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GUJARAT BRIDGE COLLAPSE: FRAGILITY OF PUBLIC INFRASTRUCTURE IN INDIA

Context

- The recent collapse of the **Mujpur-Gambhira bridge** over **Gujarat's Mahisagar (Mahi) river** has once again exposed the alarming fragility of public infrastructure of India.

About Mahisagar (Mahi) River

- It is one of the few major **west-flowing** interstate rivers in India, traversing the states of **Madhya Pradesh, Rajasthan, and Gujarat** before draining into the **Gulf of Khambhat** in the Arabian Sea.
- Origin:** Northern slopes of the Vindhyas, Dhar district, Madhya Pradesh.
- It is the **only river in India** that crosses the **Tropic of Cancer twice**.
- Major Tributaries:**
 - Right Bank:** Som River
 - Left Bank:** Anas River, Panam River

About India's Public Infrastructure

- India's public infrastructure — like national *highways & expressways, economic corridors, bridges, drainage systems, urban utilities, telecom, and infrastructures related to ports & shipping etc* — is recognized as the foundation of economic growth, social equity, and national resilience.
 - Over the past decade, sectors like transport, energy, housing and digital connectivity have gained momentum.
- According to the **Ministry of Statistics and Programme Implementation (MoSPI)**, 431 infrastructure projects faced cost overruns totaling 4.82 lakh crore as of December 2023.
 - Delays range from 1 month to over 5 years, with 36% of projects running 25–60 months behind schedule.

Reasons For Fragility of India's Public Infrastructure

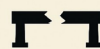
- Chronic Underfunding & Investment Gaps:** India needs 70 lakh crore by 2036 to meet urban infrastructure demands.
 - Municipal finances remain stagnant at 1% of GDP, limiting local capacity to maintain infrastructure.
- Overreliance on Public Sector Funding:** Public sector contributes 78% of infrastructure investment; private participation remains low due to long payback periods and high risk.

- Fragmented Governance:** Multiple agencies (e.g., DDA, PWD, MCD) operate in silos, especially in metros like Delhi and Mumbai.
 - Lack of coordination leads to blame games and reactive maintenance, rather than proactive planning.

Pattern of Failures



Palanpur NH58 Bridge (2023)
Girders collapsed, killing two.



Varivav Bridge (2023)
Developed cracks just 42 days after inauguration.



Valsad Railway Overbridge (2023)
Chunks of concrete fell off pre-inauguration



Mindhola River Bridge (2023)
Middle portion collapsed; no casualties



Morbi Suspension Bridge (2022)
135 lives lost



Ahmedabad Flyover (2021)
Slab fell during stress test

- Poor Planning & Execution:** Projects often lack comprehensive feasibility studies, resulting in flawed designs—like underpasses that flood every monsoon.
 - Urban infrastructure is frequently built on natural drainage basins, worsening flood risks.
 - Detailed Project Reports (DPRs)** are outsourced with inconsistent quality and data accuracy.
- Regulatory & Legal Bottlenecks:** Land acquisition delays, outdated building codes, and weak enforcement of safety norms slow down projects.
 - Dispute resolution and arbitration mechanisms are inadequate, leading to prolonged litigation.
- Skill & Capacity Deficits:** Local bodies lack trained personnel and modern project management tools.
 - Short-term training programs are being considered, but systemic reform is needed.
- Climate & Disaster Vulnerability:** CBRE-CII Report (2024) revealed that 50% of India's public infrastructure is unprepared for natural or man-made disasters. Key risks include:
 - Floods, heatwaves, and cyclones;
 - Industrial accidents and cyberattacks;
 - Public health crises;

Proposed Reform

- **Structural & Governance Reforms:** Treat urban infrastructure as core national infrastructure to unlock long-term capital.
 - ♦ Create unified, tech-enabled urban governance bodies for integrated planning.
 - ♦ Strengthen State Finance Commissions to empower municipal autonomy.
- **Financing Innovations:** Develop a municipal bond market and pooled finance mechanisms.
 - ♦ Decouple project preparation from financial assistance to ensure sustainability.
 - ♦ Leverage Digital Public Infrastructure (DPI) for efficient service delivery.
- **Spatial & Industrial Integration:** Synchronize urban expansion with industrial corridors to reduce inefficiencies.
 - ♦ Capture land value in transport projects, especially metro rail.
- **Sustainability & Climate Resilience:** Integrate climate adaptation into infrastructure planning.
 - ♦ Promote circular economy models in sanitation and waste management.

