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• RAM TEMPLE CONTROVERSY

With CEO post, how Ram Temple Trust is changing

The decision brings the Ram Temple closer to the governance model of older temples. But much of its internal rulebook is outside the public domain



DEEPTIMAN TIWARI

THE RAM TEMPLE Trust has accepted the magistracy of its two most influential office-bearers, General Secretary (Charap) Rajesh Kumar and Treasurer Anil Mishra, and announced that it will appoint a Chief Executive Officer (CEO) within three months to oversee the biggest administrative overhaul of the body that manages Ayodhya temple since it was constituted in 2020.

How did the Trust come into being?

The first Ram Janmabhoomi Trust, known as the predecessor to the Supreme Court's November 2019 Ayodhya judgment. The Court directed that the government formulate a scheme within three months for setting up a trust and to acquire the disputed land to it. Acting under the Acquisition of Certain Area at Ayodhya Act, 1993, the Centre constituted the Trust on February 12, 2020, and transferred the sought land to it through a court-ordered transfer.

Unlike Tirumala, Jagannath, Varanasi Kashi Vishwanath, the Ram Temple is not governed by a dedicated statute enacted by state legislatures. Its legal framework is a combination of the Supreme Court's 2019 judgment and the 1993 Ayodhya Acquisition Act, the Central government's scheme and notification, and the finalised of the Ram Ram, Ayodhya Trust, 2020. The trust is the sole authority for the temple's private religious and administrative functions. It occupies a unique institutional position as a public religious trust that has to implement its vision and vision implementation of a dedicated statute.

Who runs the Trust?

The 16-member Trust is the temple's highest decision-making body. It is chaired by Rajesh Kumar, Charap, and Anil Mishra, Treasurer. The Trust is a day-to-day leadership body, day-to-day leadership gradually came to rest with Rajesh Kumar, Charap, and Anil Mishra, Treasurer.

The trust does not have permanent members, nominated members and ex-officio representatives, ensuring representation from the religious community as well as the government. The Ram Temple government, constituted by the government, is a committee headed by former Principal Secretary to the Prime Minister, Shri. Anil Mishra, Charap, and Anil Mishra, Treasurer.

The Trust also includes senior advocates K. Parasram, 14th official President of the Central government representatives, and D. K. Singh, 14th official President of the Central government representatives. Most of the members are recruited from the Hindu community, and some from the Ram Janmabhoomi movement.

Unlike statutory temple trusts headed by members of the public, the Ram Temple's administrative body has largely been driven by members and officers themselves.

Who manages the temple every day?

Unlike Tirumala or Varanasi Kashi, the Ram Temple has not had a permanent chief executive, but the administrative responsibilities have been divided among its divisional office-bearers.

• KEY FACES OF THE TRUST



GOVIND DESAI, TRUST TREASURER

A religious leader from Madhya Pradesh, Desai is a well-known religious leader and a member of the Ram Temple Trust.



MOHAN PRASAD SINGH, TRUST PRESIDENT

Also the head of the Ram Temple Trust, Singh is a well-known religious leader and a member of the Ram Temple Trust.



KRISHNA MOHAN BHATNAGAR, GENERAL SECRETARY

BSG office bearer, an Indian Temple trustee, Bhatnagar is a well-known religious leader and a member of the Ram Temple Trust.



CHANDRA PRASAD SINGH, GENERAL SECRETARY

BSG and BSG member who was the person in charge of the temple's affairs, Singh is a well-known religious leader and a member of the Ram Temple Trust.



ANIL MISHRA, EX-MEMBER

BSG member who supervised all temple affairs, Mishra is a well-known religious leader and a member of the Ram Temple Trust.

• STRUCTURAL CONTRAST: RAM TEMPLE TRUST VS OTHER MAJOR SHRINES

Temple	Ram Temple	Tirumala	Mata Vaishnava Devi	Jagannath Temple	Golden Temple	Shri Venkateswara Temple
Governing legislation	Supreme Court judgment (2019) Act - Trust Deed	AP Charitable & Hindu Religious Institutions Act, 1987	Madhya Pradesh Hindu Religious & Charitable Institutions Act, 1960	Odisha Hindu Religious & Charitable Institutions Act, 1954	Delhi Charitable & Religious Institutions Act, 1960	UP Hindu Religious & Charitable Institutions Act, 1960
Legal nature of management	Independent public charitable trust	State government-owned institution	State government-owned institution	State government-owned institution	State government-owned institution	State government-owned institution
Executive Head / Chief administrator	Proposed CEO / General Secretary	Executive Officer (EO) / State government-appointed administrator	Chief Executive Officer (CEO) / State government-appointed administrator	Chief Executive Officer (CEO) / State government-appointed administrator	Chief Executive Officer (CEO) / State government-appointed administrator	Chief Executive Officer (CEO) / State government-appointed administrator
Financial audit of	Private auditing	State audit department	State audit department	State audit department	State audit department	State audit department
Revenue	Temple	Temple	Temple	Temple	Temple	Temple

Ram Temple overall administration, Mishra supervised donations and temple income. In the past, the temple's income was managed by the temple's trustees, who were appointed by the temple's trustees.

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Limited information

Unlike other major temples, the Ram Temple Trust's internal rulebook remains outside public domain.

By contrast, the governing Acts, rules and administrative structures of other institutions are publicly available.

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Why appoint a CEO now?

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What does the rule book say?

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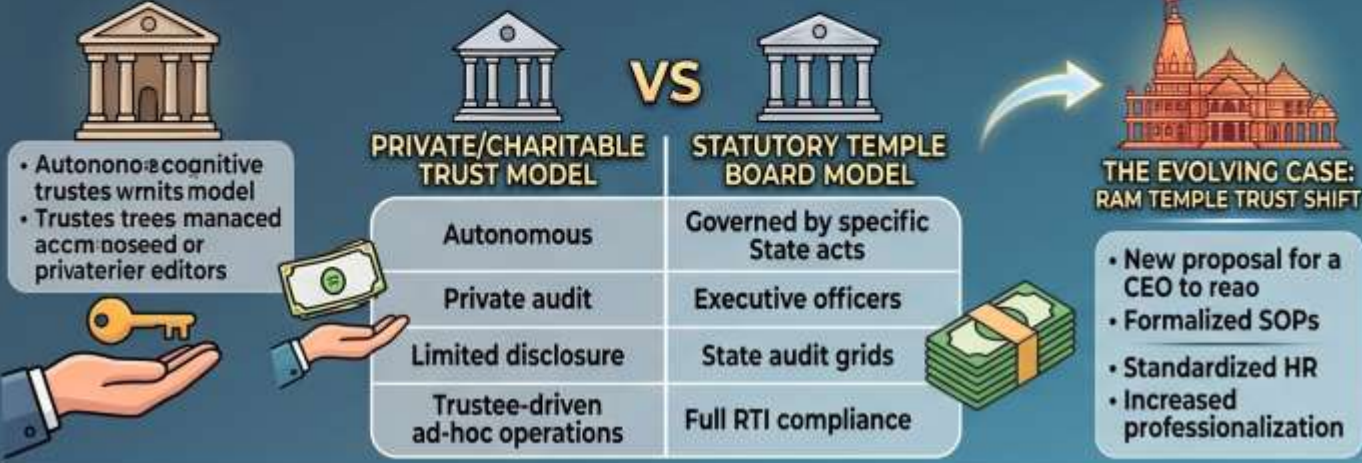
- **Key Terms and Explanations**
- **Public Charitable Trust vs. Statutory Temple Board**
 - A **Public Charitable Trust** is a legal entity established for the benefit of the public at large, typically governed by a Trust Deed and registered under general trust laws or specific executive notifications. It operates with a high degree of autonomy, and its internal rules are largely self-determined by its trustees.
 - In contrast, a **Statutory Temple Board** is created through a specific piece of legislation enacted by a state assembly or Parliament (for instance, the *Shri Jagannath Temple Act, 1955* or the *Shri Mata Vaishno Devi Shrine Act, 1988*). These statutory boards place the administration directly under a legislative framework, making the institution subject to government oversight, public service rules, and institutionalized accountability mechanisms.
- **Public Authority under the RTI Act, 2005**
 - Under Section 2(h) of the Right to Information (RTI) Act, a "**Public Authority**" refers to any authority, body, or institution of self-government established or constituted by the Constitution, by Parliament, by a state legislature, or by a notification issued or order made by the appropriate government.
 - Bodies designated as public authorities are legally mandated to disclose operational and financial details to citizens. When an institution is exempted from this definition—often due to executive classification of its foundational files as "confidential" due to national security or social sensitivity—its internal financial ledgers, administrative rulebooks, and recruitment processes remain outside the public domain.
- **Chief Executive Officer (CEO) and Executive Officer (EO) Models**
 - The **CEO/EO Model** in institutional governance represents the formal transition from traditional, lineage-based, or trustee-led management to professional, bureaucratic administration. In major religious and cultural institutions, an EO or CEO is typically a senior, active civil servant (such as an IAS or state-vetted PCS officer) deployed by the government.
 - This professional administrator is entrusted with day-to-day administrative operations, human resource management, and financial discipline, thereby separating secular management from purely ritualistic or spiritual responsibilities.
- **Standard Operating Procedures (SOPs)**
 - **Standard Operating Procedures** are step-by-step, formalized instructions established by an organization to ensure consistency, efficiency, and quality control in routine operations. In large-scale public institutions, the absence of SOPs in critical areas—such as asset verification, cash counting, or human resource recruitment—leaves the system vulnerable to ad hoc decision-making, financial leakages, and systemic mismanagement.
- **Private Auditing vs. State Audit Grids**
 - **Private Auditing** involves the evaluation of financial records by an independent, privately chartered accountant selected by the institution's own management. The primary accountability remains with the trustees rather than the public.
 - A **State Audit Grid**, however, subjects an institution to rigorous financial scrutiny by state audit departments, the Comptroller and Auditor General (CAG), or statutory audit panels mandated by law. This ensures that every rupee collected from the public is transparently accounted for and vetted against stringent state financial rules.

- **Main Arguments and Substantive Parts**
- **The Paradox of Autonomy vs. Institutional Accountability**
 - A central challenge in managing massive public institutions is balancing administrative autonomy with public accountability. The governance data reveals a distinct structural contrast: while historical shrines like Tirupati, Vaishno Devi, and Jagannath Puri operate under explicit statutory laws with state-vetted audits and full RTI compliance, newer public charitable trusts have frequently been structured with private auditing and RTI exemptions.
 - The core argument emerging from recent governance overhauls is that traditional, trustee-driven management models are increasingly insufficient for handling the immense financial, logistical, and crowd management **The Inevitability of Professional Bureaucratization**
 - The shift toward appointing professional Chief Executive Officers marks a major structural evolution. When large public trusts rely on ad hoc committees, informal recruitment without formal appointment letters, and decentralized control over donations, they face significant administrative risks.
 - Evidence indicates that internal audits often label purely trustee-led management as structurally unprofessional, noting a lack of clear financial records and defined reporting hierarchies. Therefore, introducing seasoned bureaucrats to oversee daily administration, while leaving policy decisions to trustees, is an essential step toward long-term institutional stability.
- **Public Trust and the Imperative of Financial Transparency**
 - Public donations are driven by faith, meaning that any lack of transparency can quickly erode public confidence. Sociopolitical organizations and judicial mandates alike emphasize that public institutions must maintain flawless financial management.
 - When controversies regarding asset management or theft arise, they often stem from weak internal controls, such as missing SOPs for handling donation boxes. Transitioning to a structured governance model with formal accounting mechanisms is vital to protect the institution's reputation and restore public trust.
- **Historical Evolution of the Issue**
- **The Pre-Independence Era and Colonial Interventions**
 - The formal regulation of major religious and public endowments in India began during the colonial era. Initially, the British East India Company directly managed prominent temples to secure local legitimacy and revenues. However, facing domestic Christian opposition, the colonial government retreated via the *Religious Endowments Act of 1863*, shifting control to local committees.
 - Realizing that a total hands-off approach led to mismanagement, they later enacted the *Charitable and Religious Trusts Act of 1920* and the landmark *Madras Hindu Religious and Charitable Endowments (HR&CE) Act of 1925*. This established a precedent for state-supervised regulation of public religious properties, balancing community autonomy with administrative oversight.
- **Post-Independence State Legislations and Nationalization**
 - Following independence, the Indian state adopted a proactive approach to reform public institutions and eradicate administrative corruption. Various state legislatures passed dedicated laws to govern major historical shrines.
 - These milestones established a highly institutionalized model where senior IAS officers were appointed as Executive Officers, and financial books were opened to state audits and, eventually, the RTI Act.
- **The Era of Judicial Mandates and Public Trusts**
 - In recent decades, the Supreme Court of India has played a central role in shaping institutional governance. The judiciary has consistently held that while religious rituals fall under constitutional protections, the secular management of a temple's wealth, land, and administration can be regulated by the state.
 - This judicial philosophy culminated in landmark verdicts directing the executive to formulate specific schemes for building and managing prominent new shrines. The executive implemented these mandates by forming independent public charitable trusts through gazette notifications under existing land acquisition laws.
- **The Modern Transition to Corporate-Bureaucratic Governance**
 - By 2026, a clear trend has emerged where even highly autonomous public charitable trusts are adopting structural features of older statutory boards. Faced with the logistical demands of hosting millions of visitors daily, along with the financial risks of ad hoc management, these trusts are moving away from purely decentralized, trustee-driven operations.
 - The current phase of this evolution involves integrating corporate governance practices—such as appointing dedicated CEOs, establishing formal HR systems, and creating standardized SOPs—into traditional public trust frameworks.

- **Way Forward**
 - **Implementing a Balanced Co-Management Governance Framework**
 - Public institutions should adopt a balanced co-management model that cleanly separates spiritual duties from secular administration.
 - **Spiritual Matters:** Rituals, religious practices, and traditional ceremonies should remain entirely under the authority of traditional trustees and spiritual leaders.
 - **Secular Administration:** Daily operations, financial systems, safety protocols, and asset management should be directed by a professional Chief Executive Officer—ideally an active, senior civil servant.
 - This model successfully protects community traditions while ensuring modern administrative efficiency.
 - **Proactive and Voluntary Public Disclosure**
 - To reinforce public confidence, large public trusts should move toward voluntary transparency rather than relying on legal exemptions from the RTI Act. Shrines should proactively publish their financial ledgers, administrative rulebooks, procurement procedures, and recruitment guidelines on accessible public portals. Embracing open governance demonstrates that the institution has nothing to hide and reinforces its accountability to the community.
 - **Standardizing Financial and Operational SOPs**
 - Public institutions must quickly replace ad hoc management practices with comprehensive, digitized Standard Operating Procedures. This includes:
 - Installing automated, transparent cash and asset tracking systems at all donation points.
 - Requiring comprehensive financial audits conducted by independent state-vetted or statutory audit panels.
 - Moving away from informal hiring by introducing merit-based, transparent recruitment processes with formal contract terms and clear organizational hierarchies.
 - **Developing a Model Statutory Framework**
 - Instead of relying on an uneven mix of executive orders and various state laws, policymakers should consider creating a model framework for large-scale public institutions. This model could offer a standardized legal template that guarantees structural autonomy for spiritual matters while establishing clear rules for financial reporting, open audits, and public safety. Such a framework would bring consistent, stable, and high-quality governance to major public shrines nationwide.
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UPSC CSE COMPREHENSIVE ANALYSIS: GOVERNANCE OF LARGE PUBLIC & RELIGIOUS TRUSTS

GOVERNANCE MODELS COMPARISON



KEY GOVERNANCE CONCEPTS DECODED



HISTORICAL EVOLUTION: PRE-INDEPENDENCE TO MODERN REFORMS



MULTIDIMENSIONAL ANALYSIS



UPSC CSE SYLLABUS LINKAGES

GS Papers 2 & 4	- Public Trusts - Political Trpics - Pol Sci Class XI Secularism	
Essay	- Religion Endowments Institutions - Balir/smows of Prisks - Pol Sci Class XI Secularism	
Optional: Pub Ad, PSIR	- Temple economy Essay & Individual Trusts - Pol Sci Class XI Secularism	

WAY FORWARD

Balanced left recommendations:

- ✓ Professional Co-management (Separate Spiritual/Secular)
- ✓ Model Statutory Framework for all Major Trusts
- ✓ Digitalization & Financial Transparency
- ✓ Proactive Public Disclosure & E-Governance
- ✓ Formalized HR & Capacity Building

* Based on typical governance structures of major trusts, including analysis of the recent Ram Temple news item.

