FINDER

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FORTUNE IAS NEWS DAILY EXPLAINER

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Indian aviation safety, its dangerous credibility deficit

Prelims: General Studies Paper - 1
Indian Polity and Governance-Constitution, Political System, Panchayati Raj, Public Policy, Rights Issues, etc.

Mains: General Studies - 3
Infrastructure: Energy, Ports, Roads, Airports, Railways etc.

1. Transparency and ICAO Obligations

- In **2006**, the Chairman of the **International Civil Aviation Organization (ICAO)** emphasised that **aviation safety depends on collective transparency**, where a weakness in one system endangers all.
- **India**, as an ICAO signatory, is bound by **ICAO Annex 13**, which mandates **independent, transparent, and credible accident investigations**.
- Failure to uphold transparency **undermines public confidence** and global aviation safety norms

2. AI 171 Crash and Investigation Concerns

- **Air India Flight 171** crashed on **June 12, 2025**, shortly after take-off from **Ahmedabad**, killing **241 onboard and 19 on the ground**, with **one survivor**.
- **The Cockpit Voice Recorder (CVR) and the Digital Flight Data Recorder (DFDR)** were recovered within days, but **India lacked technical expertise**, requiring assistance from the **National Transportation Safety Board (USA)** and **Air Accidents Investigation Branch**.
- The **preliminary report** revealed:
  - **Fuel control switches of both engines moved to "cut-off"** seconds after lift-off.
  - A cockpit exchange indicating **neither pilot admitted moving the switches**.
- Since these switches **can only be moved manually**, the **CVR/DFDR data should clearly reveal responsibility**, yet findings remain **vague and delayed**.
- Reports of **serious disagreements between Indian authorities and NTSB** raise concerns of **political interference** and lack of transparency.

3. Systemic Weaknesses in India's Aviation Safety Regime

- Past accidents (**Mangalore 2010, Kozhikode 2020**) showed:
  - **Cover-ups**, **regulatory dilution**, and **political pressure**.
  - Failure of the **Directorate General of Civil Aviation (DGCA)** to enforce safety norms.
- **Civil Aviation Requirements** have been repeatedly **relaxed under airline pressure**.
- After the AI 171 crash:
  - **The crash site was not secured**, evidence was compromised.
  - The airport reopened **without rescue and fire-fighting services**, endangering lives.
- **Delayed and unclear communication** has fuelled **misinformation on social media**, weakening institutional credibility.

4. Global Best Practices vs India's Approach

- The **Ministry of Civil Aviation** and the **AAIB** should **learn from how the FAA and NTSB respond quickly and transparently after an aircraft crash**.
- When a **UPS cargo MD-11 aircraft crashed** on November 4, 2025:
  - The **NTSB held daily press briefings**.
  - The **Federal Aviation Administration (FAA)** issued an **Emergency Airworthiness Directive within days**
- However, **lack of transparency** and **keeping foreign experts out** could lead to:
  - **Erosion of India's global credibility**.

- **Isolation in international aviation and diplomacy**
- **Transparent collaboration**, not **institutional ego**, is essential to prevent future tragedies.

The parallel track that keeps U.S.-India ties going

Prelims: General Studies Paper - 1
Current events of national and international importance

Mains: General Studies - 2
Effect of policies and politics of developed and developing countries on India's interests, Indian diaspora.

1. Political Strain but Strategic Continuity

- In **2025**, **India-U.S. relations** faced **political tensions**, including the **postponement of the Quad Leaders' Summit** and **U.S. trade sanctions on Indian goods**.
- **India's exports to the U.S. fell**, and **concerns increased about improving U.S.–China relations and closer U.S.-Pakistan ties**.
- Despite this, **high-level visits** by India's External Affairs Minister and Navy Chief to the U.S. showed that **engagement had not broken down**.

2. Quad and Institutional Cooperation Remain Strong

- While political signalling weakened, **institutional cooperation continued to deepen**, especially within the **Quadrilateral Security Dialogue (Quad)**.
- The **Quad Foreign Ministers' Meeting (July 2025)** launched initiatives on:
  - **Maritime security**
  - **Counterterrorism**
  - **Critical technologies**
  - **Humanitarian cooperation**
- The **Quad Counterterrorism Working Group** met again in **December 2025**, showing **operational continuity beyond summits**.