Source: IE

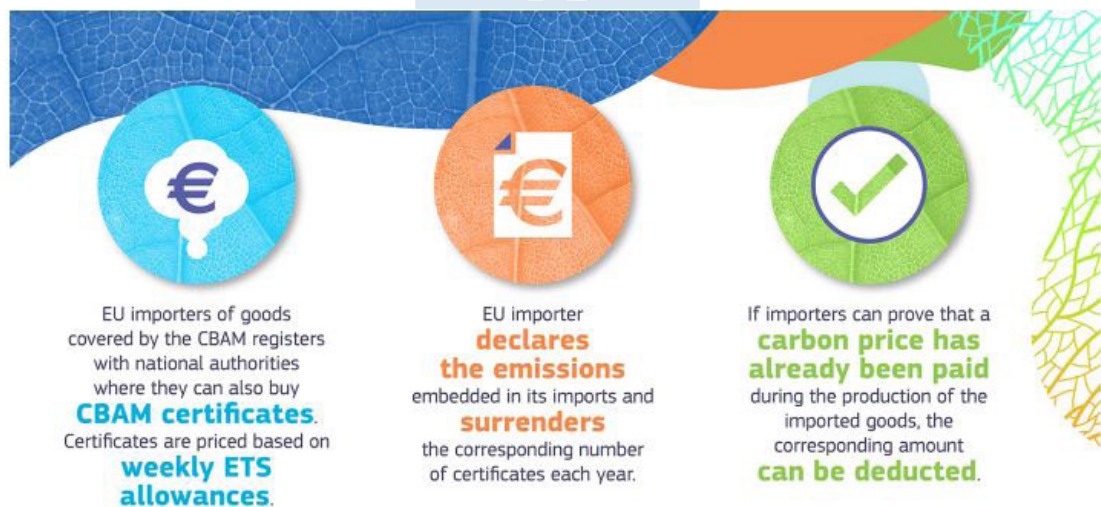
BRICS CONDEMNED EUROPEAN UNION'S CBAM

Context

- BRICS nations have “**condemned and rejected**” the **Carbon Border Adjustment Mechanisms (CBAM) of the European Union (EU)** and similar restrictive trade measures, saying they undermine their transition to a cleaner economy.

CBAM

- CBAM is an **import duty** imposed by the European Union (EU) on **goods produced by processes** that lead to **more carbon emissions than domestic European manufacturers** are allowed to emit.
- It is introduced to put a “**fair price**” on **carbon-intensive goods** imported from **non-EU countries**.
 - ♦ It is to **create a level playing field** with EU companies that account for their carbon emission through the **bloc’s Emission Trading System (ETS)**.
- **Application:** To be imposed from January 1, 2026, on six items: steel, aluminium, cement, fertilizer, hydrogen, and electricity.



Concerns of Developing Nations

- **Environmental Compliance:** Discussions on CBAM are happening under the Trade and Technology Council (TTC), with India and developing nations arguing that environmental issues shouldn't be tied to trade.
- **Impact on Exports:** The policy hurts the export competitiveness of developing countries such as China and India.
 - ♦ CBAM could affect 43% of India's exports to the EU, including metals, textiles, chemicals, electronics, and vehicles.
- **CBAM could impose a 20-35% tax on specific imports like steel and aluminium.**
- **India's metal sector is most vulnerable, with exports worth over \$8 billion at risk.**
- **Violation of International Agreements:** The Paris Agreement adopted in 2015 protects developing countries from the social and economic impacts of “response measures” against climate change.
 - ♦ Dubai climate meeting (COP28) in 2023 acknowledged that “measures taken to combat climate change, including unilateral ones, should not constitute a means of

arbitrary or unjustifiable discrimination or a disguised restriction on international trade”.