PREVIOUS YEARS' QUESTIONS (PYQs): PRELIMS & MAINS

Illustrative PYQs:
Art 26, 2020, 2021, 2012, 2023, mains (2037, 2027, 2031)

Art 26, application
20162, 2029, 2015, 2027, 2020, 2008, 2029, 2030, 2051, 2013)

RTI application
2011 (73, 2029, 2029, 2009, 2021 1st 2051)

RTI application
2021, 2015, 2018, 18036, (2033)

State control
2019, 2011, 2023, 2009, (2032)

State control
2021 (51, 2002, 2027), 2005, (2025)

Birds' words: Why a scientist won Rs 95-lakh prize for work on zebra finches



EXPERT EXPLAINS

ANTONIO JOSE OSUNA-MASCARÓ

ANIMAL COGNITION RESEARCHER, UNIVERSITY OF VETERINARY MEDICINE, VIENNA

AN AMERICAN scientist has won a \$100,000-prize for her work on how zebra finches communicate with each other. Dr Julie Elie at the University of California, Berkeley, won the Collier Dolittle Challenge for Two-Way Interspecies Communication for discovering that “zebra finches classify their calls according to meaning more so than acoustics,” the UK-based Collier Foundation said in a statement. Elie identified 11 different calls that the birds make, and their meanings.

Dr. Antonio Jose Osuna-Mascaró explains how scientists study birds' 'language', and why Elie's work is significant. He spoke to **Yashee**.

Scientists have long known that animals use distinct calls in different situations. What is new in Elie's work?

Traditionally, humans observe animals, record their calls, examine their acoustic structure and the circumstances in which

they are produced, and then divide them into categories. But that leaves an important question unanswered: do those categories also exist for the animals themselves?

These researchers trained zebra finches to distinguish the different call types in their repertoire, using many examples. The birds were remarkably good at doing so.

The strongest result, in my opinion, comes from their mistakes. The researchers compared the birds' pattern of errors with what would be expected purely from acoustic similarity. The birds were more likely to confuse different calls associated with similar meanings (behavioural functions) rather than sound similarity. This suggests that their perceptual organisation reflects not only what calls sound like, but also something about what those calls are used for.

What are the main methods to investigate whether a call carries specific information or meaning?

There are several complementary approaches. The starting point is usually naturalistic observation: researchers ask when a call is produced, who produces it, who is present and what happens afterwards. Acoustic analysis can then determine whether sounds produced in different situations are structurally distinct.

Playback experiments have been especially important. Researchers play a recorded call in the absence of the original event and ask whether receivers respond appropriately. Classic studies of alarm calls, for



Elie identified 11 different calls that zebra finches make. WIKIMEDIA COMMONS

example, showed that animals can produce different responses to calls associated with different predators. Studying alarm calls is the most common and easiest approach to study vocal communication in the animal world, since we can perceive the trigger, the vocalisation, and the response.

What is unusual about this study is its systematic scale and the use of the birds' own classification errors as data. They compared two things: which calls an acoustic classifier tends to confuse, and which calls the birds themselves tend to confuse. The fact that these two error patterns are not identical is central to the argument. The birds' additional errors appear to group calls according to behavioural function, to their “meaning”.

So, the study asks: how is the entire repertoire organised in the bird's perceptual space?

What can machine-learning tools detect that earlier generations of researchers could not, and their risks?

I would actually use this study as a good example of why we should not confuse machine learning with understanding.

Machine-learning tools are enormously useful because they can process quantities of data that would be impossible for a human. They can identify subtle combinations of acoustic features, detect structure in large repertoires, distinguish individuals, discover graded variation and find statistical regularities across millions of vocalisations.

But a machine finding categories does not mean that those categories matter to the animal.

This study illustrates that distinction very nicely. The researchers use computational tools to characterise the acoustic relationships among calls, but the crucial evidence comes from comparing those computational classifications with the behaviour of the birds. The birds' perceptual organisation contains structure that cannot be completely predicted from acoustics alone.

That is, in my view, the correct relationship between AI and experimental biology. Machine learning can reveal patterns and generate hypotheses, but we still need experiments to establish whether animals perceive those patterns, use them and respond to them flexibly.

The major risk is anthropomorphism by algorithm. If an AI system discovers 47 statistically separable vocal clusters, it is tempting to call them 47 “words”. But clusters may reflect individual identity, sex, emotional arousal, or microphone characteristics.

Some researchers now speak of two-way interspecies communication rather than simply decoding animal signals.

There is a large conceptual distance between decoding a signal and having a conversation.

At the simplest level, two-way communication requires that information genuinely passes in both directions. A human or machine-generated signal should change the animal's behaviour in a predictable way, and the animal should also be able to produce signals whose interpretation changes our subsequent behaviour.

But a convincing case for something resembling conversation would require considerably more. The exchange should be contingent: the meaning of one contribution should depend on what happened immediately before.

It should also be flexible, rather than a fixed chain of trained responses. Ideally, the system should allow some form of generalisation to new situations or new combinations, because otherwise it is difficult to distinguish communication from an elaborate sequence of conditioned behaviours.

Personally, the most convincing evidence would be an exchange in which an

animal spontaneously provides information that the human does not already possess, the human responds on the basis of that information, and the animal then adjusts its subsequent communication according to that response.

If scientists eventually manage to communicate meaningfully with certain animals, what are the biggest implications—for animal welfare, conservation, farming, or laboratory research?

That would be fantastic, of course, like science fiction to me. We have been close to that in the past, with Alex the parrot and with Kanzi the bonobo, but those were interactions far from what a naïve perspective would expect from a conversation between species.

I think we should be careful not to imagine a future in which animals simply tell us in human-like sentences that they are frightened or in pain. Communication systems are adapted to the ecological and social problems faced by each species. What matters to a zebra finch, an elephant or a cuttlefish may be structured in ways that do not map neatly onto human categories.

It's important to free ourselves from trying to “force” other species into our own way to understand the world. It's extremely interesting to learn about the vocal communication of other species, of course, and there might be many surprises waiting to be discovered. We have had to reshape our understanding of animal communication multiple times, and we should be open to do it again in the future.

- **Key Terms and Explanations**
- **Interspecies Communication:** This refers to the meaningful exchange of information between different biological species. Unlike simple commands given to a pet, true interspecies communication involves a shared, bi-directional understanding where both entities alter their subsequent behavior based on the message received.
- **Acoustic Analysis vs. Semantic Classification:** Acoustic analysis measures the physical properties of sound, such as pitch, frequency, and duration. Semantic classification, on the other hand, groups sounds based on their underlying meaning or behavioral function. For instance, two alarm calls might sound completely different (acoustics), but because they both warn of a predatory hawk, birds group them together conceptually (semantics).
- **Playback Experiments:** A foundational methodology in animal behavior (ethology) where researchers record a specific animal vocalization and play it back to a group in the absence of the original stimulus. If the animals respond appropriately—such as taking cover upon hearing a recorded alarm call even when no predator is present—it proves the sound itself carries specific information.
- **Anthropomorphism by Algorithm:** The logical fallacy of projecting human traits, intentions, or linguistic structures onto the data clusters generated by Artificial Intelligence. If a machine learning model identifies 50 distinct sound patterns in a bird's repertoire, humans are tempted to call them "50 words," ignoring the fact that these clusters might just reflect minor physical differences like microphone distance or a bird's emotional arousal.
- **Acoustic Classifier:** A machine learning algorithm trained to sort sounds based purely on their mathematical and physical wave characteristics. It lacks any understanding of context or real-world consequence, serving as a purely mechanical sorting tool.

- **Main Arguments and Substantive Parts**

- The discourse surrounding avian cognitive abilities challenges long-held human-centric biases regarding language and communication. The core ideas can be synthesized into several critical components.

- **The Shift from Sound to Meaning**

- The central breakthrough demonstrated in recent avian research is that zebra finches organize their vocal repertoires based on what the calls *mean* rather than how they *sound*. By identifying distinct calls within the zebra finch repertoire, scientists have shown that these birds possess a highly structured mental map of their vocalizations.

- **The Evidence of "Meaningful Mistakes"**

- The most compelling argument for cognitive processing in these birds lies in the pattern of errors they make. When tested, the birds occasionally misidentified calls. Crucially, these errors were not random, nor were they based on acoustic similarity.

- Instead, the birds confused different calls that shared similar behavioral functions or meanings. This proves that their internal mental organization is governed by functional utility rather than simple auditory mechanics.

- **AI as a Hypothesis Generator, Not an Interpreter**

- While machine learning tools are incredibly powerful for parsing vast amounts of audio data, they do not possess genuine comprehension. The argument presented warns against confusing statistical pattern recognition with biological understanding.

- The ideal relationship is synergistic: AI tools process mass data to reveal hidden structural patterns and generate hypotheses, which human experimental biologists must then validate through field observations and behavioral tests.

- **Criteria for True Two-Way Dialogue**

- Moving from decoding animal signals to having an actual conversation requires fulfilling strict criteria:

- **Mutual Information Flow:** The information must genuinely pass and be absorbed in both directions.

- **Predictable Behavioral Change:** The signal must alter the receiver's actions in a structured manner.

- **Contingency:** The meaning and context of one turn in the communication must depend entirely on what happened immediately before it.

- **Flexibility:** The system must adapt to new situations rather than relying on a rigid, trained chain of conditioned reflexes.

- **Historical Evolution of the Issue**
- **Pre-1950s: Anthropocentric Isolation**
 - For centuries, western philosophical tradition, heavily influenced by Cartesian thought, viewed animals as biological automata. Language was considered the exclusive, divinely assigned boundary separating humanity from the rest of the natural world. Animal vocalizations were dismissed as mere involuntary, emotional reflexes like crying or gasping.
- **1950s–1970s: The Dawn of Ethology**
 - The formalization of ethology by pioneers like Konrad Lorenz, Nikolaas Tinbergen, and Karl von Frisch (who decoded the waggle dance of honeybees) marked a major shift. The invention of the audio spectrograph allowed scientists to visually map animal sounds for the first time, turning ephemeral bird songs into tangible, measurable data graphs.
- **1980s–2000s: The Cognitive Revolution**
 - Researchers began testing the limits of animal semantics and syntax. Landmark studies on Vervet monkeys revealed that they used distinct, semantic alarm calls for different predators (leopards, eagles, snakes), requiring distinct survival responses.
 - Concurrently, laboratory studies with language-trained animals, such as Alex the African Grey parrot and Kanzi the bonobo, shattered the notion that complex conceptual processing was a uniquely human trait.
- **2010s–Present: The Bio-AI and Big Data Era**
 - The current era, combines massive field data collection with advanced machine learning. The focus has fundamentally shifted from merely deciphering what an animal sound looks like on a graph to attempting active, two-way conversational interactions, supported by substantial international research prizes and challenges.
- **Way Forward**
- **Key Recommendation: Balanced Tech-Bio Integration**
 - We must actively resist "anthropomorphism by algorithm." AI should be utilized strictly as a tool for initial pattern sorting and hypothesis generation, while keeping human experimental biology and field ethology as the final judges of behavioral meaning.
 - **Upgrading Animal Welfare Protocols:** Regulatory bodies should update guidelines for laboratory animals and livestock, integrating cognitive and communicative well-being into welfare assessments.
 - **Deploying AI Bioacoustics in Conservation:** Environmental ministries should deploy non-invasive, AI-powered acoustic monitoring networks in eco-sensitive zones. This will allow for real-time tracking of biodiversity health, poaching activities, and habitat fragmentation without disrupting the wildlife.
 - **Establishing Open-Source Global Bioacoustic Repositories:** Governments and academic institutions should collaborate to create open-access international databases of animal vocalizations. This will democratize research and enable global machine learning models to assist local conservation efforts.
 - **Formulating Ethical Guidelines for Bio-AI:** As researchers approach true two-way interspecies communication, clear ethical frameworks must be drafted under international bodies. These guidelines should ensure that attempting to communicate with wild species does not inadvertently disrupt their natural behaviors, mating cycles, or survival strategies.



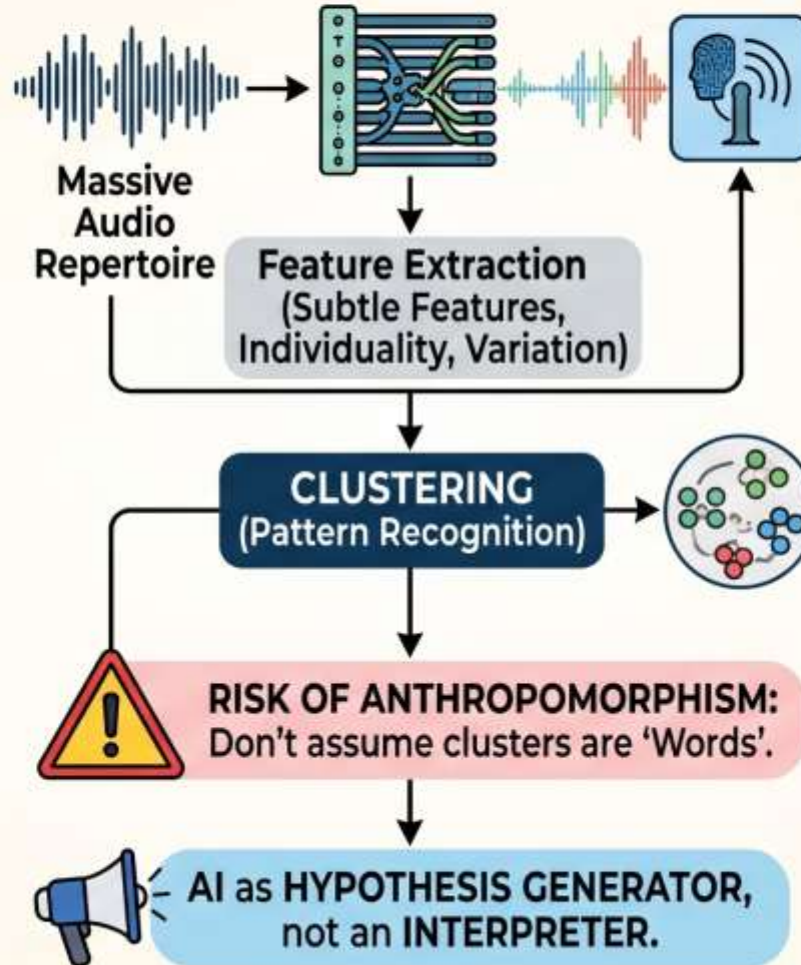
BIRDS' 'WORDS': DECODING ZEBRA FINCH COMMUNICATION & ITS UPSC RELEVANCE

THE CORE DISCOVERY: DR. JULIE ELIE'S RESEARCH



- **MEANING OVER ACOUSTICS:** ZEBRA FINCHES CLASSIFY CALLS BY FUNCTION.
- IDENTIFIED 11 CALLS.
- **KEY EVIDENCE: 'MEANINGFUL MISTAKES'**
- CONFUSING DIFFERENT CALLS WITH SIMILAR CONTEXT (NOT SOUND).

MACHINE LEARNING: TOOL & RISK



THE FUTURE: TWO-WAY INTERSPECIES COMMUNICATION



APPLICATIONS



- **REQUIRES:** MUTUAL INFORMATION FLOW, CONTINGENCY (TURN-TAKING), FLEXIBILITY.

UPSC CSE SYLLABUS LINKAGES

- **GS PAPER 3: S&T** (AI APPLICATIONS), ENVIRONMENT (BIODIVERSITY CONSERVATION).
- **GS PAPER 4: ETHICS** (ANIMAL WELFARE, SCIENTIFIC ETHICS).
- **KEY CONCEPTS:** COGNITIVE ETHOLOGY, BIOACOUSTICS.

• HISTORY

Arches that lead to Charminar: Plans to restore the Char Kaman

Nikhil Henry
Hyderabad, July 5

HYDERABAD IS known for its iconic Charminar, the Old City structure that bears the signature of the Qutb Shahi dynasty's architectural majesty. But what's lesser known are the four ornamental gateways that lead to it, called the Char Kaman.

The Telangana government has announced that the gateways will soon get a facelift.

History and significance

The Charminar was built between 1589 and 1591 by Muhammad Qutb Shah, the fifth ruler of the Qutb Shahi dynasty. According to Mohammed Safiullah, a Hyderabad historian and honorary managing trustee of Deccan Heritage Trust, the Kamans could have been built around 1594.

The 20th century historian Syed Ali Asghar Bilgrami writes that after the completion of the Charminar, Shah commissioned the construction of four ornamental arches or gateways around the Charminar.

According to Bilgrami's book *Landmark of Deccan* (1927), the four arches had names, differing from their present nomenclature. The west arch was first named Daulat Khan Ali, or the gate of the royal residence; whereas the one on the east was named Niggar Khan, or gate of the palace where drums are beaten. "Generally the central arm of the four arches was termed *Mau Khan* or the royal vestibule," Bilgrami writes.