3. Defence and Technology as the Core Pillars

- **Defence cooperation** remains the **backbone of India-U.S. relations**, built since the **2008 civil nuclear deal**.
- Key agreements include:
  - **The Logistics Exchange Memorandum Of Agreement** (LEMOA) in 2016, **the Communications Compatibility and Security Agreement** (COMCASA, 2018) and the **Basic Exchange and Cooperation Agreement** (BECA, 2020).
  - **The 2023 India-US Defence Acceleration Ecosystem (INDUS-X)** and **Initiative on Critical and Emerging Technologies**
  - **Security of Supply Arrangement (2024)**
- A **10-year Defence Framework Agreement (2025)** strengthened **coordination, intelligence sharing and technology collaboration**.
- Major outcomes:
  - **Hindustan Aeronautics Limited signed a billion-dollar deal with the U.S.'s General Electric for fighter jet engines**
  - **NISAR satellite launch (2025)**
  - Regular military exercises such as **Yudh Abhyas** and **Malabar**.

4. Institutions as the Relationship's Real Strength

- The **India–U.S. partnership follows a dual-track model**:
  - **Political diplomacy fluctuates**
  - **Institutions ensure continuity**
- Bureaucratic, defence, and technological frameworks **shield cooperation from political volatility**.
- Analysts warn that **trade disputes may delay political momentum**, but **institutional trust sustains the partnership**.
- Looking to **2026**, deeper **institutional understanding beyond defence** is essential.

What does the SHANTI Bill change?

Prelims: General Studies Paper - 1
Economic and Social Development-Sustainable Development, Poverty, Inclusion, Demographics, Social Sector Initiatives, etc.

Mains: General Studies - 3
Infrastructure: Energy, Ports, Roads, Airports, Railways etc

1. Context

- Parliament has cleared the **Sustainable Harnessing and Advancement of Nuclear Energy in India (SHANTI) Bil**l, ending the State monopoly (since 1956) over nuclear power.
- It aligns with the **Nuclear Energy Mission** wit**h ₹20,000 crore** for **Small Modular Reactors (SMRs**) and **advanced pressurised water reactors**.
- This initiative aims at **energy security**, clean baseload power, and **net-zero 2070 targets**

2. Features

- **Sectoral Opening:** Allows private Indian companies to own, build, and operate nuclear plants; permits foreign supplier participation.
- **Ownership Structure:** Up to **49% private participation**, with **51% government control** over f**uel production, heavy water, waste management,** s**afety, licensing, and strategic oversight.**
- **Ends Nuclear Power Corporation of India Limited (NPCIL) Monopoly**: Introduces **PPP model** across operations, fuel fabrication, equipment, and R&D
- **Technology Push**: Facilitates SMRs and indigenous reactor designs, supporting clean energy transition and long-term energy security.
- **Regulatory Strengthening**: Grants **statutory status to Atomic Energy Regulatory Board (AERB),**, making it answerable to Parliament; enhances safety oversight
- Liability Clarity: Caps fixed at ₹3,000 crore (3,600 MW Capacity), ₹1,500 crore (1,500–3,600 MW), ₹100 crore (SMRs); **penalties capped at ₹1 crore**
- **State Backstop**: **Union government bears liability beyond operator caps**, supported **by a nuclear liability fund.**
- **Energy Security**: Reduces coal dependence; may revive stalled nuclear deals with **U.S., France, Japan, diversifying beyond Russia**.

3. Challenges

- **Accountability dilution: Supplier liability removed**; State bears risks, weakening the **polluter pays principle**..
- **Low Liability Caps**: Caps and penalties seen as **nominal against potential damages**; no indexation over 15 years despite inflation and long-term health/ environmental costs.
- **Global Precedents**: **Fukushima** damages were around 700 times the proposed cap; **Chernobyl** highlights scale of risks.
- **Transparency Concerns:** Section 39 **overrides RTI Act, 2005,** restricting access to plant data, operations, and regulatory submissions, **weakening public accountability**.
- **Labour safety risks: Section 42** excludes nuclear workers from general safety laws; opposed by **10 trade unions**..
- **Public Participation Gaps**: No mandatory public hearings, **EIA disclosures,** community consent, regular public safety reporting, or **Parliamentary scrutiny**.
- **Strategic critique:** Seen as **vendor-driven**, underplaying India's **thorium-based self-reliance**; contrasts with **France's state-controlled model**..

4. Way Forward

- **Rebalance Liability**: Reintroduce **calibrated supplier accountability** and review liability caps to reflect realistic risk, inflation, and long-term impacts.
- **Restore Transparency**: Harmonise Section 39 with RTI exemptions-in-public-interest, ensuring **justified disclosure and oversight.**
- **Protect Workers:** Reinstate robust occupational safety and health frameworks for nuclear workers.
- **Strengthen Participation**: Mandate public hearings, EIA transparency, community consent, and regular safety reporting with Parliamentary review.
- **Leverage Indigenous Strengths**: Prioritise **Indian reactor technologie**s aligned with the **thorium fuel cycle**

What remote-sensing reveals about plants, forests, and minerals from space

Prelims: General Studies Paper - 1
General Science

Mains: General Studies - 3
Awareness in the fields of IT, Space, Computers, robotics, nano-technology, bio-technology and issues

1. Context

- **Remote sensing** is a technology that uses satellites and drones to study Earth's surface and subsurface without physical contact, by **analysing electromagnetic radiation** reflected or emitted by objects.
- Different materials **reflect energy uniquely,** creating **spectral signatures** that act as fingerprints for identifying vegetation, water, minerals, and landforms.