- **Benefits Developed World:** Industries in developed economies with emissions standards comparable to the EU's stand to benefit from a CBAM-like measure.
 - ♦ CBAM, therefore, can have the net effect of helping industries in the developed world, while putting those in developing countries at a disadvantage.

Way Ahead for India on CBAM

- **Strengthen Global Negotiations through Alliances:** India can actively collaborate with other developing countries, especially under platforms like the Trade and Technology Council (TTC), G77, and BASIC group, to push for a fair and equitable global carbon policy.
- **Build Domestic Carbon Competitiveness:** Invest in green technologies, cleaner industrial processes, and carbon accounting mechanisms to align with global emission norms.
- **Establish a Carbon Market Framework:** Developing a robust carbon market domestically, as India has already proposed, can help internalize carbon pricing and provide a benchmark that can be negotiated internationally.
- **Sectoral Support for Affected Industries:** Provide financial, technological, and policy support to vulnerable sectors such as steel, aluminium, and chemicals to help them reduce emissions intensity and comply with international standards.
- **Develop a Counter-Policy Framework:** India can consider formulating its own carbon border policy or tax incentives for green manufacturing, ensuring a level playing field domestically while signaling its readiness for fair environmental trade practices.

- **Leverage EU–India Trade Talks:** Use ongoing Free Trade Agreement (FTA) negotiations with the EU to seek exemptions, transitional arrangements, or mutual recognition mechanisms for Indian exporters under CBAM.

Source: IE

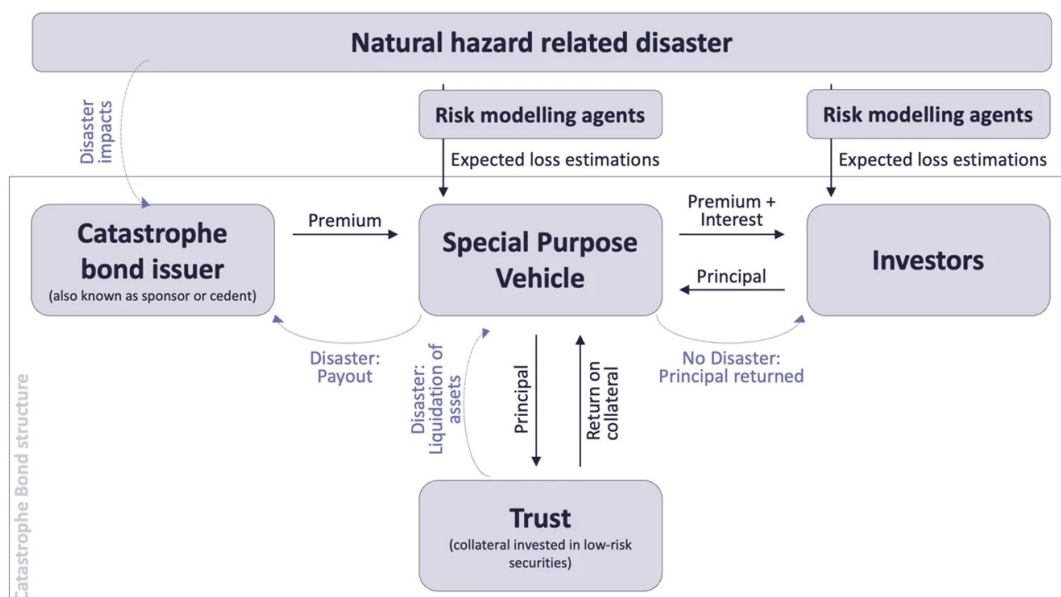
CATASTROPHE BONDS (CAT BONDS)

Context

- Recently experts have advocated for India to consider **catastrophe bonds (cat bonds)** as a financial instrument to manage disaster risk and post-disaster reconstruction costs.