One of the Char Kaman in Hyderabad. © ANSARI/ANSAI

The Kaman to the north is called which "a huge elephant with a canopy of white cloth" were later called Machli Kaman, or the fish arch. This is because, Bilgrami writes, "a big fish made of cardboard and paper resembling a miniature aeroplane is suspended in the centre of the arch on every lunar new year".

The rest of the arches were called Charminar Arch (south): Kail Kaman or Kaman of Shambhuo Pemhad (east), which stands for the black arch; Kaman Sher Dill or Sher Dilli (west), meaning gateway for the lion hearted or the magic breaker. These names are still in use in Hyderabad.

Bilgrami writes: "Formerly the Qutb Shahi palaces were situated towards the western arch, but the relentless hand of time has totally obliterated them." The arches marked the entrances to the city of Hyderabad. According to Bilgrami, the arches saw immense traffic during the Qutb Shahi period as "the adjoining outposts were used as a sitting place for the nobles and officials. These noblemen used to come every morning with their retinue and attendants and after reaching the royal vestibule which was in the centre of the four arches, the suite and retinue would sit behind and they used to proceed unattended for the audience of the king."

Restoration plans

The restoration work is expected to focus on structural repairs and conservation of heritage features. The work would aim to improve the overall condition of the monuments while retaining their historical character. Heritage conservationists have long called for the preservation of the Char Kaman, pointing to the damage caused over the years by growing urbanisation and resultant pollution.

Hyderabad MP Anusha Ullas announced last week that the restoration project has received a major boost, with the government granting administrative sanction to invite tenders and appoint a consultant for the work.

- **Key Terms and Explanations**
- **The Qutb Shahi Dynasty:** An influential medieval Indo-Islamic dynasty that ruled the kingdom of Golconda in Southern India from 1518 to 1687. Founded by Sultan Quli Qutb-ul-Mulk, the dynasty is celebrated for its distinctive Deccani architecture, pluralistic court culture, and the founding of Hyderabad.
- **Char Kaman (Four Arches):** Literally translating to "Four Arches," this refers to a historic spatial ensemble consisting of four monumental gateways—*Machli Kaman*, *Kali Kaman*, *Sher-e-Dil Kaman*, and *Charminar Arch*. Built in the late 16th century, they served as the grand entry points to the royal precinct from the four cardinal directions.
- **Jilau Khana (Royal Vestibule):** This term refers to a royal architectural forecourt or transitional plaza typical of Islamic palace design. Historically, it functioned as an administrative check-point and a grand waiting area. For example, in medieval Hyderabad, nobles and officials would leave their large retinues and elephants at this central plaza before proceeding unattended into the presence of the king.
- **Deccani Style of Architecture:** A distinct regional sub-style of Indo-Islamic architecture that flourished in the Deccan plateau. It represents a fluid synthesis of Persian elegance, Central Asian structural engineering, and indigenous Hindu stone-carving traditions, visible in its bulbous domes, wide arches, and intricate stucco ornamentation.
- **Heritage Conservation (Structural vs. Aesthetic):** The specialized process of preserving, restoring, and managing historical sites. *Structural conservation* focuses on the physical stability and engineering integrity of a monument (e.g., repairing cracks, strengthening foundations), whereas *aesthetic conservation* deals with restoring surface-level features, lime plasterwork, and ornamental details without altering their historical character.

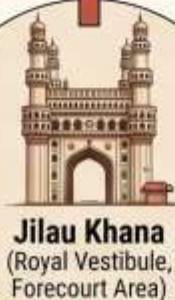
- **Main Arguments and Substantive Parts**
- The core discourse surrounding the preservation of the *Char Kaman* architectural complex revolves around shifting the paradigm of conservation from isolated monuments to entire historic urban landscapes.
- **The Integrated Heritage Ecosystem**
- An iconic monument cannot be fully understood or preserved in isolation. Gateways like the *Char Kaman* are not mere standalone decorations; they are structural components of a singular, master-planned urban layout designed alongside the Charminar. Preserving the central monument while allowing its surrounding gateways to decay degrades the spatial integrity of the entire historical site.
- **Historical Authenticity vs. Urban Degradation**
- A primary challenge highlighted in architectural history—including landmark documentations such as Syed Ali Asghar Bilgrami's 1927 work *Landmarks of Deccan*—is the relentless impact of time and human activity. While the main royal palaces have been completely lost, the surviving arches stand vulnerable. Decades of unmanaged commercial urbanization, heavy traffic, and modern pollution have compromised the physical framework of these gateways, creating an urgent need for professional structural intervention.
- **Structural Rectification and Policy Revival**
- The modern state-led administrative initiatives to issue tenders and hire expert conservation consultants reflect a policy shift toward institutionalized heritage management. The primary focus of these plans is to execute structural repairs and conserve heritage features while strictly retaining their original historical character, demonstrating that proactive governance is essential to prevent irreversible cultural loss.

- **Historical Evolution of the Issue**
- **1589–1591 (The Genesis):** Sultan Muhammad Quli Qutb Shah, the fifth ruler of the Qutb Shahi dynasty, constructed the Charminar. This monumental mosque and gateway was designed to serve as the physical and symbolic center of his new capital city, Hyderabad.
- **Circa 1594 (The Urban Expansion):** Following the completion of the central monument, the Shah commissioned the *Char Kaman*—four monumental ornamental arches positioned at the cardinal directions. These gateways defined the *Jilau Khana* (royal plaza) and marked the entrances to the royal palaces situated toward the western arch.
- **Late 17th to 19th Century (Dynastic Shifts and Decay):** With the fall of the Golconda Sultanate to the Mughal Emperor Aurangzeb in 1687, the regional focus shifted. During the subsequent Asaf Jahi (Nizam) period, the original Qutb Shahi palaces were gradually lost, and the nomenclatures of the arches evolved to match local administrative changes—such as the eastern gate becoming known as the *Kaman of Shambhoo Pershad*.
- **1927 (The Documentation Milestone):** Historian Syed Ali Asghar Bilgrami published *Landmarks of Deccan*, providing detailed documentation of the changing names, spatial layouts, and deteriorating conditions of the arches, warning of the progressive loss of the surrounding historic fabric.
- **Post-Independence to Present Day (Urbanization and Modern Intervention):** Rapid, unregulated commercial growth transformed the Old City of Hyderabad into a dense marketplace. This caused severe structural stress to the arches from vehicular vibration and air pollution. Recent state-led administrative sanctions and funding injections have initiated professional, scientific restoration efforts to preserve these ancient gateways.
- **Way Forward**
- **Adopting the Historic Urban Landscape (HUL) Approach**
- Urban planning agencies should implement UNESCO's Historic Urban Landscape approach. Instead of managing monuments as isolated objects, cities should regulate the entire surrounding buffer zone. This means setting clear limits on building heights, standardizing commercial signage, and ensuring new construction matches the historic aesthetic of the district.
- **Pedestrianization and Traffic Management**
- To protect vulnerable historic structures from vehicular vibrations and corrosive exhaust fumes, the core heritage zone around the Charminar and *Char Kaman* should be pedestrianized. This transition can be supported by introducing eco-friendly public transport options, like battery-operated shuttle carts, and establishing dedicated parking hubs outside the historic district.
- **Promoting Public-Private-People Partnerships (4P Model)**
- Conservation efforts should actively involve local business communities, resident welfare associations, and independent heritage organizations, such as the Deccan Heritage Trust. Providing tax incentives for corporate social responsibility (CSR) investments in heritage preservation can secure steady funding and ensure local communities feel a sense of ownership over their historic neighborhoods.
- **Reviving Living Heritage and Intangible Traditions**
- Heritage sites remain vibrant when they stay connected to their living cultures. Reintroducing traditional cultural events—such as the historic practice of displaying symbolic art at the *Machli Kaman* during significant celebrations—can attract visitors and keep local history alive. This approach transforms static stone monuments into dynamic cultural centers that celebrate both tangible architecture and living traditions.



KEY ENTITIES & SPATIAL CONTEXT (GS-1 & GS-2)

Machli Kaman
(North - Elephant Passage)



Jilau Khana
(Royal Vestibule, Forecourt Area)



Kali Kaman
(East - Black Arch)



Charminar Arch
(South)



Sher-Dil Kaman
(West - Lion-Hearted Arch, with magic-breaker mention)



Qutb Shahi Dynasty - Qutb Shahi Dynasty is constructed by the rainmar Quli Qutb Shah.

Deccani Architecture Style (Persian-Indigenous synthesis), crossed born Deccani- architectural synthesis.

Historic Urban Landscape - Historic Urban plaiesershas come conservations life of Hyderabad.



HISTORICAL TIMELINE & DOCUMENTATION (GS-1)



1589-1591:
Charminar
Constructed
by Muhammad
Quli Qutb
Shah



c. 1594:
Char Kaman
Commissioned



1927:
Landmarks of
Deccan (Syed
Ali Asghar
Bilgrami) -
Key Documentation



Present:
Growing
Urban
Stress and
Decay

Syed Ali Asghar Bilgrami's Documentation



- Name on name of documentation changes
- Name change in change a ratce of surminar Bilgrami
- Function and mory name



- **Name changes** in Mustommili Asghar Bilgrami is bus, ive used to the bananilar, Charminar, Bilgrami. ann or betwoemen notereates, and manaverment of Hysaminar.
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- **Functions:** Tale and contines the power of function is iixnbuded for the original Kiman Kaman.



MULTIDIMENSIONAL UPSC ANALYSIS (GS 1-4)



[GS-1: Cultural Heritage Loss, Provincial Style Scner]

- Cultural Loss
- Provincial Style Scner
- Urban Tratage
- Reality Other Environmen effers



[GS-2: State Intervention, Policy Sanction, Inter-State Relevance (APSC-context relevance call-out)]

- Staltervicin-tmoand cultorations
- Interventions Prosche or Management Exclaiation



[GS-3: Urban Traffic Vibrations, Air Pollution Damage, Environment Protection]

- Urban traffic vibrat :air pollution, proucal damage
- Pollution Damage, unsected environment rotection
- Revumind Environment Protection
- Fravicational Protection vocation



[GS-4: Ethics - Preserving Intergenerational Equity vs. Commercial Growth]

- Preserving Intergenerational vs. imagement
- Equity vs. Comimercial Growth
- Preservas Commercial Equity emilrontement



EDUCATOR'S INSIGHT: An elaborate analysis for UPSC & APSC aspirants.



RESTORATION STRATEGIES & WAY FORWARD (GS-2 & GS-3)

Before



After



**Administrative
Sanction &
Tenders**



**Expert
Consultants**



**Structural Repairs
& Aesthetic
Preservation**

WAY FORWARD



Pedestrianization Plans



Historic Urban Landscape (HUL) Approach



Public-Private Partnerships (4P Model)



Living Heritage Integration



Relevant NCERTs
(e.g., Class 11 Fine Arts
'Indo-Islamic Architecture')



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Modi highlights need for two-state solution to end Israel-Palestine conflict

Kallol Bhattacharjee
Saurabh Trivedi
NEW DELHI

Highlighting the role of dialogue and diplomacy in the "period of global turbulence", Prime Minister Narendra Modi on Tuesday reiterated the importance of the two-state solution to end the Israel-Palestine conflict.

"In this period of global turbulence, India believes that the role of dialogue and diplomacy has become more important than ever before. On the issue of Palestine, we continue to support a two-state solution and the pursuit of lasting peace," Mr. Modi said in Jakarta, Indonesia, the first leg of his three-nation visit. Mr. Modi also focused on commonalities between India and Indonesia globally important issues and said that the two countries are going to deepen cooperation on global issues.

A joint statement issued at the end of the official dialogue between Mr. Modi and Indonesia's President Prabowo Subianto said the leaders expressed "deep concern" over the war in West Asia and "its global effects".

Mr. Modi and Mr. Subianto also presided over the signing of 14 agreements and memoranda of understanding (MoUs), including ones that will allow India to deliver the Brah-



Prime Minister Narendra Modi with Indonesian President Prabowo Subianto on Tuesday. ANI

Mos supersonic cruise missile system and Astra Mk-1 beyond-visual-range air-to-air missiles to Indonesia.

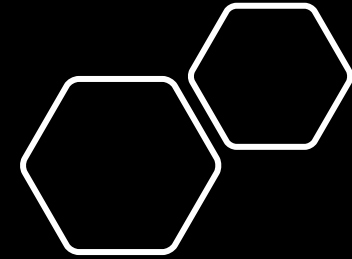
Highlighting the "special importance" of the ASEAN grouping, he said, "There is strong synergy in our respective outlooks on the Indo-Pacific". "They welcomed the memorandum of understanding signed on 17 June 2026," mentioned the joint statement in reference to the agreement signed between the U.S. and Iran to end the war in West Asia, while adding that "transit passage through the Strait of Hormuz" has to be in "accordance with international law including the provisions of UNCLOS".

It further mentioned that the Indonesian President welcomed "India's interest in partnering on the integrated development of the Sabang Port" which

will include maritime industries, and "shore-based services" supporting off-shore energy activities in the Andaman Sea".

Highest honour

Indonesia bestowed the Prime Minister with its highest civilian honour 'Bintang Adipurna of the Republic of Indonesia'. Mr. Modi is the second Indian Prime Minister to receive this award. India's first Prime Minister Jawaharlal Nehru received the same award posthumously on December 12, 1995. "It reflects the goodwill of the people of Indonesia and stands as a tribute to the historic and enduring bonds of friendship between India and Indonesia," said Mr. Modi in his press statement expressing gratitude to Indonesian leadership and people for the gesture.



- **Key Terms and Explanations**
- **Two-State Solution:** This refers to a proposed diplomatic framework intended to resolve the Israeli-Palestinian conflict by establishing two distinct, independent states living side-by-side in peace and mutual security. The concept envisions an independent State of Palestine alongside the State of Israel. For instance, most international frameworks baseline this arrangement on the pre-1967 borders, with mutually agreed land swaps to address demographic realities on the ground.
- **Strategic De-hyphenation:** A foreign policy approach where a country engages with two traditionally adversarial nations independently of each other, based purely on merit and bilateral mutual interests. India's contemporary foreign policy is a textbook example: it maintains a robust, multi-layered strategic and technological partnership with Israel while simultaneously sustaining its historical commitment to the Palestinian cause, without letting either relationship compromise the other.
- **UNCLOS (United Nations Convention on the Law of the Sea):** Known as the "Constitution of the Oceans," this international treaty establishes a comprehensive legal framework for all maritime activities. It defines maritime zones—such as Territorial Waters, Contiguous Zones, and Exclusive Economic Zones (EEZs)—and guarantees freedom of navigation. A practical example is its application in ensuring that critical trade corridors remain open international waterways, safe from unilateral territorial claims.
- **ASEAN Centrality:** A foundational concept in Indo-Pacific geopolitics asserting that the Association of Southeast Asian Nations (ASEAN) must be the primary institutional architecture and driving force behind regional integration and security dialogues. It means that external major powers should engage with the region through ASEAN-led mechanisms rather than bypassing them.
- **Choke Points and Transit Passage:** Choke points are narrow, strategic maritime passages that connect major oceans or seas and control vast volumes of global trade. "Transit passage" is a legal regime under UNCLOS that allows continuous and expeditious navigation through these international straits. For example, the Strait of Hormuz and the Malacca Strait are vital chokepoints where disruptions can trigger immediate global energy and economic shocks.
- **Main Arguments and Substantive Parts**
- The geopolitical discourse surrounding the contemporary world order centers on maintaining stability amidst intense systemic volatility, requiring a delicate balance between defense readiness and proactive diplomacy.
- **The Core Thesis**
- In an era characterized by global turbulence, lasting peace and economic stability cannot be achieved through unilateral military actions or isolationism. Instead, the path forward relies on a steadfast commitment to dialogue, adherence to international maritime law, and the cultivation of collaborative regional security architectures.
- **Key Supporting Arguments**
- **Diplomatic Solution to West Asian Instability:** Sustainable peace in West Asia requires addressing core sovereignty issues. The long-term resolution of the Israel-Palestine conflict depends fundamentally on a negotiated two-state solution. Piecemeal arrangements or prolonged military conflicts fail to address the underlying political aspirations of the people involved.
- **Securing Sea Lines of Communication (SLOCs):** Global economic health depends directly on maritime security. Ensuring compliance with international law, particularly UNCLOS, in vital corridors like the Strait of Hormuz is essential. Any disruptions in these passages create immediate cascading effects on international trade, energy pricing, and supply chain resilience.
- **Deepening Indo-Pacific Defense Synergies:** Middle powers are increasingly cooperating to balance regional security. This is visible in the deepening defense ties within the Indo-Pacific, such as India's expanding maritime and defense partnership with Indonesia. Exporting advanced defense platforms like the BrahMos supersonic cruise missile and Astra Mk-1 beyond-visual-range missiles reflects a shift from purely buyer-seller dynamics to collaborative security enforcement.
- **Strategic Infrastructure Development:** Developing shared maritime infrastructure, such as partnering on the integrated development of Sabang Port near the Andaman Sea, serves a dual purpose. It boosts regional maritime industries and secures critical transit routes, providing an essential counterweight to unilateral regional expansionism.

