on fossil fuels. The government aims for gas to account for only 20% of power generation by 2030, down from 33% last year, while increasing renewable energy's share to 38%.

## Declining Demand for LNG

With sluggish power demand and a push for cleaner energy, the need for LNG in Japan is expected to decline, complicating the decision to renew contracts with Sakhalin-2.

## The Future of Sakhalin-2 Contracts

As contracts begin to expire between 2026 and 2033, starting with JERA's 0.5 million ton annual supply agreement, the question looms: will Japan renew its contracts?

## Expiration Timeline

The timeline for these contracts is critical, as it aligns with Japan's broader energy strategy and the global LNG market's dynamics.

## Potential Supply Gaps

Industry insiders warn of potential supply gaps if contracts are not renewed, especially as Japan's energy needs evolve.

## Rival Producers Eyeing the Market

With Japan's contracts in flux, rival LNG producers are keen to step in and fill the void left by Russian gas.

## New Opportunities for U.S. and Canadian LNG

Countries like the U.S. and Canada are positioning themselves as viable alternatives to Russian LNG, with new projects on the horizon.

## Alaska LNG Project

U.S. Senator Dan Sullivan has been actively promoting the Alaska LNG project to Japanese buyers, emphasizing its strategic importance for both the U.S. and Japan.

## Canadian LNG Initiatives

Canada is also gearing up to export LNG to Japan, with projects like the Shell-led LNG Canada project set to begin operations soon.

## Conclusion

As Japan navigates its energy future, the expiration of contracts with Sakhalin-2 presents both challenges and opportunities. With a focus on cleaner energy and a shifting geopolitical landscape, Japan's LNG market is poised for significant changes.

# Kazakhstan cleans oil waste dating back to Soviet era from its Caspian Sea shores

**Agence France-Presse**
ALMATY

Kazakhstan's state-owned energy company said on Wednesday that it had decontaminated Soviet-era oil waste on the shores of the Caspian Sea, the largest lake in the world which has now been hit by pollution and the effects of global warming.

KazMunayGas said it had cleaned up nearly 3,63,000 cubic metres of oil waste in the last four years at the Karazhanbas field in the western Mangystau region on the coast of the vast inland sea.

Reclamation work included cleaning contaminated soil and above-ground storage facilities, the energy company said in a statement. Resource-rich Kazakhstan has been hit by pollution from the oil and gas industry and the authorities in Almaty are mulling the creation of "environmental disaster zones" in several regions.

The largest lake in the world which has been hit by pollution and the effects of global warming. AP

In Central Asia, work to remove toxic waste dating back to Soviet times has gathered pace in recent years, particularly in Tajikistan and Kyrgyzstan, where millions of cubic metres of radioactive waste are stored.

# Topic → Pollution in caspian sea

🌊 Kazakhstan's state-owned energy company, KazMunayGas, has decontaminated Soviet-era oil waste along the Caspian Sea.

🛢️ The cleanup involved nearly 363,000 cubic meters of oil waste over the past four years at the Karazhanbas field in the Mangystau region.

🌍 The Caspian Sea, the world's largest lake, is facing pollution and the impacts of global warming.

🏞️ Reclamation efforts included cleaning contaminated soil and aboveground storage facilities.

⚠️ Kazakhstan is considering the establishment of "environmental disaster zones" due to pollution from the oil and gas industry.
♻️ Central Asian countries, including Tajikistan and Kyrgyzstan, are also increasing efforts to remove toxic waste from the Soviet era.

📦 Millions of cubic meters of radioactive waste are currently stored in Central Asia, highlighting the region's environmental challenges.

Summary: Kazakhstan's KazMunayGas has cleaned up significant Soviet-era oil waste from the Caspian Sea, amid growing pollution concerns and plans for environmental disaster zones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BY SAURABH PANDEY SIR

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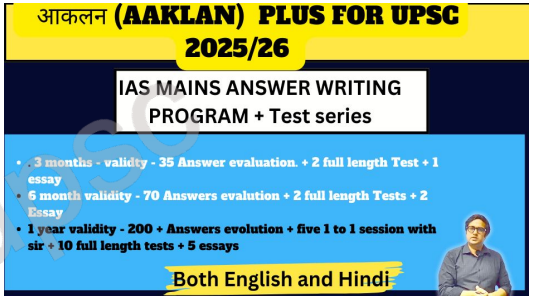