What is a Cat Bond?

- Cat bonds are a unique **hybrid insurance-cum-debt financial product** that transforms insurance cover into a tradable security.
- These are **high-yield debt instruments**, issued by a **sponsoring entity** (like a government), through **intermediaries** such as the World Bank or ADB, and bought by investors.
 - ♦ If a specified disaster occurs, the investor may lose part or all of their principal, which is then used for relief and reconstruction.
 - ♦ If no disaster occurs during the bond period, investors earn attractive coupon payments.
- When a cat bond is created, a **Special Purpose Vehicle (SPV)** is also set up. This SPV is like a temporary company made just for handling that bond. It makes sure that:
 - ♦ The money is safe and not mixed with other government or company funds.
 - ♦ Investors are protected from fraud or misuse.



Advantages of Cat Bonds

- **Risk Diversification:** As noted by Nobel Laureate Harry Markowitz, adding cat bonds helps diversify investor portfolios since disaster risk is uncorrelated with traditional financial markets.
- **Faster Payouts:** Unlike conventional insurance claims which may take months to settle, cat bonds disburse funds quickly after a trigger event, enabling immediate disaster response.
- **Reduced Burden on Governments:** They provide pre-arranged financing, protecting government budgets from sudden shocks due to disaster recovery expenses.
- **Wider Capital Base:** These instruments tap into global financial markets, going beyond traditional reinsurance capacities.
- **Promotion of Mitigation Efforts:** Issuers with stronger disaster preparedness and mitigation policies can avail lower premiums, promoting risk-reducing behaviours.

Limitations of Cat Bond

- **Trigger Threshold Rigidity:** If the disaster is slightly below the predefined threshold (e.g., a 6.5M earthquake when the bond requires 6.6M), no payout is triggered, even if damages are severe.
- **Opportunity Cost:** If no disaster occurs, the premium paid may appear wasteful, especially in resource-scarce settings.
- **Design Complexity:** A poorly designed bond may exclude many probable risk scenarios, rendering it ineffective.
- **High Premiums for High-Risk Regions:** Hazard-prone regions may attract higher premiums, reducing cost-effectiveness unless supported by global intermediaries.

Potential for Cat Bonds in India

- **Disaster Exposure:** India is one of the most disaster-prone countries globally, facing regular cyclones, floods, landslides, and earthquakes.
- **Low Insurance Penetration:** Disaster risk insurance remains poorly developed, leaving most individual assets and livelihoods uninsured.
- **Government Funding:** India allocates 1.8 billion annually (since FY21–22) for disaster mitigation and capacity building, signalling readiness for proactive risk management.

Source: TH

STARLINK RECEIVES INDIA'S FINAL REGULATORY NOD FOR LAUNCH

Context

- India's space regulator **INSPACe** has granted a licence to **Elon Musk-run Starlink to offer space-based internet services in the country.**

About

- Starlink has been waiting **since 2022** for licences to operate commercially in India.
- It would be the **third company** to receive India's nod to enter the space after Eutelsat's OneWeb and Reliance Jio.
 - ♦ Starlink will now need to secure spectrum from the government, set up ground infrastructure, and also demonstrate through testing and trials that it meets the security rules it has signed up for.
- Starlink authorisation is to operate **Gen1 constellation for providing satellite broadband capacity over India till 2030.**

Regulation Landscape in India

- **Licensing Framework under Indian Telegraph Act, 1885:**
 - ♦ **Section 4:** Grants exclusive privilege to the Union government for establishing and operating telecommunication systems (including VSAT).
 - ♦ **Section 7:** Authorises the government to frame rules and conditions for such licences.
- **Regulatory Oversight by TRAI (TRAI Act, 1997): Section 11: Lists TRAI's functions:**
 - ♦ Recommending licence terms and conditions.
 - ♦ Advising on spectrum management.
 - ♦ Ensuring level playing field and fair competition.
 - ♦ TRAI significantly influences Starlink's operational framework through its regulatory recommendations.
- **Telecommunications Act, 2023:** Governs satellite spectrum allocation.
 - ♦ Allows administrative allocation of spectrum.
 - ♦ Imposes compliance on: Security obligations and Pricing norms.
- **Space Sector Regulation:** Satellite Communications Policy, 2000 regulates satellite use in India.
 - ♦ IN-SPACe (Indian National Space Promotion and Authorisation Centre) coordinates with private players like Starlink.