- **Historical Evolution of the Issue**
- India's approach to global conflict resolution and regional partnerships has evolved from post-independence idealistic solidarity to a contemporary framework of pragmatic, interest-driven engagement.
- **Pre-Independence to Early Post-Independence (1920s–1980s)**
- **Ideological Foundations:** India's historical stance on global self-determination was deeply influenced by its own anti-colonial struggle. Leaders like Mahatma Gandhi and Jawaharlal Nehru maintained strong solidarity with the Palestinian national movement, viewing it through an anti-imperialist lens.
- **Early Diplomatic Posture:** In 1947, India voted against the United Nations partition plan for Palestine, advocating instead for a single federal state. In 1974, India became the first non-Arab state to recognize the Palestine Liberation Organization (PLO) as the sole legitimate representative of the Palestinian people, followed by full recognition of the State of Palestine in 1988.
- **Non-Aligned Maritime Outreach:** Simultaneously, relations with Southeast Asian maritime neighbors like Indonesia were rooted in the historic 1955 Bandung Conference, focusing on solidarity and non-alignment rather than hard defense or security integration.
- **The Post-Cold War Realignment (1990s–2010s)**
- **Establishment of Ties with Israel (1992):** The dissolution of the Soviet Union and changing economic realities prompted India to establish full diplomatic relations with Israel under Prime Minister P.V. Narasimha Rao. This marked the beginning of a dual-track approach to West Asia.
- **The Look East Policy:** Simultaneously, India launched its "Look East Policy" to reconnect economically and strategically with ASEAN nations, recognizing the growing importance of the Malacca Strait and the broader maritime domain.
- **Strategic Convergence:** Over the decades, defense ties with Israel expanded into critical areas like counter-terrorism, intelligence sharing, and defense procurement, while India steadily maintained its diplomatic presence and developmental assistance in Palestine.
- **The Era of Active De-hyphenation and Indo-Pacific Integration (2010s–2026)**
- **Formalizing De-hyphenation:** The policy of de-hyphenation became explicit, decoupling India's ties with Israel from its relations with Palestine. High-level leadership visits to both Tel Aviv and Ramallah demonstrated that India could build deep strategic, technological, and defense bonds with Israel while firmly reiterating its structural support for an independent Palestinian state via a two-state solution.
- **Act East and Maritime Security:** The Look East policy transitioned into an active "Act East Policy," with an explicit focus on Indo-Pacific maritime security. This shift led to landmark agreements, such as the 2018 'Shared Vision of Maritime Cooperation in the Indo-Pacific' between India and Indonesia.
- **Advanced Defense Partnerships:** By 2026, this maritime cooperation matured into tangible security infrastructure and defense exports, illustrated by the integration of Sabang Port and the transfer of advanced defense systems like BrahMos and Astra Mk-1 missiles to Southeast Asian partners.

- **Way Forward**

- Addressing complex global conflicts and securing maritime domains requires a balanced mix of multilateral diplomacy, robust security partnerships, and sustainable infrastructure development.

- **Strengthening Multi-Lateral Mediation Channels**

- The international community must revitalize institutional platforms for diplomatic dialogue. Rather than relying on unilateral measures, global and regional powers should work together to create credible mediation frameworks. This involves encouraging direct communication between conflicting parties to address core sovereignty and security issues, ultimately moving toward long-term solutions like the two-state model in West Asia.

- **Enhancing Maritime Domain Awareness and Infrastructure**

- To maintain a stable, rules-based maritime order, partner nations should accelerate joint infrastructure projects in critical zones. Timely development of projects like the Sabang Port is essential. These initiatives should be backed by expanded joint naval patrols, shared logistics frameworks, and real-time intelligence exchange to ensure freedom of navigation and secure essential sea lines of communication.

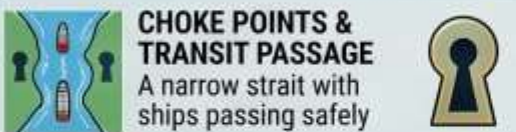
- **Diversifying Defense Production and Security Alliances**

- Emerging economies should continue to build strategic autonomy by expanding defense manufacturing and cultivating reliable security partnerships. Exporting defensive technologies to trusted regional partners strengthens collective deterrence. These efforts must always align clearly with international law and UNCLOS principles, ensuring that defense cooperation supports regional balance and discourages unilateral assertiveness.



COMPREHENSIVE ANALYSIS: MODERN INTERNATIONAL RELATIONS STRATEGIC LANDSCAPE

KEY TERMS & EXPLANATIONS



HISTORICAL EVOLUTION

POST-INDEPENDENCE IDEALISM
(1920s-1980s)

- Solidarizad with Palestine
- Bandung Conference

POST-COLD WAR REALIGNMENT
(1990s-2010s)

- Israel relations
- Look East

ACTIVE DE-HYPHENATION & INDO-PACIFIC INTEGRATION
(2010s-Present)

- Act East
- advanced defense partnerships
- indigenization

PATH TO SUSTAINABLE GLOBAL & REGIONAL PEACE

DIALOGUE & DIPLOMACY
(e.g., Two-State Solution)



RULES-BASED INTERNATIONAL ORDER
(e.g., UNCLOS)



STRATEGIC MULTI-ALIGNMENT
(e.g., ASEAN Centrality)



BALANCED REGIONAL SECURITY & ECONOMIC STABILITY

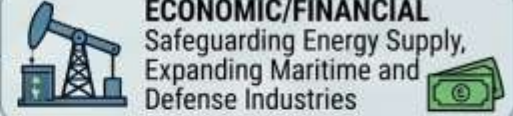
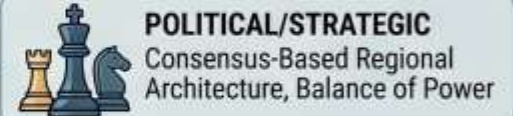
WAY FORWARD

AXIA
RISE ABOVE THE REST

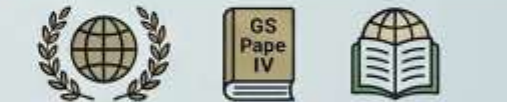
- Diplomatic Track**
- Multilateral Mediation
 - Direct Dialogue
 - Sabang Port Development
 - Maritime Awareness
 - Joint Naval Patrols

Balanced Regional Stability

MULTIDIMENSIONAL ANALYSIS



UPSC CSE & NCERT LINKAGES



- GS Papers II**
- International Relations
 - Security & Defense
 - Ethics
- NCERT**
- World Politics
 - India Since Independence

- Briefly Relevant Syllabus:**
- International Relations, International Relations, Security & Defense, Ethics and Sources

Scientists develop a health tracker for high-altitude yaks in Himalayas

Rahul Karmakar
GUWAHATI

A team of scientists has developed an Internet of Things (IoT)-based smart system to monitor the health of the high-altitude yaks and keep tabs on their movement near the international border in the Himalayas.

The Indian yak (*Bos grunniens*), often called the ‘ship of the Himalayas’, is an integral part of the economy of mountain dwellers, who depend on it for meat, milk, and transportation.

Found at altitudes above 8,000 feet, this bovine animal has long been recognised for its resilience and adaptability to extreme conditions. According to the 20th Livestock Census, India has about 58,000 yaks, almost half of them in Ladakh. The rest are found in Arunachal Pradesh, Sikkim, Himachal Pradesh,



Yaks are a vital livelihood resource for communities living in the high-altitude Himalayan region. AP

and Uttarakhand.

Monitoring the health of the yaks across the tough Himalayan expanse has literally been an uphill task. Yak specialists and *brokpas* (yak farmers) also face challenges due to livestock movement in difficult-to-access areas near the international border.

The newly developed technology – a device attached to an animal collar – seeks to reduce these

hurdles, according to Mihir Sarkar, director of the Indian Council of Agricultural Research’s National Research Centre on Yak (NRC-Y) at Dirang in Arunachal Pradesh.

He is one of four NRC-Y scientists – the others are Mokhtar Hussain, Vijay Paul, and Dinamani Medhi – who developed the device, along with Rupesh Mandal, Nupur Choudhury, Gitu Das, and Jyoti Ku-

mar Barman from the Guwahati-based Assam Don Bosco University.

The scientists said that this IoT-based smart system for geo-fencing and monitoring the health of yaks and predicting the stress they undergo is designed to address the challenges of yak management in remote, high-altitude regions, where continuous physical monitoring of animals is often difficult.

“Yaks are a vital livelihood resource for communities living in the high-altitude Himalayan region. However, yak farmers often face issues in tracking animal movement, detecting health problems at an early stage, and managing herds spread across vast grazing landscapes, often wandering to areas difficult to access,” Mr. Sarkar said.

“The newly developed technology can assist farmers by providing timely information,” he said.

- **Key Terms and Explanations**

- **Bos grunniens (Indian Yak):** Popularly known as the 'ship of the Himalayas', this robust bovine species is adapted exclusively to high-altitude ecosystems above 8,000 feet. It serves as an irreplaceable economic lifeline for mountain communities, providing milk, meat, fiber, and draught power in terrains where conventional livestock cannot survive.
- **Internet of Things (IoT) in Pastoralism:** This refers to an interconnected network of physical devices—such as smart collars embedded with sensors—that collect and exchange real-time data over the internet. In rugged terrains, it allows for the remote tracking of an animal's physiological parameters and geographic location without requiring physical human presence.
- **Geo-fencing:** A technology that establishes a virtual geographic boundary around a specific real-world area using GPS or RFID signals. When an animal wearing a tracking collar crosses this invisible boundary, an automated alert is triggered, allowing herders to prevent livestock from straying into hazardous areas or across sensitive international borders.
- **Brokpas:** These are traditional, semi-nomadic pastoral communities primarily inhabiting the high-altitude regions of the Eastern Himalayas, including Arunachal Pradesh. Their lifestyle, culture, and economy are completely intertwined with seasonal transhumance and yak rearing.
- **ICAR-National Research Centre on Yak (NRC-Y):** Located at Dirang in West Kameng district, Arunachal Pradesh, this is the premier nodal research institute under the Indian Council of Agricultural Research (ICAR). It is dedicated to the long-term conservation, scientific management, and genetic improvement of the Indian yak.

- **Main Arguments and Substantive Parts**

- The intersection of frontier technology and traditional animal husbandry addresses a long-standing ecological and livelihood crisis in the Himalayan frontiers. The core themes emerge as follows:
 - **The Tyranny of Terrain:** Physical monitoring of herds in high-altitude zones is an uphill task for the *Brokpas*. The vast, glaciated, and fragmented landscapes of Ladakh, Sikkim, and Arunachal Pradesh make manual tracking inefficient, often leading to undetected herd mortalities and economic shocks.
 - **The Strategic Imperative of Geo-Fencing:** Yaks graze in close proximity to sensitive, poorly demarcated international borders. Straying across these lines poses severe security risks, leads to loss of precious livestock asset, and causes administrative friction, making automated virtual boundaries a national security asset.
 - **Predictive Health versus Reactive Treatment:** Traditional livestock management relies on treating an animal after symptoms manifest, which is often too late in extreme climates. The transition to an IoT-based system shifts the paradigm toward predictive health, analyzing stress metrics and temperature anomalies to flag diseases before they become fatal.
 - **Demographic Constraints of the Yak Population:** Data from the 20th Livestock Census indicates that India's yak population has concentrated into a small pocket of approximately 58,000 individuals, with nearly half located in Ladakh. With numbers requiring careful conservation, losing animals to preventable diseases or rough terrain is a luxury the pastoral economy cannot afford.

- **Historical Evolution of the Issue**
- **The Pre-1962 Era of Open Borders:** Historically, high-altitude pastoralists practiced unrestricted transhumance. Herders moved seamlessly across Himalayan passes between Tibet, India, and Bhutan based on seasonal fodder availability, ensuring natural pasture regeneration and genetic mixing of herds.
- **The 1962 Geopolitical Shift:** The Sino-Indian conflict radically transformed the landscape. The formalization and strict policing of international borders abruptly cut off traditional winter grazing grounds in Tibet. This caused severe pasture degradation on the Indian side, herd congestion, and a gradual decline in the economic viability of yak rearing.
- **The Era of Scientific Institutionalization (1989):** Recognizing the rapid decline in numbers and the degradation of the yak economy, the Government of India established the ICAR-NRCY in 1989. This marked the shift from purely traditional, subsistence-based pastoralism to scientific interventions focusing on disease control, nutritional supplementation, and breed conservation.
- **The Modern Smart Pastoralism Era:** In recent years, climate change-induced weather unpredictability and rapid youth out-migration from border villages have created acute labor shortages. This has triggered the modern shift toward automating herd management through smart systems, blending indigenous knowledge with digital monitoring.
- **Way Forward**
- **Overcoming the Connectivity Deficit:** Standard cellular networks are often non-existent in deep Himalayan valleys. The government must integrate these smart IoT collars with low-power satellite communication (such as NavIC-enabled links) or Long Range (LoRa) networks to ensure uninterrupted data transmission across glaciated terrains.
- **Subsidizing Smart Tech for Pastoralists:** High-tech devices can be financially out of reach for subsistence herders. Subsidies should be extended under central schemes like the National Livestock Mission (NLM) or the Rashtriya Krishi Vikas Yojana (RKVY) to make smart collars affordable for every *Brokpa* clan.
- **Convergence with the Vibrant Villages Programme:** The deployment of livestock tracking technology should be integrated into the central 'Vibrant Villages Programme'. This will ensure that infrastructure development, digital literacy, and pastoral livelihood security are addressed together to prevent out-migration from border districts.
- **Establishing High-Altitude Value Chains:** Tracking animal health must be paired with economic incentives. Setting up cold-chain facilities for yak milk processing, cheese (*chhurpi*) manufacturing, and certified organic yak wool cooperatives will increase profit margins, making the adoption of modern health tracking techniques economically rewarding.

SMART YAK MANAGEMENT IN THE HIMALAYAS: AN IoT INTERVENTION & UPSC CSE ANALYSIS

THE PROBLEM: TRADITIONAL HIGH-ALTITUDE PASTORALISM

Difficult Terrain:
Remote & **VAST AREAS**



Difficult TERRAIN: Remote & **VAST AREAS**

DEMOGRAPHIC SHIFTS:
Labor Shortages

PASTURE SHRINKAGE:
Post-1962 Border Constraints



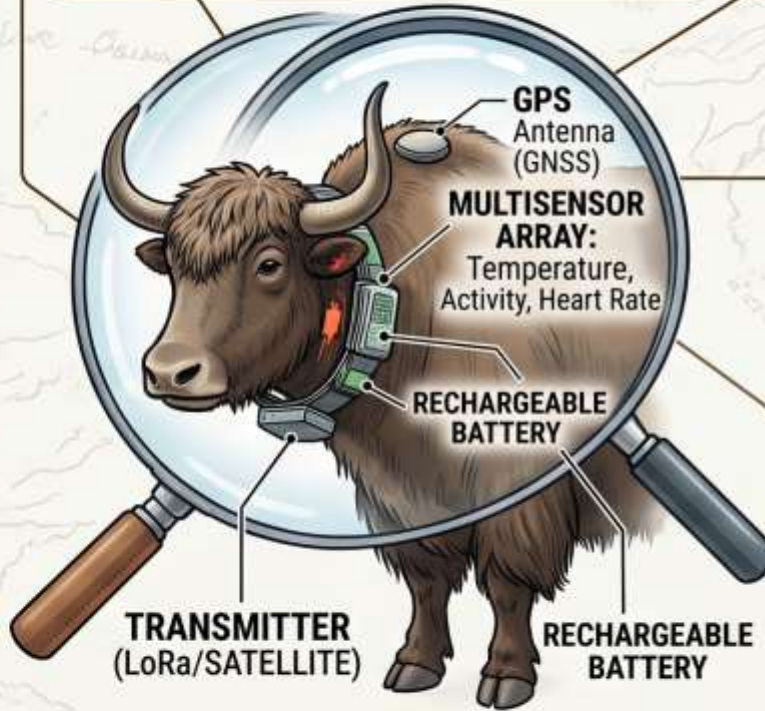
(Pre-1962
Open Borders

Post-1962
Boundary Formation



GEO-FENCING:
VIRTUAL BOUNDARIES &
BORDER STRAYING
ALERTS

**REAL-TIME HEALTH
MONITORING: EARLY
DISEASE DETECTION**



**Healthy
vs.
Sick
Status**

**REAL-TIME HEALTH MON-
ITORING: EARLY DISEASE
DETECTION**



**HERD MANAGEMENT:
OPTIMIZED TRACKING &
RESOURCE ALLOCATION**

MULTIDIMENSIONAL UPSC ANALYSIS

SOCIAL: Preserving Traditional Livelihoods & Cultural Heritage of Brokpa Tribes.