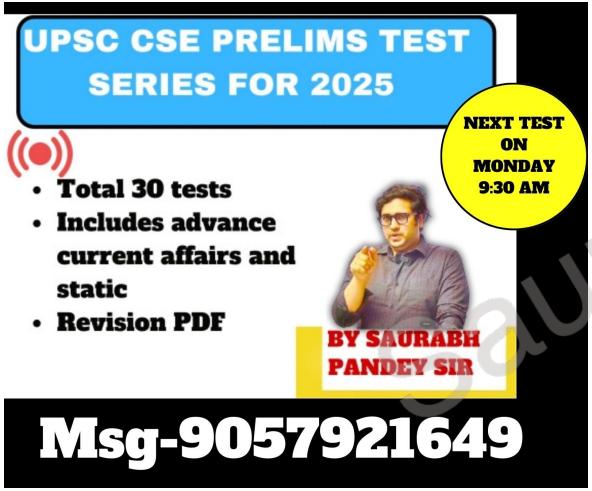


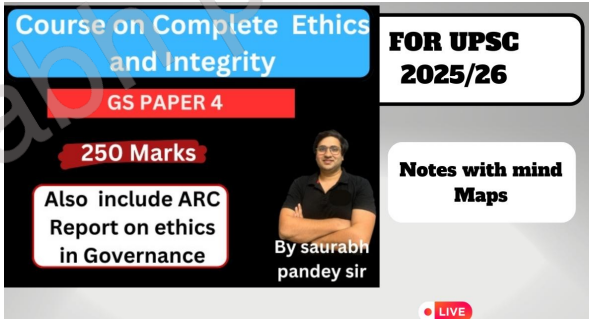


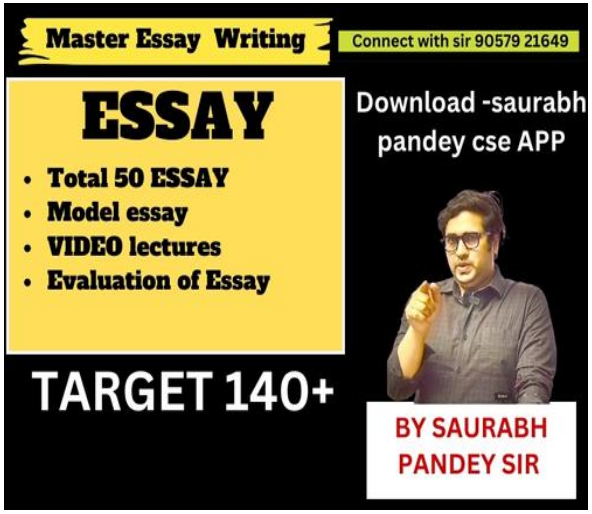

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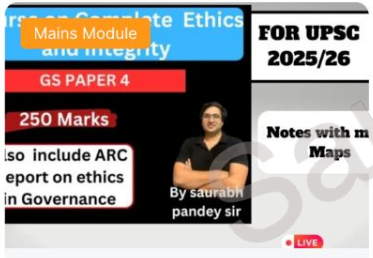


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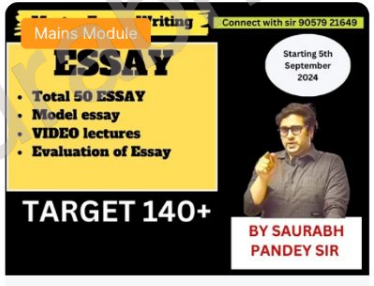


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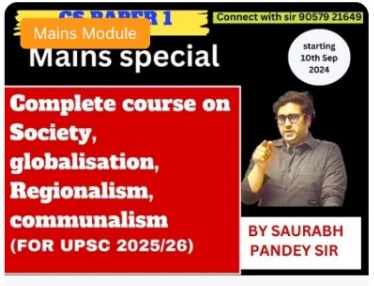


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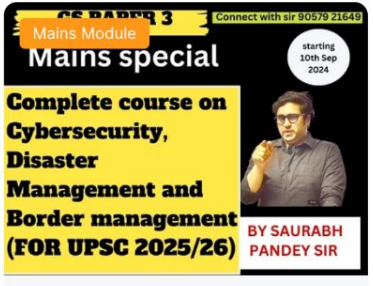


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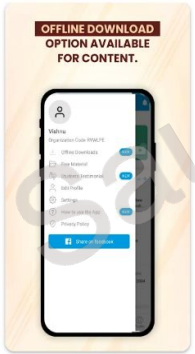



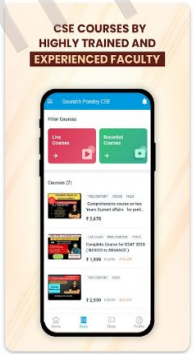


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