- ♦ Ensures non-conflict with ISRO assets.
- ♦ Aligns operations with national space priorities.
- **Data and Cybersecurity Laws:** Information Technology Act, 2000 governs cybersecurity and lawful interception.
 - ♦ Digital Personal Data Protection Act, 2023 regulates personal data handling, imposes data storage and encryption norms.
- **National security compliance:** Directives from the Ministry of Home Affairs and intelligence agencies must be followed.

Significance of privatization of space sector

- **Cost Reduction:** The profit-driven nature of private enterprises compels them to bring innovation and cut unnecessary costs.
 - ♦ For example: Companies like SpaceX have revolutionized space economics through reusable rockets (e.g., Falcon 9), slashing launch costs dramatically.
- **Lean Operational Models:** Private firms operate with smaller, highly specialized teams. Fewer layers of hierarchy lead to faster decision-making and lower overhead costs.
- **Employment & Self-reliance:** Privatization generates jobs, supports modern technology adoption, and helps make the space sector self-reliant.

Steps Taken by Government to Strengthen Space Sector

- **Space Sector Reforms (2020):** Government allowed private sector participation, defining roles of IN-SPACe, ISRO, and NSIL.
- **Space Vision 2047:** Aims for Bharatiya Antariksh Station (BAS) by 2035 and an Indian Moon landing by 2040.
 - ♦ Gaganyaan follow-on missions & BAS first module by 2028.
 - ♦ Next Generation Satellite Launch Vehicle (NGLV) by 2032.
 - ♦ Chandrayaan-4 by 2027, to collect moon samples and demonstrate return technology.
 - ♦ Venus Orbiter Mission (VOM) by 2028, to study Venus.
- **Indian Space Policy, 2023:** Ensures level playing field for Non-Government Entities (NGEs) in space activities.
- **Venture Capital Fund:** Rs. 1000 crore fund for space startups under IN-SPACe over the next 5 years.
- **SpaceTech Innovation Network (SpIN):** SpIN is a one-of-its-kind public-private collaboration for start-ups and SMEs in the space industry.

- **Under the amended FDI policy, 100% FDI is allowed** in the space sector.

Way Ahead

- **Early and Structured Engagement:** Starlink's experience highlights the importance of early dialogue between technology firms and regulatory bodies.
 - ♦ Proactive engagement can preempt legal ambiguities and build mutual understanding between innovators and the state.
- **National Security as a Pillar:** Compliance with encryption norms, data localisation, and surveillance directives reflects India's strong emphasis on digital sovereignty.
- **Broader Significance for India's Digital Future:** As India positions itself as a global digital leader, the regulatory treatment of technologies like Starlink serves as a litmus test of its commitment to:
 - ♦ Transparency and predictability in governance,
 - ♦ Innovation-friendly ecosystems, and
 - ♦ Digital inclusion across geographies, a step towards **bridging India's rural-urban digital divide**.

Source: TH

OPTICAL ATOMIC CLOCK

Context

- Researchers from six countries have conducted the **world's largest and most accurate comparison of optical atomic clocks** across three continents.
- It is a major step towards redefining the **SI unit of time — the second** — using optical clocks instead of current caesium-based atomic clocks.

What is the Current Definition of a Second?

- **Present Standard (since 1967):** One second equals the time taken for **9,192,631,770 cycles** of radiation produced by the **caesium-133** atom when it changes between two energy states.
 - ♦ Caesium was chosen for its high accuracy and consistency.
- **India's Timekeeping:** The National Physical Laboratory (NPL) in Delhi maintains India's time standard using five caesium clocks.
 - ♦ The clocks' output is disseminated to various applications around India via the INSAT satellites, telecommunication signals, and fibre links.