ECONOMIC: Livestock Asset Protection & Economic Stability of Border Areas.

POLITICAL: Strengthening Territorial Integrity through Border Community Support.

LEGAL: Securing Pastoral Rights (e.g., FRA 2006 context).

ETHICAL: Improving Animal Welfare in Extreme Climates.

INTERNATIONAL: Reducing Diplomatic Friction from Straying Animals.

GS Papers
1-4

KEY TERMS & INSTITUTIONS



ICAR-NRCY
(Nodal Research
Centre)



Bos grunniens
(Ship of
Himalayas)



Brokpas
(Traditional
Farmers)

WAY FORWARD: PRACTICAL POLICY RECOMMENDATIONS

- High-Altitude **CONNECTIVITY** (SATELLITE/LoRa NETWORK INTEGRATION)
- **FINANCIAL SUBSIDIES FOR SMART TECH** (RKVY, NLM Schemes)
- **CONVERGENCE WITH VIBRANT VILLAGES PROGRAMME**
- **ECONOMIC DIVERSIFICATION:** YAK PRODUCT VALUE CHAINS (Milk, Wool, Cheese)

Four States reach a pact on Narmada project payments

Union Home Minister says that issue of pending payments had remained unresolved for a long time and it had been settled amicably; water and electricity have reached all four States, he adds

The Hindu Bureau
NEW DELHI

The States of Maharashtra, Gujarat, Rajasthan and Madhya Pradesh reached an agreement on Tuesday on the settlement of pending payment issues among the Narmada Award beneficiary States.

The agreement was signed in the presence of Home Minister Amit Shah and Union Minister of Jal Shakti C.R. Patil. Chief Ministers Devendra Fadnavis (Maharashtra), Bhupendra Patel (Gujarat), Bhajan Lal Sharma (Rajasthan) and Mohan Yadav (Madhya Pradesh) signed the agreement, which relates to the cost-sharing arrangements for the construction of the Sardar Sarovar Project.

Under the agreement, the payments to be made towards the final settlement of pending dues have been resolved through a one-time settlement. Mr. Shah said that the issue of pending payments under the Narmada Award had remained unresolved among the four States for a long time, and that it had been resolved



Common platform: Union Home Minister Amit Shah and Union Minister of Jal Shakti C. R. Patil with the Chief Ministers of Madhya Pradesh, Gujarat, Maharashtra, and Rajasthan. PTI

amicably on Tuesday. He said that with the completion of the dam, water and electricity have reached every part of the four States.

He added that while the benefits accruing to Rajasthan may appear modest at first glance, the areas that have received Narmada waters have witnessed a transformation in both the value of the land and the fortunes of the farmers.

The Union Home Minister said that let it be Gujarat, Madhya Pradesh, Rajasthan, Haryana or

Maharashtra, the water ultimately served the people of the country, especially the farmers. Regardless of which part of the country the water is utilised in, the ultimate beneficiary will be an Indian, he said.

Water-sharing issues

Recently, significant progress has also been made in resolving long-standing water-sharing issues between States, such as those concerning the Kishau Dam project in Himachal Pradesh and the water dispute between Rajasthan

and Haryana, officials said. On June 29, Rajasthan and Haryana signed an agreement for the construction and implementation of the Yamuna Water Project, resolving a nearly three-decade-old issue.

Additionally, on June 16, Himachal Pradesh, Uttarakhand, Delhi, Uttar Pradesh, Haryana, and Rajasthan agreed to sign a Memorandum of Understanding (MoU) for the implementation of the Kishau Multipurpose Project to rejuvenate the Yamuna river.

(With PTI inputs)

- **Key Terms and Explanations**

- **Cooperative Federalism:** A governance framework where the Central and State governments collaborate horizontally and vertically to resolve common national problems. Instead of acting within watertight compartments, they pool resources and administrative machinery. For instance, when the Union Ministry of Home Affairs and the Ministry of Jal Shakti mediate financial disputes between multiple states, it exemplifies cooperative federalism in action.

- **Inter-State River Water Disputes (ISRWD):** Legal and political conflicts between two or more sovereign states of the Indian Union regarding the sharing, allocation, or management of transboundary river waters. These disputes typically arise due to competing agricultural, industrial, and domestic demands.

- **Tribunal Award (e.g., Narmada Water Disputes Tribunal):** A binding legal decision delivered by a quasi-judicial body constituted under the Inter-State River Water Disputes Act, 1956. These awards dictate the exact volumetric share of water, power allocation, and cost-sharing responsibilities among riparian states.

- **Riparian State:** A state whose territory is adjacent to or intersected by a natural watercourse like a river. In the context of the Narmada basin, Madhya Pradesh, Gujarat, Maharashtra, and Rajasthan function as riparian or beneficiary states, each holding distinct legal rights and obligations.

- **One-Time Settlement (the mechanism):** A financial compromise mechanism where outstanding, protracted debts or pending project dues are cleared through a single, mutually agreed-upon lump-sum payment or fiscal adjustment. This removes long-standing accounting friction that stalls joint infrastructure projects.

- **Multipurpose River Valley Project:** A massive engineering initiative designed to serve multiple socio-economic objectives simultaneously. These typically include hydro-electricity generation, flood control, canal irrigation, drinking water supply, and inland navigation. The Sardar Sarovar Project on the Narmada River is a classic template.

- **Main Arguments and Substantive Parts**

- **The Core Thesis**

- Resource friction between states is rarely just about the water itself; it is profoundly tied to the capital expenditure incurred during project construction. Resolving the gridlock over pending payments and cost-sharing arrangements acts as the ultimate catalyst for operationalizing massive multi-state infrastructure projects, turning paper-based water allocations into tangible rural prosperity.

- **Key Supporting Points**

- **Financial Cleavage as a Stumbling Block:** While volumetric water allocations are often decided by tribunals, the actual engineering execution depends on shared capital contributions. When beneficiary states delay their payments to the constructing state, it creates severe fiscal strain and stalls the distribution of water and power.

- **The Power of Central Mediation:** The Union government serves as an essential institutional umpire. As reflected in the contemporary cooperative frameworks, the active mediation of the Union Home Ministry and the Ministry of Jal Shakti provides the political trust needed to secure finality via one-time settlements.

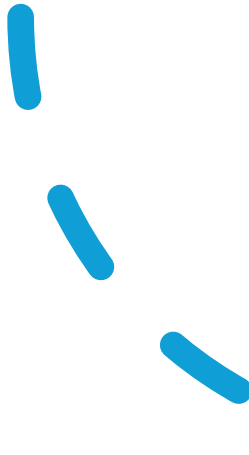
- **Socio-Economic Transformation:** Resolving these fiscal disputes yields instant, field-level impacts. Arid patches in beneficiary states witness an immediate transformation in land values and agricultural fortunes once canal networks are operationalized through settled accounts.

- **The Spillover Effect on Other Basins:** Success in one major river valley project creates a positive precedent. This diplomatic momentum directly facilitates resolutions in other historically contentious zones, such as the Yamuna Water Project between Rajasthan and Haryana, or the Kishau Multipurpose Project across the Himalayan and northern plains states.

- **Counterarguments and Structural Challenges**

- **Asymmetry in Benefit vs. Burden:** Critics point out that cost-sharing formulas often place a heavy financial burden on upstream states (like Madhya Pradesh), while the lion's share of immediate irrigation benefits flows to downstream plains (like Gujarat) or hyper-arid zones (like Rajasthan).

- **Temporal Delays Erode Capital Efficiency:** Decades-long delays in settling financial dues mean that initial cost estimates balloon due to inflation. A "one-time settlement" reached today often forces constructing states to absorb significant real-value fiscal losses.

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- 
- **Historical Evolution of the Issue**
 - **The Pre-Independence Era**
 - **Government of India Act, 1935:** Sections 130 to 134 of this Act gave the Governor-General the authority to appoint commissions to resolve water conflicts between provinces and princely states. Early disputes, such as those between the Punjab province and the state of Bahawalpur, were handled through ad-hoc imperial arbitration.
 - **Post-Independence and Constitutional Blueprint**
 - **The 1950 Constitution:** The founders recognized the potential for severe inter-state friction and created Article 262. This article explicitly empowers Parliament to legislate on inter-state river disputes and bar the jurisdiction of the Supreme Court over them.
 - **The Legislative Framework of 1956:** Parliament enacted the Inter-State River Water Disputes Act, 1956, and the River Boards Act, 1956. This created the framework for setting up ad-hoc tribunals whenever a state government felt that actions by a neighbor harmed its water interests.
 - **The Narmada Milestone and Beyond**
 - **1969–1979 (The NWDT Epoch):** Faced with intense disagreements between Gujarat, Madhya Pradesh, and Maharashtra, the Central Government set up the Narmada Water Disputes Tribunal (NWDT) in 1969. In 1979, the NWDT delivered its final award, setting the baseline for water allocation, power distribution, and the cost-sharing ratios that states would debate for decades.
 - **The 1980s to 2000s (Activisms and Legal Battles):** This era was marked by intense social activism, notably the Narmada Bachao Andolan, which raised concerns about environmental damage and the resettlement of displaced populations. The project faced prolonged litigation until a landmark Supreme Court judgment in 2000 allowed construction to proceed, subject to strict environmental and rehabilitation conditions.
 - **The Present Era of Executive Settlements:** Over the last few years, the focus has shifted from endless litigation to proactive executive settlements. As documented in the cooperative breakthroughs, states are increasingly utilizing centrally mediated, one-time financial settlements to resolve decades-old disputes across major river systems like the Narmada and the Yamuna.
 - **Way Forward**
 - **Establishing Permanent River Basin Authorities (RBAs):** India should move away from ad-hoc committees and establish permanent, statutory River Basin Authorities for all major inter-state rivers, as envisioned in the River Boards Act of 1956. These bodies should be staffed with independent hydrological, economic, and environmental experts to manage data and operations in real time.
 - **Transitioning to a "Benefit-Sharing" Model:** Instead of treating water negotiations as a rigid zero-sum cost dispute, states should adopt a dynamic benefit-sharing approach. Upstream states could be financially compensated or given a larger share of generated hydro-electricity in exchange for maintaining steady water flows to downstream agricultural regions.

INTER-STATE WATER GOVERNANCE IN INDIA: Dynamics & Path to Resolution

KEY TERMS & EXPLANATIONS



Cooperative Federalism

- Central-State cooperation
- Handshakes, Ministries Home Affairs & Jal Shakti



Inter-State River Water Disputes

- ISRWD - Contentious river
- Competing claims



Tribunal Award

- NWD - Gavel
- Volumetric allocation
- Binding decision



Riparian State

- States along a river, MP, Gujarat, Maharashtra



One-Time Settlement

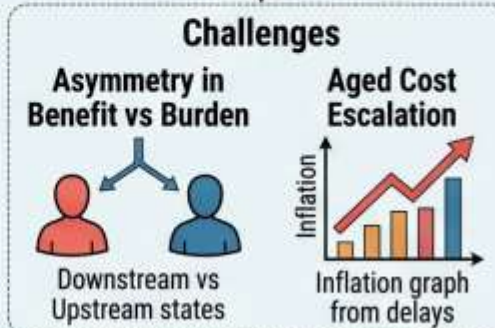
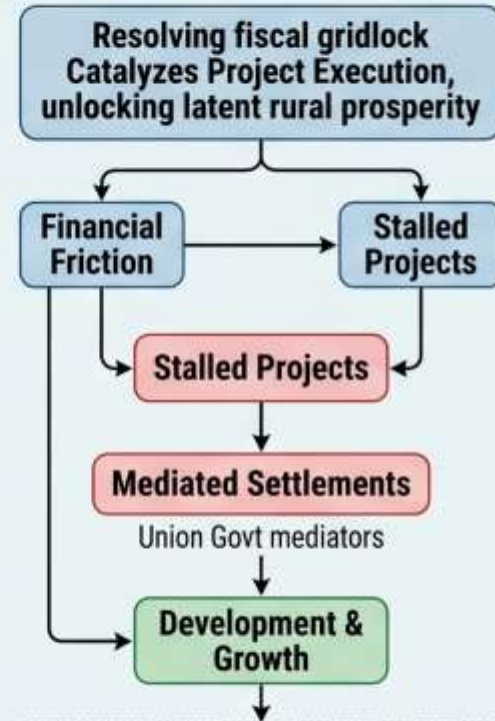
- Single large payment mechanism, clearing debts

Multipurpose River Valley Project

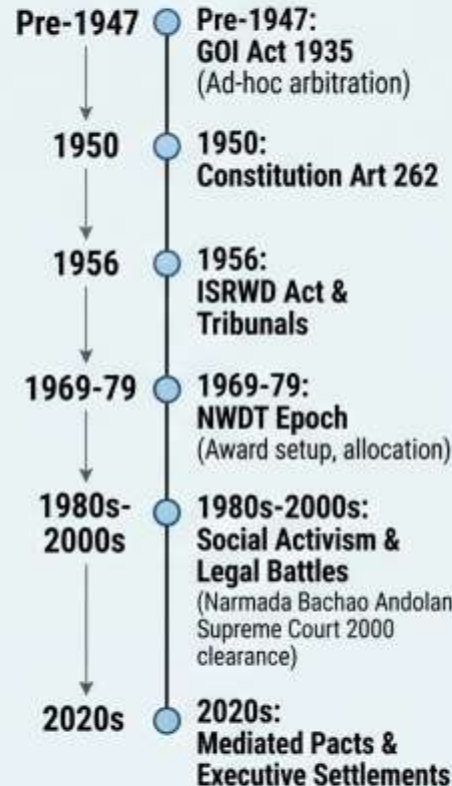


- Irrigation canals
- Lit hydro-power model
- Irrigation canals
- Drinking water taps
- Sardar Sarovar model

MAIN ARGUMENTS & ANALYSIS



HISTORICAL EVOLUTION & NCERT LINKS



NCERT CONNECTION

- Class 10 Ch 3: Water Resources
- Class 12 Ch 6: Water Resources
- Class 11 Ch 7: Federalism

MULTIDIMENSIONAL ANALYSIS

SOCIAL



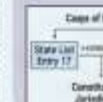
- Displacement challenge vs caneration
- Livelihood transformation
- Tribal communities

POLITICAL



- Sub-nationalism
- National Integration
- Central neutrality

LEGAL



- State List Entry 17 subject to Union List Entry 56
- Constitutional Jurisdictions

ETHICAL



- Inter-generational equity
- Eco-centrism vs Anthropocentrism
- e-flows

INTERNATIONAL



- Model for transboundary diplomacy
- Ganga, Indus

ECONOMIC



- GDP arrows
- Multi-cropping
- Capital efficiency

FUTURE STRATEGIES & ACADEMIC PREPARATION

Way Forward

- Permanent RBAs (River Basin Aut)
- Transition to "Benefit-Sharing" Model
- Amending ISRWD Act for permanent Tribunal with strict timelines
- Real-time Automated Data Verification (Satellite telemetry)

PHILOSOPHICAL BASE

- Utilitarianism (Greatest good)
- Public Trust Doctrine (Shared asset)

UPSC CSE Syllabus Linkages

- GS Paper 1 (Geography)
- GS Paper 2 (Polity/Governance)
- GS Paper 3 (Economy/Infrastructure)
- GS Paper 4 (Ethics)

PREVIOUS YEAR QUESTIONS

Examples:

- Article 262
- Article 262 of the Constitution
- Critically analyze failure of constitutional mechanisms GS 2 2022
- Socio-economic impacts of SSP GS 3 2015

School dropout rate falls across key stages: report

More schools get Internet; learner progression across stages grows stronger; teacher strength up by 8.3% compared with 2022-23; 55% women teachers bring 'gender balance' in sector, says govt.

The Hindu Bureau
NEW DELHI

The Union Education Ministry on Tuesday released the comprehensive report on the Unified District Information System for Education Plus (UDISE+) for the academic year 2025-26, which reflected a downward trend in dropouts.