2. Vegetation and Forest Monitoring

- Healthy plants absorb **red light and reflect near-infrared (NIR**) due to chlorophyll.
- The **Normalised Difference Vegetation Index (NDVI)** assesses plant health using these reflections.
- Spectral analysis helps distinguish tree species, estimate **forest biomass**, and **assess carbon storage**, aiding climate-change mitigation.

3. Water Mapping and Quality Assessment

- **Water reflects green light** and absorbs NIR and shortwave infrared (SWIR).
- The Normalised Difference Water Index (NDWI) and Modified NDWI (MNDWI) map water bodies, especially in urban areas.
- **Synthetic Aperture Radar (SAR)** enables **flood mapping** through clouds and at night, as calm water appears dark in radar images.
- Satellites also track **water quality, pollution**, and **algal blooms** via spectral signatures.

4. Subsurface Resource Exploration

- **Hyperspectral sensors** split light into hundreds of bands, allowing **detection of minerals, rock type**s, and alteration zones linked to ore deposits.
- Oil and gas exploration uses indirect indicators such as **vegetation stress, soil changes, surface anticlines**, and sedimentary basins.
- Satellites map **gravitational anomalies** over oceans and magnetic fields to identify structures capable of holding **hydrocarbons**.

5. Groundwater Detection

- Underground aquifers exert measurable **gravitational pull.**
- NASA's **Gravity Recovery and Climate Experiment (GRACE) mission** (2002-2017) measured changes in gravity to estimate groundwater.
- A 2009 Nature study using GRACE data revealed alarming groundwater depletion in North India due to over-extraction for irrigation.

6. Significance

- Remote sensing makes r**esource exploration faster, cheaper, and environmentally sustainable.**
- It supports targeted extraction, disaster management, and long-term conservation by monitoring **natural resources and preventing overuse**.

KEYWORDS

Global Methane Status Report

- The **Global Methane Status Report** says that **some progress** has been made under the **Global Methane Pledge**.
- However, **more action is needed** to meet its targets.
- The report is prepared by the **UN Environment Programme (UNEP)** and the **Climate and Clean Air Coalition (CCAC)**.
- It explains that **methane is a powerful greenhouse gas** and is responsible for **about one-third of current global warming**.
- Although **methane emissions are still rising**, expected emissions in **2030 are lower than earlier estimates** due to **government policies and sector-wise regulations**.
- Still, **only full use of proven control measures** can achieve the goal of a **30% reduction from 2020 levels by 2030**.

Places in News

Popocatépetl Volcano

- Popocatépetl is an **active stratovolcano** located about 70 km southeast of **Mexico City** in the **Trans-Mexican Volcanic Belt**.
- It is **North America's second-highest volcano** (5,426 m) and its name means **"Smoking Mountain"** in the Aztec language.
- After nearly 50 years of dormancy, the volcano **reactivated in 1994** and has remained continuously active.
- Its eruptions are dominantly explosive, involving lava dome formation and collapse.
- Past large eruptions generated **lahars (mudflows)** that buried Aztec settlements.
- Scientific studies have produced the **first 3D image of its interior,** revealing multiple magma chambers at different depths up to 18 km below the crater.
- Nearly **25 million people live within a 100 km radius**, making Popocatépetl a major volcanic hazard in Mexico.

Ajmer Sharif Dargah

- The Ajmer Sharif Dargah, located in **Ajmer, Rajasthan,** is one of the **holiest Muslim shrines in India.**
- It is dedicated to **Khwaja Moin-ud-din Chishti**, a Sufi saint from Persia and the founder of the Chishti Order in India.
- He settled in Ajmer in 1192 AD and **died in 1236 AD.**
- His teachings emphasized **secularism, tolerance, and inclusiveness**, and the shrine is **open to people of all faiths**.
- The Dargah was built by Mughal Emperor **Humayun** in his honour.
- Emperor **Akbar undertook annual pilgrimages** to Ajmer, and Akbar and Shah Jahan constructed mosques within the complex.
- The tomb is made of **marble with gold plating,** enclosed by a silver railing and marble screen.
- The shrine is known for its **spiritual atmosphere,** with offerings of flowers, sweets, and incense.