What are Optical Atomic Clocks?

- Like caesium clocks, Optical Atomic Clocks measure time based on an atom's internal

energy transitions, but **use optical (visible light) frequencies** instead of microwaves.

- **Common Atoms Used in Optical Clocks:** Strontium-87 (Sr), Ytterbium-171 (Yb) and Ytterbium ions (Yb), Indium-115 ions (In) and Charged Strontium-88 (Sr).

Why Replace Caesium with Optical Clocks?

- **Higher Frequency, Better Precision:** Optical clocks use higher-frequency visible light, enabling more oscillations per second and thus more precise time measurement than caesium clocks.
 - ♦ **Caesium** clocks use radiation at **9.19 billion Hz**,
 - ♦ **Strontium** clocks use **429 trillion Hz**,
 - ♦ **Ytterbium** clocks use **642 trillion Hz**.
- **Unmatched Stability:** Some optical clocks are so stable that they drift by just one second in **15 billion years**, making them **10,000 times more precise** than caesium clocks.
- **Atomic Transition Principle :** Like caesium clocks, optical clocks measure time by counting how atoms shift between fixed energy levels.
 - ♦ But instead of microwaves, they use lasers to stimulate and detect these shifts, resulting in much more stable and accurate frequency measurements.

Significance of the Development

- **Lays Foundation** for Redefining the Second, likely by **2030**.
- **Supports High-Precision** Applications like:
 - ♦ **Satellite navigation** (GPS, NavIC, Galileo)
 - ♦ **Radio astronomy** (e.g., black hole imaging)
 - ♦ **Climate science** (tracking gravity changes due to ice/water loss)

Source: TH

- He served as Finance Minister of Bengal (1941–42) in the Fazlul Haq ministry.
- **1944:** He founded an English daily, "**Nationalist**."
 - ♦ Presided over the Bilaspur session of the All-India Hindu Mahasabha.
 - ♦ Met M.A Jinnah to find out a solution of Hindu-Muslim problems.
 - ♦ He was a strong critic of the Muslim League and the partition of India.
- He joined the **cabinet of the interim government** as Minister for Industry and Supply after independence (1947–1950), but resigned over differences.
- **Founder of Bharatiya Jana Sangh:** In 1951, founded the Bharatiya Jana Sangh, the ideological predecessor of today's Bharatiya Janata Party (BJP).
 - ♦ Advocated for national unity, cultural nationalism, and economic self-reliance.
- **Legacy:** He is remembered as a staunch nationalist, educationist, and advocate of cultural unity.
 - ♦ The Syama Prasad Mookerjee Port in Kolkata and several institutions are named in his honor.

Source: PIB

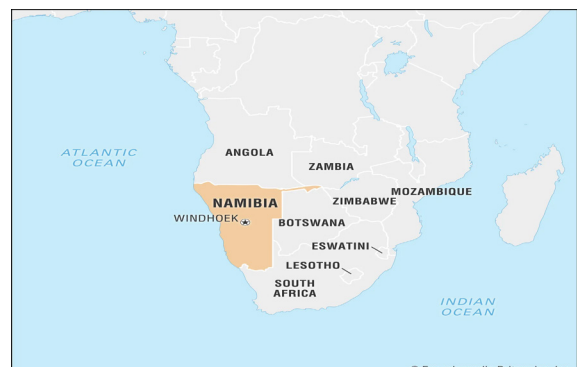
PM MODI CONFERRED WITH NAMIBIA'S HIGHEST CIVILIAN AWARD

Context

- The President of Namibia conferred on Prime Minister Modi the highest civilian award of Namibia - **Order of the Most Ancient Welwitschia Mirabilis**.
 - ♦ He is the **first Indian leader** to be given this award.

About

- Namibia is a country located on the **southwestern coast of Africa**.