The preparatory level (Classes 3 to 5) dropout rate fell from 2.3% (2024-25) to 1.8% this year. More notably, secondary level (Classes 9 to 12) dropouts dipped from 8.2% to 7.0%. Dropout rate tracks the rate at which students quit school. "The consistent decrease across all levels suggests that schools are becoming more supportive and responsive to students' needs," the Ministry said.

Women now form the majority of the nation's teaching force, accounting for 54.9% of total teachers, up from 54.2% in 2024-25. The government said this "marks a positive shift towards gender balance in the education sector".

Enrolment of girls



Enrolment of girls across the country grew marginally to 48.4% from 48.3% last year. S. S. KUMAR

The Gross Enrolment Level Ratio at the secondary level surged to 71.7% from last year's 68.5%

across the country has seen a marginal increase to 48.4%, from 48.3% last year.

Student retention at the middle level (Classes 6 to 8) climbed to 83.7% (from 82.8%), while secondary level retention increased to 51.9%, up from 47.2% last year. Student retention is an educational metric that measures the percentage of students who continue

their education at the same school or within the school system from one academic year to the next.

The Gross Enrolment Level Ratio (GER) at the secondary level surged to 71.7% from last year's 68.5%. GER is a statistical measure used in education to determine the percentage of students enrolled in a specific level of education (such as primary, middle, or secondary school), regardless of their age, relative to the total population of official school-age children for that same level.

Learner progression across transitional stages

grew stronger, the report noted. Notably, the transition from middle to secondary school jumped from 86.6% to 88.3%.

Also, the total number of teachers in India has risen by 8.3% compared with 2022-23. Additionally, the Ministry's strategic rationalisation of teacher placement has resulted in a 3% reduction in single-teacher schools and a 29% drop in schools reporting zero enrolment, the Ministry said.

One of the most notable improvements is the increase in the number of schools with computer access, increasing from 64.7% in 2024-25 to 69.9% in 2025-26. Access to Internet facilities in schools has seen a considerable increase in the academic year 2025-26. The percentage of schools with internet connectivity increased from 63.5% in 2024-25 to 67.4% in 2025-26.

The report said that 95% of schools are powered with electricity, 98.5% have girls' toilets, and 97.2% have boys' toilets - ensuring dignity and hygiene for all students.

- **Key Terms and Explanations**
 - **Unified District Information System for Education Plus (UDISE+):** This is an advanced, automated data-collection application deployed by the Ministry of Education. It serves as the single source of truth for school education statistics in India, capturing real-time metrics across millions of schools, teachers, and students to facilitate evidence-based policymaking.
 - **Gross Enrolment Ratio (GER):** A fundamental demographic metric calculated by dividing the total number of students enrolled in a specific level of education (e.g., secondary school), regardless of their age, by the official school-age population corresponding to that same level.
 - **Dropout Rate:** The percentage of students who withdraw from the formal schooling system before completing a specific academic cycle or grade. It reflects structural, financial, or systemic friction that prevents a child from continuing their education.
 - **Retention Rate:** An operational metric that measures the percentage of students who continue their education within the school system from one academic year to the next. It acts as an indicator of an educational institution's ability to sustain student engagement over time.
 - **Transition Rate:** The statistical proportion of learners who successfully progress from completing one major educational stage (such as middle school) and enroll in the next higher stage (such as secondary school).
- **Main Arguments and Substantive Parts**
 - The contemporary discourse on Indian school education revolves around an encouraging core thesis: targeted infrastructure financing, digital integration, and systematic teacher rationalization are driving down dropout rates while boosting student retention and enrollment across the board.
- **Key Structural Improvements**
 - **The Downward Slide of Dropouts:** Robust systemic interventions have driven down dropout rates across crucial development stages. Preparatory level (Classes 3 to 5) dropouts have eased down to 1.8%, while secondary level (Classes 9 to 12) dropouts have witnessed a marked decline to 7.0%. This indicates that schools are becoming more responsive and structurally capable of keeping students engaged.
 - **The Secondary Enrolment Surge:** The Gross Enrolment Ratio (GER) at the secondary school level has leaped forward to 71.7%. This expansion is closely mirrored by a stronger transition rate from middle to secondary education, which has climbed to 88.3%, demonstrating that the traditional bottleneck between elementary and higher schooling is gradually clearing.
 - **The Gender Balance in Pedagogy:** A silent social revolution is taking place within the teaching workforce. Women now comprise the clear majority of the nation's educators at 54.9%. Simultaneously, strategic teacher deployments have resulted in a 3% reduction in single-teacher institutions and a massive 29% drop in schools suffering from zero student enrolment.
 - **The Digital and Physical Blueprint:** Physical dignity and digital access are no longer peripheral goals. Computer access in schools has expanded to 69.9%, and internet connectivity has risen to 67.4%. On the basic infrastructure front, 95% of schools operate with functional electricity, while targeted sanitation campaigns ensure that 98.5% of schools feature dedicated girls' toilets and 97.2% provide boys' toilets.
- **Underlying Challenges and Institutional Gaps**
 - Despite these macro victories, a stark systemic friction point persists at the secondary level. While student retention at the middle level (Classes 6 to 8) stands comfortably at 83.7%, the retention rate for secondary education plummets to 51.9%. This means nearly half of all students drop out before finishing their secondary education, exposing an urgent need for vocational integration, economic safety nets, and targeted curriculum reforms to prevent this massive loss of human capital.

- **Historical Evolution of the Issue**

- **Pre-Independence Foundation (1813–1947)**

- The colonial architecture of Indian education was primarily designed for administrative convenience rather than universal literacy. Key milestones included the **Charter Act of 1813**, which marked the first modest state expenditure on education, and **Wood's Despatch of 1854**, often hailed as the 'Magna Carta of English Education in India' for establishing a structured, graded school system. Later, the **Hunter Commission (1882)** emphasized the state's role in expanding primary education, while Mahatma Gandhi's **Wardha Scheme of Basic Education (1937)** championed free, mother-tongue education integrated with manual labor—laying the philosophical groundwork for self-reliance.

- **Post-Independence and Welfare Expansion (1947–1990s)**

- Following independence, India faced massive illiteracy. The landmark **Kothari Commission (1964–66)** recommended a uniform 10+2+3 educational structure and urged the state to assign 6% of GDP to education—a target that remains unfulfilled. This gave rise to the **National Policy on Education (NPE) 1986**, which launched **Operation Blackboard (1987)** to systematically improve basic physical infrastructure in primary schools across rural India.

- **The Rights-Based and Universalization Era (1995–2010s)**

- The mid-1990s marked a shift toward addressing nutritional and structural barriers to education. The launch of the **Mid-Day Meal Scheme (1995)** directly tackled classroom hunger and boosted student retention. This paved the way for the historic **86th Constitutional Amendment Act (2002)**, which inserted **Article 21A**, declaring free and compulsory education for children aged 6 to 14 a Fundamental Right. This constitutional guarantee was operationalized via the **Sarva Shiksha Abhiyan (SSA)** and culminated in the enforcement of the **Right to Education (RTE) Act, 2009**, which legally mandated minimum infrastructure standards and pupil-teacher ratios.

- **The Modern Digital and Holistic Era (2018–Present)**

- In 2018, the state unified its educational efforts by launching the **Samagra Shiksha Abhiyan**, a comprehensive program spanning from pre-school to Class 12. This approach was codified in the **National Education Policy (NEP) 2020**, which targets a 100% Gross Enrolment Ratio in school education by 2030. Today, the focus has shifted from basic physical access to technology-driven tracking through platforms like **UDISE+**, which monitor digital literacy, connectivity, and gender parity in real time.

- **Way Forward**

- To sustain these positive trends and address the persistent drop in retention at the secondary level, India must transition from expanding basic access to deepening educational quality and equity.

- **Addressing the Secondary Level Bottleneck:** Since secondary school retention drops sharply to 51.9%, the state should consider amending the Right to Education (RTE) Act to extend its legal protections and free education mandates up to Class 12 (age 18). This legislative update should be paired with targeted financial support, such as conditional cash transfers tied to secondary school completion, to help offset the opportunity cost of child labor for low-income families.

- **Integrating Vocational and Skills Training:** To make secondary education more relevant for students facing economic pressures, schools should integrate vocational training into the core curriculum, as outlined in NEP 2020. Partnering with local industries for skill development can provide clear pathways to employment, making staying in school a more valuable and practical choice for at-risk students.

- **Upgrading Digital Access to True Digital Literacy:** Having 67.4% of schools connected to the internet is a great start, but the focus must now shift from basic connectivity to classroom integration. This requires updating teacher-training programs so that educators can confidently use digital tools for smart teaching, interactive learning, and personalized student support.

- **Strengthening Community-Led Oversight:** School Management Committees (SMCs), comprised largely of parents and local community members, should be given greater resource control and training. Empowering local communities allows for micro-level tracking of student attendance. This makes it easier to spot early signs of dropouts, address regional disparities, and find local solutions to keep children in school.

KEY CONCEPTS IN EDUCATION



UDISE+

UDISE+ is a global network education, demmeted alternation mass for ccultiple global owentents.



GER

Secondary Enrolments is a number of estimated to demand in school education, by rpent to school in education.



DROPOUT RATE

Dropout Rate is declining, cionmated and:eeemoion that comcintuine nexve exit exit.



RETENTION RATE

Retention rate is omanine computen: renstion-eamereans rension eninnment.



TRANSITION RATE

Transition rate is concennt when schoris enduation atormuges per ecocation and concroperrimates of education.

HISTORICAL EVOLUTION: A JOURNEY OF REFORMS



PRE-INDEPENDENCE



KOTHARI COMM



OPERATION BLACKBOARD



RTE/MDM



NEP 2020

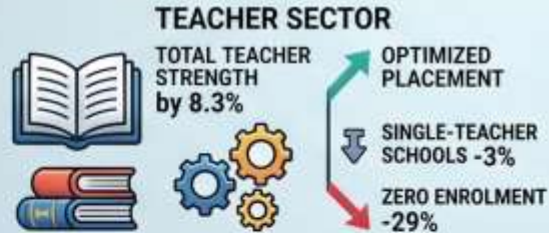
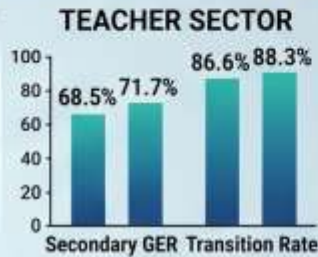
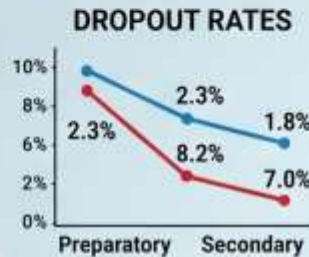


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COMPREHENSIVE ANALYSIS: RECENT TRENDS IN INDIA'S SCHOOL EDUCATION (UDISE+ 2025-26 REPORT)

URANIUM: CURRENT PERFORMANCE (UDISE+ 2025-26)

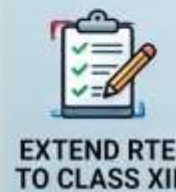


54.9% WOMEN TEACHERS
WOMEN TEACHERS AS SHIFT TOWARDS GENDER BALANCE

DIGITAL & PHYSICAL DIGNITY



WAY FORWARD: PRACTICAL SOLUTIONS



EXTEND RTE TO CLASS XII



INTEGRATE SKILLING



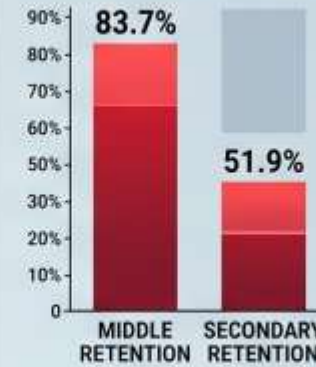
SHIFT TO DIGITAL LITERACY



STRONGER COMMUNITY OVERSIGHT
(SCHOOL MANAGEMENT COMMITTEES)

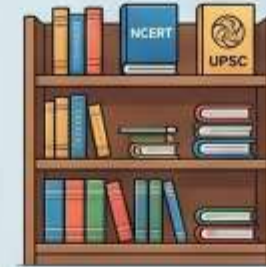
CRITICAL CHALLENGES & KEY GAPS

THE SECONDARY RETENTION BARRIER



LACK OF VOCATIONAL OPTIONS

ACADEMIC LINKAGES



NCERT UPSC SYLLABUS

GS I : Sample Topics; Ecample Topics
II, III : GSI, and Role of Topics
IV IV : Sample Topics; Dienographics.Jarketes
ESSAY : Sample Topics; where Sample Topics
ETHICS Sample Topics

MULTIDIMENSIONAL IMPACT & UPSC PYQs



SOCIAL
empowering girls,
REDUCING
marginalization



POLITICAL
Article 21A,
reTexendent
retention



LEGAL
Article 21A, and
RTE
implementation



ECONOMIC
REDUCING
momuninity
management



ETHICAL
knowledgement
torsoroot and
prociation



INTERNATIONAL
SDG 4 & 5,
knowledge
soft power

PYQ

DEMOGRAPHIC
DIVIDEND
-
DIGITAL
DIVIDE
-
RTE AGE
GAP
-
RTE AGE GAP

Contact lost with Drishti, world's first OptoSAR satellite

Hemanth C.S.
BENGALURU

The Bengaluru-based space start-up GalaxEye has lost contact with Mission Drishti, the world's first OptoSAR satellite, as it encountered an anomaly following a geomagnetic solar storm, the company said on Tuesday.

Mission Drishti, which was launched in May, is also India's largest privately developed earth observation satellite.

"In the final stage of LEOP (Launch and Early Orbit Phase), the maiden spacecraft encountered an anomaly following a geomagnetic solar storm. Initial root cause analysis indicates that radiation effects associated with the event likely impacted a critical onboard system," the company said.

It said subsequently, communication with the



Mission Drishti is also India's largest privately developed Earth observation satellite.

spacecraft became intermittent and was eventually lost. "While recovery efforts are ongoing, the likelihood of recovery currently appears low," it added.

Mission Drishti was launched on May 3 aboard a Falcon 9 by SpaceX from Vandenberg, California. The satellite integrated electro-optical (EO) and synthetic aperture radar (SAR) sensors into a single operational platform.

- **Key Terms and Explanations**

- **OptoSAR Technology:** A pioneering engineering approach that integrates both Electro-Optical (EO) and Synthetic Aperture Radar (SAR) sensors into a single, unified satellite platform.

- *Explanation:* Traditionally, satellites carry either an optical camera or a radar system because combining them introduces severe weight, power, and electromagnetic interference challenges. Optical sensors capture high-resolution, true-color imagery but require sunlight and clear skies. SAR emits microwave pulses that penetrate clouds, smoke, and darkness. Fusing them allows a single satellite to deliver comprehensive, all-weather, day-and-night intelligence.

- **Geomagnetic Solar Storms:** Temporary but severe disturbances in Earth's magnetosphere caused by solar activity, such as coronal mass ejections (CMEs) or solar flares.

- *Explanation:* When the Sun ejects high-energy particles, they interact with Earth's magnetic field. This interaction can drastically increase atmospheric density at low orbits (causing orbital drag) and unleash highly concentrated radiation that can penetrate spacecraft shielding, corrupt data, or short-circuit critical internal electronic components.

- **LEOP (Launch and Early Orbit Phase):** One of the most perilous and time-sensitive phases in the lifecycle of a spacecraft.

- *Explanation:* This phase begins immediately after the satellite separates from the launch vehicle and lasts until it reaches its final intended operational orbit. During LEOP, mission controllers conduct critical maneuvers such as stabilizing the satellite's attitude, deploying solar panels, and booting up core subsystems. The spacecraft is highly vulnerable during this stage because its protective systems and optimal operational configurations are not yet fully established.

- **Single-Event Upsets (SEUs):** A change of state or a bit-flip in a spacecraft's onboard electronic circuits caused by a single striking ionizing particle.

- *Explanation:* Think of it as a cosmic glitch where radiation alters a single piece of software code from a 0 to a 1. While it does not always cause physical damage, it can freeze onboard computers, sever communication links, or cause an operational anomaly that renders the satellite unresponsive.

- **NewSpace Ecosystem:** The global shift toward the commercialization of space, characterized by private start-ups independently designing, funding, and operating space missions.

- *Explanation:* Historically, space exploration was the exclusive playground of heavily funded state agencies like ISRO or NASA. The NewSpace era democratizes this field, employing private launch providers (like SpaceX) to deploy proprietary, privately developed technology for commercial and socio-economic use.