NEWS IN SHORT

DR. SYAMA PRASAD MOOKERJEE

Context

- The Ministry of Culture announced a two-year official commemoration of the **125th birth anniversary of Dr. Syama Prasad Mookerjee**.

About

- Initially a member of the **Indian National Congress**; later joined the **Hindu Mahasabha in the 1930s**.
- He became the **youngest Vice-Chancellor** of Calcutta University at age **33 in 1934**.

- It is bordered by **Angola to the north**, Zambia to the northeast, Botswana to the east, South Africa to the southeast and south, and the Atlantic Ocean to the west.
- The country's name comes from the **Namib Desert**, which is considered to be the oldest desert in the world.
- **Major rivers:** Four large rivers flow along Namibia's borders: the Zambezi, Orange, Cunene and Okavango/Cubango.

Do You Know?

- Namibia has become the first African country to sign a licensing agreement to adopt **India's Unified Payments Interface (UPI)** system for real-time digital payments.

Source: TH

EKLAVYA MODEL RESIDENTIAL SCHOOLS (EMRS)

Context

- More than 600 students from government-run Eklavya Model Residential Schools (EMRS) cleared the IIT-JEE and NEET exams this year, according to an assessment by the Tribal Affairs Ministry.

About Eklavya Model Residential Schools (EMRS)

- The EMRS is a **Central Sector Scheme** implemented by the **Ministry of Tribal Affairs** to provide quality education to the tribal children.
- The government aims to establish one EMRS in every block having more than **50% ST population** and at least **20,000 tribal persons** (as per Census 2011).
- The target is to set up **728 EMRSs across the country by 2026**.
- To promote sports, **15 Centres of Excellence for Sports (CoE for Sports)** will be set up in EMRSs.
- The *National Education Society for Tribal Students (NESTS)*, an autonomous body, has been created to manage and implement the scheme.

Do you Know?

- EMRSs were first introduced in **1997-98** and revamped in **2018-19**.
- Up to **10% of seats** can be filled by non-ST students (but the total must not exceed 480).

Source: TH

MINISTRY OF MINES LAUNCHES 'ASPIRATIONAL DMF PROGRAMME'

In News

- The Union Ministry of Coal and Mines has released the operational guidelines for the '**Aspirational DMF Programme**', aiming to align

District Mineral Foundation (DMF) initiatives with the **Aspirational District Programme (ADP)** and **Aspirational Block Programme (ABP)**.

Key Highlights

- **Purpose:** The guidelines ensure that DMF funds—collected from mining companies for the benefit of mining-impacted communities—are used in sync with central flagship schemes and local development needs, especially in areas of health, nutrition, education, agriculture, and rural infrastructure.
- **Approach:** District Collectors and State Nodal Officers are urged to treat DMF as a mission for holistic development, ensuring 100% saturation and impactful, community-centered activities.
- **Recognition:** States such as Jharkhand, Maharashtra, Odisha, Gujarat, Himachal Pradesh, Rajasthan, and Goa were felicitated for adopting **revised PMKKKY 2024 guidelines** into DMF rules.

Aspirational DMF Programme

- The programme is built on the framework of the **Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY)** and aims to maximize the developmental impact of DMF funds in India's most underserved and mining-affected regions.
- **Priority Sectors** include Health and Nutrition, education, agriculture and water resources, basic Infrastructure & skill development.

District Mineral Foundation (DMF)

- DMFs are non-profit bodies established under Section 9(B) of the MMDR Act, 1957 (amended in 2015), with the mandate to work for the benefit of people and areas affected by mining operations, as prescribed by state governments.

Source: PIB

BULGARIA BECOMES 21ST MEMBER TO ADOPT EURO

Context

- Recently the EU finance ministers officially approved Bulgaria's adoption of the euro, set to take effect from **January 1, 2026**.
 - ♦ This makes Bulgaria the **21st member of the eurozone**.

About the Eurozone

- The Eurozone refers to EU member states that have adopted the **euro (€)** as their official currency and are subject to the monetary policy of the **European Central Bank (ECB)**.