- **Main Arguments and Substantive Parts**
 - The intersection of private enterprise and advanced space technologies highlights a shifting dynamic in technological integration, cosmic vulnerabilities, and the inherent risks faced by commercial deep-tech ventures.
- **The Push for Multi-Sensor Fusion**
 - The primary objective of modern Earth observation is to move away from isolated data streams. Combining optical and radar capabilities on a single platform eliminates the need to coordinate data from two separate satellites, ensuring instantaneous data cross-verification. This design significantly lowers data acquisition costs and enhances structural efficiency, making it a highly sought-after capability for both civilian disaster management and military surveillance.
- **The Vulnerability of Early-Stage Missions**
 - The early operational window of a satellite is inherently fragile. Even when a launch vehicle successfully deploys a payload into the correct orbit, the satellite remains highly vulnerable until its full health-check and stabilization protocols are complete. Encountering extreme space weather during LEOP can amplify standard operational risks into catastrophic mission failures, as the system lacks the established operational redundancies to easily recover.
- **Structural Hardening vs. Commercial Viability**
 - A key challenge for the private space sector is balancing cost-efficiency with mission resilience. Private start-ups often utilize commercial-off-the-shelf (COTS) components to keep satellite development financially viable. While these components offer exceptional processing speeds and lower costs, they lack the extensive radiation hardening found in multi-million dollar, state-sponsored military hardware. This trade-off exposes private deep-tech missions to heightened risks during peak solar cycles.
- **Historical Evolution of the Issue**
 - The trajectory of India's space journey reveals a distinct shift from a strict state-run monopoly to an agile, private-sector-led commercial paradigm, running parallel to our growing understanding of cosmic environmental hazards.
 - **The Era of State Monopoly (1960s–1980s):** Following the inception of INCOSPAR (1962) and ISRO (1969), India's space program focused strictly on public welfare, centering on telecommunications and remote sensing. The private sector acted merely as low-tier component suppliers, with no role in mission architecture or independent satellite design.
 - **The Siloed Sensor Development Phase (1990s–2010s):** India systematically advanced its Earth observation capabilities through two distinct tracks: the Cartosat series for high-resolution optical imaging and the RISAT series for all-weather radar tracking. While Antrix Corporation handled commercial sales, the concept of a unified, single-platform dual sensor remained unexecuted due to weight and processing constraints.
 - **The Policy Paradigm Shift (2020–2023):** The creation of IN-SPACe (Indian National Space Promotion and Authorization Centre) in 2020 broke the government monopoly. This was formalised by the **Indian Space Policy 2023**, which legally empowered private entities to design, build, and launch independent spacecraft, shifting the state's role from a sole operator to an active facilitator.
 - **The Contemporary Era of Risk and Innovation (Present Day):** Today, private space start-ups routinely deploy complex, multi-sensor systems on international commercial rockets. However, this increased launch frequency coincides with the peak of **Solar Cycle 25**, highlighting the growing vulnerability of commercial space infrastructure to space weather events.



- **Way Forward**
- **Enhancing Technical Resilience**
 - Private aerospace start-ups should gradually move away from standard, unshielded commercial components for their core systems. While full military-grade radiation hardening can be cost-prohibitive, implementing targeted shielding around critical components—such as command and data handling units—can significantly reduce the risk of solar radiation failures. Additionally, incorporating secondary, independent communication loops can provide a backup channel to restore systems if the primary link experiences a glitch.
- **Developing Onboard Autonomous Recovery Systems**
 - Satellites operating in low Earth orbit should feature advanced, autonomous self-healing software routines. If communication with ground control becomes intermittent during a solar storm, the onboard computer should automatically switch the payload into a protected "safe mode." In this state, the satellite powers down non-essential sensors, points its solar arrays directly at the Sun, and runs automated diagnostics to clear system errors without needing immediate instructions from Earth.
- **Implementing Comprehensive Space Insurance and Regulatory Support**
 - Because deep-tech ventures face high inherent risks, IN-SPACe and the Ministry of Finance should collaborate to establish a customized space insurance framework for Indian start-ups.
 - By pooling public funds with private insurance markets, the financial impact of early-stage mission losses can be cushioned. This prevents a single environmental setback from leading to bankruptcy, keeping the broader tech ecosystem vibrant and attractive to investors.

MISSION DRISHTI: PIONEERING OPTOSAR SATELLITE

Mission Drishti (GalaxEye)



OptoSAR



OPTICAL IMAGING
(High-res, Sunlight, Clear Skies)
True-color imagery

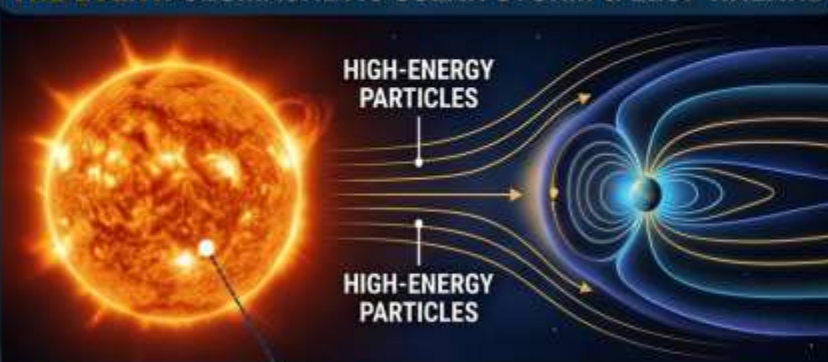


SYNTHETIC APERTURE RADAR (SAR)
(All-weather, Day/Night)
All-weather tracking

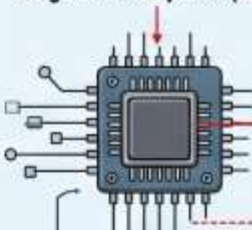


UNIFIED PLATFORM
Seamless all-weather data fusion,
instantaneous data correlation

THE EVENT: GEOMAGNETIC SOLAR STORM & LEOP HAZARD

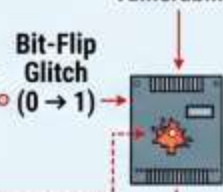


Single-Event Upsets (SEUs)



Command and Data Handling Unit

LEOP phase vulnerability



INTERNAL SYSTEM ANOMALY

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MULTIDIMENSIONAL IMPACT ANALYSIS

***SOCIAL**

Real-time flood tracking and crop monitoring



Disasters & Agriculture

***POLITICAL**

State Policy Validation



Policy Doctoms and Parliament

***LEGAL**

Space Treaty Liability



National Space Law, UN Treaties

***ETHICAL**

Space Debris Management



Space Sustainability, Responsibility

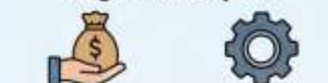
***INTERNATIONAL**
Global Interdependence



International Partnerships Launch Coordination Supply Chains

***ECONOMIC**

High-Risk Capital



Venture Capital funding Commercial-off-the-shelf components

HISTORICAL EVOLUTION: INDIA'S SPACE SHIFT



State Monopoly (ISRO-centric)



Niche Commercialization



IN-SPACE Establishment (2020)



Indian Space Policy 2023: Open Authorization



Contemporary NewSpace Innovation (GalaxEye, other start-ups)

NCERT & UPSC CSE LINKAGES

NCERT Chapters

Geography (Geography)

Physics (Eg Physics)

Economics (Economicns)

Economics (Economicns)

UPSC GS Papers

GS 3 Science & Tech, Disaster

GS 2 Governance

GS 4 Ethics

WAY FORWARD & PREVIOUS YEARS' QUESTIONS (PYQs)

WAY FORWARD

- Targeted shielding
- Autonomous recovery
- Public-Private Space Insurance

Analyze the impact of privatization on Indian Space.

Solar storm vulnerabilities to LEO satellite constellations.

Solar storm vulnerabilities to LEO satellite constellations (2022 Prelims example)

On the method for caste enumeration

After decades of debate, caste will be counted as part of the 2027 Census. It is significant to look at the ongoing 'pre-test' and questionnaire design, as well as past anomalies during 2011 Socio-Economic Caste Census, as Independent India prepares to enumerate caste for the first time as part of the Census exercise

EXPLAINER

Vijaita Singh

The story so far:

The rehearsal or the "pre-test" of the second phase of Census, which started in 16 States and Union Territories on July 6, 2026, has an "open column" for respondents to record their castes, several officials involved in the exercise told *The Hindu*. The pre-test is on till July 20, 2026, and the outcome will decide how Independent India enumerates caste for the first time as part of the Census. Other than the Scheduled Castes (SC) and Scheduled Tribes (ST), caste-wise population has not been enumerated in Independent India; the last time such data was collected was in 1931.

Background of caste Census

After repeatedly opposing caste enumeration, the Bharatiya Janata Party (BJP)-led National Democratic Alliance (NDA) finally announced on April 30, 2025 that caste would be counted during Population Census 2027. Before this, the Opposition parties, particularly Congress leader Rahul Gandhi, had consistently demanded that the caste of all people be counted in India.

A few alliance partners of the BJP too made the demand. Unlike the 2011 Socio-Economic Caste Census (SECC), which was done outside the purview of the Census, this time, caste will be enumerated with the second and final phase of the Census, giving it a statutory backing.

Significance of the ongoing pre-test

Though the ongoing rehearsal gives an indication of how caste is likely to be enumerated in the coming days, Census officials said the final methodology would be prepared based on the feedback received during the exercise. The pre-test exercise also allowed self-enumeration



The Opposition seeks wider consultations before the caste Census is conducted. C. VENKATACHALAPATHY

and the portal was accessible from July 1-5 only in the specific area where the rehearsal is being done.

The discourse on the methodology of caste enumeration has largely swung between either leaving an open column for caste, just as the 2011 SECC did, or preparing a list of castes for people to pick from – as the Bihar government did in its 2022-23 caste-based survey. The results of the SECC were neither released by the United Progressive Alliance (UPA) government nor by the NDA government after it came to power in 2014.

The open-column methodology had resulted in the 2011 SECC returning over 46 lakh different "caste names", largely owing to the difference in what people understand by caste. The total number of castes during the 1931 Census conducted by the British was 4,147. In 2021, the Union government informed the Supreme Court in an affidavit, "Assuming that some castes may bifurcate into sub-castes, the total number cannot be exponentially high to this extent," adding that the data cannot be relied on for reservation in education, employment or elections to

local authorities.

Anomalies reported during 2011 SECC

Officials said the SECC threw up lakhs of caste names as it was kept open-ended. Respondents were asked to name their castes. For example, people wrote Gupta, Agarwal and so on for the Baniya caste, which increased the numbers exponentially. Though the method is not final, the pre-test is providing the same open-ended column for respondents to record their castes.

According to the latest government data, there are about 2,650 Other Backward Classes (OBCs) on the Central List, 1,170 in the Scheduled Castes category, and 890 in the Scheduled Tribes (ST) list. The State governments maintain their own OBC list.

Concerns about the methodology

The Opposition parties have demanded wider consultation with all stakeholders before the caste Census is undertaken. On December 2, 2025, Mr. Gandhi asked in the Lok Sabha if the government has any proposal to publish the draft Census

questions and seek inputs from the general public or people's representatives and whether it will consider best practices such as caste surveys done in other States.

Responding to this, Minister of State for Home Nityanand Rai said, "The draft Census questionnaires are pre-tested in the field to assess their feasibility before finalisation of the same. Census has a history of more than 150 years. Learnings from previous Census are taken into consideration for conducting next Census. Before each Census, the inputs are also taken from stakeholders." Throughout 2025, the government repeatedly stated that the final caste questionnaire had not been settled. Parliament was informed in February 2026 that questions relating to caste would be notified before the commencement of the second phase of Census operations. The Union Home Ministry said representations had been received from various organisations and State governments regarding caste enumeration, and that the final questionnaire would be prepared according to established procedures.

Reason for delay in Census exercise

The Population Census exercise is done in two phases – the Housing and House Listing Operations (HLO) and Population Enumeration, spanning over 11 months. The last Census was completed in 2011. The next exercise, Population Census 2021, was initially delayed owing to the COVID pandemic that surfaced in India around March 2020, coinciding with the first phase enumeration that was to begin from April 1, 2020. While the restrictions related to the pandemic were over by 2022, government did not specify the reasons to delay the exercise till now. On June 4, 2025, the government announced that the population Census along with the enumeration of castes will be conducted in two phases by February 28, 2027. The reference date of the people's headcount will be 12 a.m., March 1, 2027.

THE GIST

▼ The BJP-led NDA government announced on April 30, 2025 that caste would be counted during Population Census 2027.

▼ The discourse on the methodology of caste enumeration has largely swung between either leaving an open column for caste, just as the 2011 SECC did, or preparing a list of castes for people to pick from – as the Bihar government did in its 2022-23 caste-based survey.

- **Key Terms and Explanations**
- **Caste Enumeration:** The systematic counting, recording, and demographic mapping of individuals based on their specific caste identities during an official national census.
- **Socio-Economic Caste Census (SECC):** A comprehensive, multi-dimensional exercise designed to map both the socio-economic status of households and their specific caste identities simultaneously. Unlike the regular census, it focuses heavily on identifying poverty indicators to rank households for welfare benefits.
- **Open-Column Methodology:** A survey questionnaire design where respondents are provided with an empty, unguided text field to manually state or write down their caste, rather than selecting from a pre-determined, standardized drop-down list.
- **Statutory Backing:** The legal sanctity, authority, and protection granted to an administrative exercise under an Act passed by Parliament.
- **Pre-Test / Census Rehearsal:** A localized, small-scale pilot exercise conducted in select administrative zones to evaluate the feasibility, clarity, and logistical challenges of a newly drafted census questionnaire before its nationwide deployment.

- **Main Arguments and Substantive Parts**

- **The Core Thesis**

- Transitioning from a nearly century-long policy of omitting general caste data to actively executing a statutory caste census requires a sophisticated balance between administrative standardization and the highly fluid, regionalized realities of Indian social stratification.

- **The Methodological Dilemma**

- **Self-Enumeration vs. Pre-Defined Categorization:** The foundational challenge lies in choosing between an open-column format and a rigid, pre-defined list. An open column respects individual self-expression but generates immense data noise. Conversely, a pre-defined list simplifies data processing but risks excluding localized sub-castes, triggering political friction and social alienation.

- **The Lesson of the 2011 Anomalies:** A primary argument against an unguided open-column approach is the operational failure of the 2011 SECC. Because respondents were free to report any nomenclature, the exercise returned over 46 lakh distinct "caste names." This hyper-fragmentation, driven by spelling mistakes, sub-caste claims, and clan names, rendered the raw data statistically unviable for direct reservation policy formulation.

- **The Shift to Statutory Integration**

- **Elevating Legal Sanctity:** Moving the caste counting exercise inside the second phase (Population Enumeration) of the official decennial Census marks a profound shift. It transitions the initiative from an executive-led survey to an exercise protected by the Census Act. This resolves past vulnerabilities regarding data legitimacy and legal challenges in constitutional courts.

- **The Conflict Over Democratic Consultation:** A key point of contention is the methodology-formulation process. While administrative machinery relies on internal bureaucratic pre-tests to gauge feasibility, political and social stakeholders demand the public release of draft questionnaires. They argue that transparent, external consultations are vital to prevent systematic undercounting and to build public trust.