- **The euro was launched** on **January 1, 1999** (electronic form) and **came into physical circulation in 12 countries** on January 1, 2002.
- **Bulgaria** had previously delayed euro adoption due to high inflation, which prevented it from meeting the **Maastricht convergence criteria**.

What are the Maastricht convergence criteria?

- **Price Stability:** A country's inflation rate must be close to that of the three best-performing member states in terms of price stability, with a maximum deviation of **1.5 percentage** points.
- **Sound Public Finances:**
 - ♦ **Government Deficit:** The annual government deficit (the difference between government spending and revenue) must not exceed **3% of GDP**.
 - ♦ **Government Debt:** The gross government debt (total debt accumulated by the government) must not exceed **60% of GDP**.
- **Exchange Rate Stability:** Countries must stay in the ERM-II (Exchange Rate Mechanism) for at least 2 years without severe tensions.
- **Interest Rate Convergence:** Should not exceed by more than 2 percentage points the average of top 3 performing member states.

Source: TH

EARTH INTELLIGENCE

In News

- The cumulative direct revenue from **Earth intelligence** for technology product and service providers is projected to reach **\$20 billion between 2025 and 2030**, according to Gartner.

What is Earth Intelligence?

- Earth intelligence refers to the **use of AI and advanced analytics on Earth observation data**—such as satellite images, drone footage, and IoT sensor data—to generate actionable insights for industries and governments.
- For Example this technology enables:
 - ♦ Identifying fallen trees blocking railroad tracks after storms
 - ♦ Monitoring temperatures of metal refineries to assess global production
 - ♦ Counting vehicles to analyze traffic patterns and consumer trends
- In India, **Earth intelligence** is already being used for mineral exploration, disaster management, and agricultural productivity, with initiatives like AI-driven mineral targeting and drone-based land surveys.

Source: TH

POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

Context

- Researchers studied the **indenyl cation, C₉H₇⁺** to study the **PHA molecules survival in Taurus Molecular Cloud 1 (TMC1)**.

What is PAH?

- Polycyclic aromatic hydrocarbons (PAHs) are **flat, ring-shaped molecules of carbon and hydrogen**.
- Astronomers think they make up **a fifth of all carbon in interstellar space**.
- There is a hypothesis that **meteors brought PAHs from space** to young earth and created the **first building blocks of life**, attaching important value to their ability to survive in space.
- **On Earth, PAHs** are also known to form during incomplete combustion of organic matter, like burning fossil fuels.

Taurus Molecular Cloud 1 (TMC1)

- **Taurus Molecular Cloud 1 (TMC1)** is a cold, dark cloud of gas, dust, and plasma in the Taurus constellation.
- It is located about **430 light-years from Earth**.
- In TMC1, **small PAHs** (with paired electrons or “closed-shell”) are found in large amounts, even though starlight should destroy them.
- This raised a major question: **How do these molecules survive in such harsh space conditions?**
- Scientists studied a **PAH fragment called C₉H₇⁺ (indenyl cation)**.
 - ♦ They found it has a **fast cooling method**, which helps it survive instead of breaking apart.

Why Is This Important?

- It explains how small PAHs (less than 50 carbon atoms) can survive and grow in space.
- These molecules might carry prebiotic carbon to planets — possibly helping to start life.
- Helps improve our understanding of astrochemistry and how life may have begun.

Source: TH

KERALA FISHERIES DEPARTMENT'S EXCELLENCE AWARD 2025

Context

- **Kasaragod district in Kerala** has been awarded the **Fisheries Department Excellence Award**

2025 by the Kerala Fisheries Department for outstanding implementation of fisheries schemes at the grassroots level.

About

- These awards are part of the **Annual State Farmer Awards**, instituted to acknowledge exceptional contributions to aquaculture in the state.

- **Individual Recognitions:**

- ♦ **Ravi P.P. from Padanna** secured second place in the Best Backwater Fish Seed Production Farmer category.
- ♦ **Sea Pearl Aquafarm, Kumbala**, won third place for Best Innovative Fish Farming.

Source: TH