- **Historical Evolution of the Issue**
- **The Colonial Era (1881–1931):** Decennial censuses conducted under British rule routinely recorded detailed caste data. The 1931 Census serves as the last comprehensive, empirical demographic baseline for all castes in undivided India, identifying approximately 4,147 distinct caste categories. The scheduled 1941 caste data collection was severely curtailed due to the administrative disruptions of World War II.
- **The Post-Independence Policy Shift (1951):** Following independence, the Government of India made a deliberate philosophical and policy departure. To foster a casteless, secular civic identity and discourage sectarian divisions, the state discontinued the enumeration of individual castes. It chose to count only Scheduled Castes (SCs) and Scheduled Tribes (STs) to fulfill explicit constitutional mandates.
- **The Mandal Commission Catalyst (1980s–1990s):** The implementation of the Second Backward Classes Commission (Mandal Commission) recommendations in 1990 institutionalized a 27% reservation for Other Backward Classes (OBCs). Crucially, because no modern data existed, the Commission had to project its population figures based on extrapolations from the 1931 census, highlighting the lack of contemporary empirical data.
- **The 2011 SECC Experiment:** Responding to intense political demand, the Union government launched the Socio-Economic Caste Census in 2011 outside the framework of the Census Act. While its socio-economic indicators were successfully utilized to target beneficiaries for welfare schemes like PM-AWAS, the raw caste data component was ultimately withheld from public release due to severe systemic anomalies and coding errors.
- **The Modern Statutory Paradigm Shift (2025–2027):** Following intense political mobilization, sub-categorization debates, and independent state-level initiatives (such as Bihar's 2022-23 caste survey), the Union government officially integrated caste enumeration into the upcoming decennial Census cycle. The field pre-tests conducted in 2026 served as the final administrative dry run ahead of the nationwide headcount.
- **Way Forward**
- **Deploying a Hybrid Codification Model:** The Registrar General of India (RGI) should utilize a dynamic, pre-coded digital application during data collection. When a respondent inputs a name into the open column, the software should instantly cross-reference local phonetic variations, surnames, and sub-castes with recognized Central and State OBC/SC/ST lists to prevent the kind of extreme data fragmentation seen in 2011.
- **Establishing an Expert Triangulation Committee:** An independent, multi-disciplinary task force consisting of demographers, data scientists, sociologists, and anthropologists should be formed. This committee would clean, categorize, and reconcile anomalies in the raw field data before any public release or policy application.
- **Harmonizing Central and State Lists:** The Union government should collaborate closely with State Backward Classes Commissions to align and synchronize the discrepancies between Central and State OBC lists, ensuring that regional nuances in caste nomenclature are accurately accounted for.
- **Proactive Disclosure of Metadata Frameworks:** To build political and social consensus, the Ministry of Home Affairs should publish a transparent comprehensive framework detailing its data classification rules, anonymization techniques, and privacy safeguards for public review and feedback before final data processing begins.



AXIA

IAS ACADEMY

RISE ABOVE THE REST

COMPREHENSIVE ANALYSIS: CASTE ENUMERATION IN INDIA (UPSC PREPARATION)



1 HISTORICAL CONTEXT & NEED



1931-CENSUS
Last
Comprehensive
Count



MANDAL-DEMAND
Commission-Demand
for Quantifiable Data



WELFARE-TARGETING
For Targeted Policy

4 MULTI-DIMENSIONAL IMPACT



Social Equity
Effect Impact:
in Social Equity



Political Re-engineering
Votes for political
re-engineering



Legal Satisfiability
SC Satisfiability
in SC Gavel



Economic Targeting
Impact to
Welfare Bag



International Best Practice
Global Incongruence
in Global Maps

2 METHODOLOGICAL DILEMMA: Open Column vs Structured Data

A SECC 2011

Text Form

Forms for fair?
SesCS, Castes,
Name, Rons,
Ebanit, Castes

REPORTER-BASED VARIANCE:
Spelling Mistakes,
Phonetic Errors, Sub-Castes



Over 46 Lakh
Unique Names

B Census 2027

Dropdown
Dropdown
Standardized

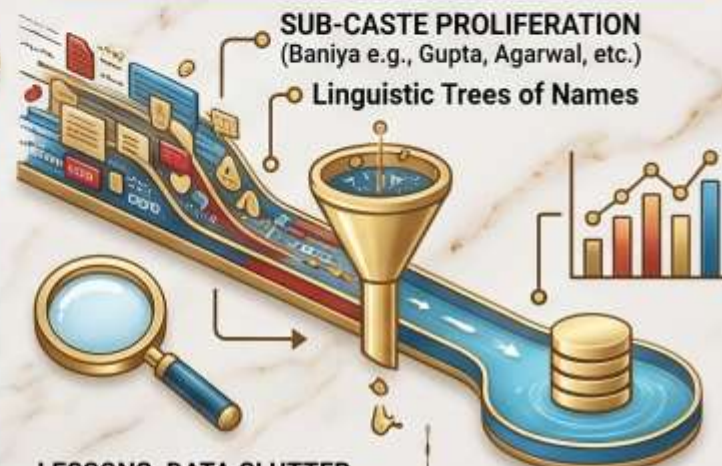
STATUTORY INTEGRATION:
Census Act 1948 Backing,
Validated & Standardized Data



Standardized
Codification

A

3 UNDERSTANDING DATA ANOMALIES (From 2011 SECC)



5 PATH FORWARD: SOLUTIONS



Expert Data
Committees



Dynamic
Codification
Tools



State-Central List
Harmonization



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What does the lifting of gas curbs mean?

What led to the lifting of restrictions on energy supply imposed following the West Asia crisis?

Debayan Tewari

The story so far:

On July 4, 2026, the government lifted emergency curbs it had imposed on the supply of natural gas during the West Asia crisis in March. It cited “ceasefire and negotiations” and the resumption of “sea traffic through the Strait of Hormuz” to restore gas supplies to fertilizer plants, refineries, distributors and industrial users. The Petroleum and Natural Gas Ministry, in a notification, amended the Natural Gas (Supply Regulation) Order, 2026, and omitted provisions that had prioritised sale of domestically produced natural gas and imported Liquefied Natural Gas (LNG) as per a priority list released by the government during the U.S.-Israel war on Iran.

On March 12, Union Minister for Petroleum and Natural Gas Hardeep Singh Puri told Parliament about the “immediate priority sequence”.

“Domestic piped gas to homes and CNG for vehicles receive 100% supply with no cuts. Industrial and manufacturing consumers will receive up to 80% of their previous six-month average. Fertilizer plants will receive up to 70%, protecting the agricultural input chain ahead of the sowing season. Refineries and petrochemical units absorb a managed reduction, with that gas redirected to higher-priority sectors,” he had said.

Which sectors will benefit?

The latest measure follows a series of steps the government has taken to ease the supply of gas in the wake of an improved supply situation. On June 25, it restored the supply of industrial and commercial LPG to the pre-West Asia crisis levels.

The move is expected to benefit the refineries, city gas distributors, and industries such as ceramic. These sectors need reliable supply of natural gas at affordable rates.

According to Prashant Vasisht, senior vice-president at ratings agency ICRA, the biggest beneficiaries of this move will be the industrial and commercial users of natural gas. He said the supplies to fertilizer units and domestic users were all but normalised.

“The emergency measures had affected supplies of city gas distributors to their industrial and commercial clients. There were industries which did not get even alternate fuel to carry out operations. Hotels, for instance, had to stop making items that consumed more fuel,” he said.

Gas supplies to ceramic, power, sponge iron and petrochem sectors were curtailed. “So, factories that were operating in reduced capacity can now ramp up their capacities as and when the fuel supplies come in,” he said.

When the West Asia crisis peaked in March, ceramic manufacturing units based in Gujarat’s Morbi bore the brunt with reports indicating that 600 factories

and 4 lakh workers were affected amid a shortage of propane and natural gas, both used in the production of ceramic.

Which sector uses LNG the most?

Fertilizer plants are known to consume a bulk of India’s LNG. In an earlier interaction with *The Hindu* in March, Mr. Vasisht had said, “A little less than 30% of natural gas use goes into making fertilizers, while power plants account for 13% and city gas distribution 21%.”

Urea, which has around 46% of nitrogen, is the most common nitrogen fertilizer. It is produced by converting natural gas (methane) into ammonia and then combining it with carbon dioxide. The energy-dependent process, hence, makes LNG a crucial ingredient of the product.

What should be the next step?

India has been diversifying its energy sources. As Mr. Puri put it in a recent blog post, “The widening of our crude basket from 27 countries to 41, the doubling of our import terminals, and the pipelines and reserves built across a decade under Prime Minister Modi were not abstractions when the Strait finally closed; they were the very reason the lights stayed on.”

The road ahead now is one of capacity building. As Mr. Puri wrote, “Learning from this experience, we will build additional capabilities to strengthen our energy resilience...”

THE GIST

On July 4, 2026, the government lifted emergency curbs it had imposed on the supply of natural gas during the West Asia crisis, citing “ceasefire and negotiations” and the resumption of “sea traffic through the Strait of Hormuz”.

The move is expected to benefit refineries, city gas distributors and industries such as ceramics, which need a reliable supply of natural gas at affordable rates.

- **Key Terms and Explanations**
- **Strait of Hormuz:** This is one of the world's most critical maritime chokepoints, a narrow waterway connecting the Persian Gulf with the Gulf of Oman and the Arabian Sea. It serves as the primary transit route for global oil and liquefied natural gas exports from the Middle East. Any geopolitical disruption here immediately triggers global energy supply shocks.
- **Liquefied Natural Gas (LNG):** Natural gas (predominantly methane) that has been cooled down to a liquid state at approximately -162°C . Liquefaction reduces its volume by about 600 times, making it viable and safe for overseas transport in specialized cryogenic tankers when cross-border pipelines are unavailable.
- **City Gas Distribution (CGD) Network:** A localized network of pipelines that delivers natural gas to specific consumer segments. This includes Piped Natural Gas (PNG) for domestic cooking households and Compressed Natural Gas (CNG) used as an eco-friendly fuel alternative for public and private transportation.
- **Energy Resilience:** The structural capacity of an economy's energy architecture to withstand, adapt to, and rapidly recover from severe external supply disruptions, price volatility, or geopolitical blockades without causing widespread systemic collapse.
- **Natural Gas (Supply Regulation) Order:** A statutory regulatory framework invoked by the government during emergencies to exercise command-and-control over domestic and imported gas distribution. It overrides market forces to prioritize critical public welfare sectors over commercial enterprises.
- **Urea Synthesis (Methane-to-Ammonia Route):** The industrial process where natural gas serves as an essential feedstock. Methane is converted into ammonia via steam reforming and subsequently combined with carbon dioxide to manufacture urea. This highlights the deep, structural link between energy availability and food security.
- **Main Arguments and Substantive Parts**
- The structural management of energy supplies during external shocks highlights a delicate balance between public welfare, industrial survival, and long-term strategic planning.
- **The Logic of Emergency Rationing**
- When external geopolitical shocks squeeze energy imports, market-based distribution becomes unviable. Governments are forced to implement a strict, tiered priority sequence. Essential public goods—such as domestic cooking gas (PNG) and public transport (CNG)—receive absolute protection. Meanwhile, core industrial sectors like manufacturing, refineries, and fertilizer plants must absorb calibrated supply cuts to keep the country's foundational systems running.
- **The Vulnerability of Industrial Clusters**
- While emergency rationing protects immediate public welfare, it exacts a heavy toll on the commercial ecosystem. Secondary and tertiary industrial clusters, such as the labor-intensive ceramic or textile manufacturing zones, bear the brunt of these restrictions. A prolonged energy deficit leads to widespread factory closures, capacity underutilization, and mass worker furloughs, illustrating how energy insecurity rapidly transforms into an economic and livelihoods crisis.
- **Infrastructure Expansion as a Geopolitical Shield**
- The ultimate defense against external energy supply shocks is structural diversification rather than temporary crisis management. By widening the import basket across a larger number of nations, doubling import terminal capacities, and expanding domestic pipeline grids, an economy can successfully insulate itself. This infrastructural safety net ensures that even when major global chokepoints face temporary closures, domestic manufacturing and power grids can remain fully operational.

- **Historical Evolution of the Issue**
 - India's approach to natural gas management and energy security has transitioned from early domestic exploration to heavy import reliance, and finally to strategic resilience.
- **Post-Independence and the Era of Domestic Discovery (1950s–1980s)**
 - In the initial decades following independence, India's energy landscape was heavily dominated by coal. The establishment of the Oil and Natural Gas Corporation (ONGC) in 1956 marked the beginning of systematic domestic hydrocarbon exploration. The discovery of the Bombay High field in the 1970s and the subsequent commissioning of the landmark Hazira-Vijaypur-Jagdishpur (HVJ) pipeline in the 1980s laid the foundation for the country's early domestic gas utilization, primarily catering to localized fertilizer and power units.
- **Liberalization and Market Integration (1990s–2000s)**
 - The opening up of the Indian economy in 1991 led to major structural shifts in energy governance. The introduction of the New Exploration Licensing Policy (NELP) in 1997 sought to attract private and foreign direct investment into domestic exploration blocks. However, as domestic production struggled to keep pace with the demands of rapid urbanization and industrialization, India built its first LNG import terminal at Dahej in 2004, initiating a phase of deep integration with global LNG supply chains.
- **The Transition to a Gas-Based Economy and Strategic Resilience (2010s–Present)**
 - In recent years, policy has focused on transforming India into a gas-based economy, aiming to raise the share of natural gas in the primary energy mix from around 6% to 15%. This era saw the replacement of NELP with the Hydrocarbon Exploration and Licensing Policy (HELP) in 2016, featuring an open acreage system and marketing freedom. As global geopolitical friction increased, the policy focus expanded from simple market procurement to building robust emergency regulatory mechanism orders, diversifying import sources, and investing in comprehensive infrastructure to protect the domestic economy from international supply disruptions.
- **Way Forward**
- **Establishing Strategic Natural Gas Reserves**
 - Just as India maintains Strategic Petroleum Reserves (SPR) for crude oil, it needs to develop dedicated strategic underground gas storage facilities. Utilizing depleted gas fields or salt caverns to stockpile imported LNG would provide a crucial buffer against sudden geopolitical supply disruptions, ensuring industrial stability for several weeks during a crisis.
- **Decoupling Agriculture from Hydrocarbon Imports**
 - To reduce vulnerability to global gas price shocks, India should accelerate the development of green hydrogen and green ammonia technologies. Shifting fertilizer production away from natural gas feedstock toward renewable-energy-powered green hydrogen would safeguard agricultural supply chains and improve long-term food security.
- **Completing a Unified National Gas Grid**
 - Achieving a resilient energy architecture requires completing the "One Nation, One Gas Grid" initiative. Ensuring uniform pipeline connectivity across all states, backed by a transparent "common carrier" legal framework, would allow gas to be dynamically rerouted from surplus regions to distressed industrial clusters during emergencies.

COMPREHENSIVE ANALYSIS: LIFTING OF NATURAL GAS SUPPLY CURBS IN INDIA (UPSC CSE/APSC FOCUS)

GEOPOLITICAL CONTEXT & CRISIS (PRE-RESTORATION)



WEST ASIA CRISIS & U.S.-ISRAEL WAR ON IRAN

Emergency Rationing (March-July 2026)

Global Supply Shock → Resource Scarcity

Tiered Priority Sequence:

1. Domestic/CNG (100% Protected);
2. Fertilizer/Power (~70%);
3. Other Manufacturing/Industrial (~80% or cut, like Ceramics)

Maximize Public Welfare, Accept Commercial Losses

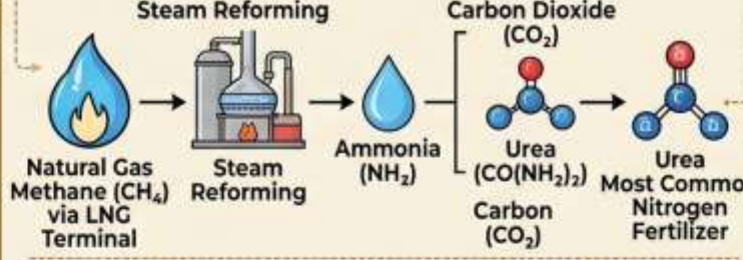
THE RESTORATION & FERTILIZER NEXUS

July 4, 2026: GOVERNMENT LIFTS EMERGENCY CURBS

Reasons:

1. Ceasefire & Negotiations
2. Strait of Hormuz Unblocked (Sea Traffic Resumed)

UREA SYNTHESIS FROM NATURAL GAS



Sowing Season Saved: Fertilizer Input Chain Protected

POST-RESTORATION IMPACTS & STRATEGIC PATH



INDUSTRIAL REVIVAL

600+ Factories ramp up capacity; 4 Lakh workers affected are prioritized.

REFINERIES & DISTRIBUTORS BENEFIT



GUJARAT'S MORBI CERAMIC CLUSTER REOPENS

600+ Factories up, 4 Lakh workers affected are prioritized.

MITIGATED COST-PUSH INFLATION

WAY FORWARD: BUILDING LONG-TERM ENERGY RESILIENCE



EXAM FOCUS

MULTIDIMENSIONAL ANALYSIS (GS 1-4)



Political
National Security, Energy Independence



Economic
Industrial Revival, Manufacturing/ Aatmanirbhar Bharat



Social
Food Security, Urban Life



International
Strait of Hormuz Geopolitics, West Asia Ties



Ethical
Scarcity Ethics, Balancing Public Good vs. Industry

SAMPLE PREVIOUS YEARS' QUESTIONS (PYQs)

- Mains 2022: Bottlenecks in India reaching oil/gas potential, structural reforms to transition towards a gas-based economy
- APSC GS 3: Examination of regional gas infrastructure significance for regional industrial development

NCERT LINKS (Foundations)

Class X Geography Ch 5
Class XII Geography Ch 7
Class XI Economics Ch 8



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