

# Monthly Current Affairs To The Point by Dhananjay Gautam April 2025

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**April** 

2025

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#### India-Thailand Strategic Partnership: Reinforcing 'Act East-Act West' Synergy

**Context:** India and Thailand, bound by **deep cultural, historical, and economic ties**, are now charting a bold new course towards enhanced strategic collaboration. Prime Minister Narendra Modi's recent visit underscores the evolving synergy between India's 'Act East Policy' and Thailand's 'Act West Policy'.

#### India-Thailand Latest News:

Prime Minister **Narendra Modi** arrived in Thailand on a **two-day visit** to attend the **6th BIMSTEC Summit**, signaling a renewed commitment to **strengthening bilateral ties**.



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#### Historical and Cultural Linkages:

India and Thailand share a **rich civilizational heritage**, reflected through:

- **Buddhism:** A key spiritual link as Buddhism, which originated in India, remains a major religion in Thailand.
- Maritime Trade Routes: Ancient trade routes enabled exchanges of culture, religion, and art.
- Ramayana Influence: Thailand's version of the Indian epic, Ramayana, known as Ramakien, is a cornerstone of Thai folklore.
- Cultural Artifacts: Indian influence is visible in Thai architecture, language (Sanskrit-Pali roots), traditional medicine, and performing arts.
- **Commemorative Gesture:** During PM Modi's **2025 visit**, Thailand released a commemorative postage stamp depicting the **Ramayana mural paintings**, highlighting the countries' shared heritage.

#### Political Relations between India and Thailand:

India and Thailand enjoy strong political ties supported by shared historical and cultural bonds.

- From 'Look East' to 'Act East': India's foreign policy evolution towards 'Act East Policy' under PM Modi emphasizes deeper engagement with Southeast Asia.
- Thailand's 'Act West Policy': A complementary effort to build stronger ties with South Asian nations.
- Multilateral Cooperation: Close collaboration within regional platforms like ASEAN, BIMSTEC, ADMM-Plus, and the East Asia Summit.

#### Strategic Partnership Announcement:

During his **April 2025 visit**, PM Modi and Thai PM **Paetongtarn Shinawatra** elevated bilateral ties to a **"Strategic Partnership"**, focusing on:

- Security Cooperation: Establishing a Strategic Dialogue between security agencies to bolster maritime and defense collaboration.
- **Regional Cooperation:** Enhancing ties through the **Indo-Pacific Vision**, emphasizing **free**, **open**, **inclusive**, **and rules-based engagement**.

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#### **Economic and Commercial Relations:**

India and Thailand are important economic partners within **Southeast Asia**, with trade and investment ties steadily expanding.

### Trade Statistics (FY 2023-24):

- Thailand: The 21st largest trading partner of India.
- Total Bilateral Trade: Approximately USD 14.94 Billion.

#### **Key Economic Initiatives:**

- India-Myanmar-Thailand Trilateral Highway: Improving connectivity and boosting trade.
- Mutual Investments: Pushing for collaboration in MSMEs and enhancing bilateral investments.
- **ASEAN and BIMSTEC Engagement:** Leveraging regional platforms for improved trade relations.

### The Indian Diaspora in Thailand:

The **Indian community in Thailand** is a significant contributor to economic and cultural ties between the two nations.

**Population:** Over **250,000** Indians reside in Thailand, including both **historical and recent migrants**. **Industries:** 

- Trade
- Jewellery Business
- Hospitality
- Various Service Sectors

#### **Cultural Influence:**

Prominent Indian-origin associations and Buddhist spiritual networks strengthen societal connections, enhancing people-to-people ties.

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#### News Summary: Upgrading to a Strategic Partnership

#### Indo-Pacific Vision and Regional Connectivity:

- PM Modi reaffirmed India's support for **ASEAN Centrality and Unity** with a focus on a **free**, **open**, **inclusive**, **and rules-based Indo-Pacific**.
- Emphasizing **developmental cooperation (Vikaasvaad)** over **expansionism (Vistaarvaad)**, aligning with India's **evolving geopolitical stance** in Asia.

#### **BIMSTEC's Role:**

- PM Modi reiterated India's commitment to the **Bay of Bengal Initiative for Multi-Sectoral Technical** and Economic Cooperation (BIMSTEC).
- Ahead of the **6th BIMSTEC Summit**, both nations emphasized the need for greater **regional connectivity and trade**.
- A key agenda item included the **signing of an Agreement on Maritime Cooperation**, reflecting **shared maritime interests**.

# **Cultural Diplomacy and Symbolic Gestures:**









#### Gift of the World Tipitaka:

In a gesture of **soft diplomacy**, Thailand gifted PM Modi the **World Tipitaka: Sajjhaya Phonetic Edition**, a special edition published in **2016** to commemorate the **70-year reign of King Bhumibol Adulyadej**. This symbolizes the **shared Buddhist heritage** and deep-rooted cultural connections between the two nations.

India-Italy: Strengthening Strategic Ties for a Future-Ready Partnership

Context: The Deputy Prime Minister of Italy, Antonio Tajani, visited India with the aim of boosting bilateral cooperation and expanding engagement across key sectors like trade, defence, clean energy, and technology.

#### **Deepening Bilateral Cooperation:**

#### The dialogue between the two nations emphasized:

- Strengthening ties under the India-Middle East-Europe **Economic Corridor (IMEEC)**
- Advancing the Joint Strategic Action Plan (JSAP) 2025–29
- Building on the momentum of the **2023 Strategic Partnership**

#### India-Italy Relations: An Overview

#### Historical Ties:

- Italy's ancient port cities were vital points in the spice trade route, linking India to the Mediterranean.
- Marco Polo's 13th-century journey to India stands as a testament to early cultural and commercial links.

#### **Diplomatic Milestones:**

- **Diplomatic relations established in 1947**, grounded in shared values and civilizational heritage.
- In **2023**, the relationship was elevated to a **Strategic Partnership**.
- The launch of the **Joint Strategic Action Plan (2025–29)** in 2024 aims to consolidate and expand collaboration.

#### **Economic and Trade Cooperation:**

- **Bilateral trade** reached **\$13.22 billion** in 2023–24.
- India exported goods worth **\$7.94 billion** to Italy.
- Italy is India's 4th largest trading partner in the EU and ranked 17th in FDI inflows from 2000 to 2023.

#### **Defence and Maritime Collaboration:**

- **INS Sumedha** and **ITS Morosini** conducted a **PASSEX exercise** near Sardinia in 2023.
- Italy's navy participated in **MILAN 2024**, India's premier multinational naval exercise.
- Defence collaboration is gaining momentum amid shared interests in maritime security and Indo-Pacific stability.

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#### Multilateral and Green Convergence:

- Italy is an active participant in:
  - International Solar Alliance (ISA)
  - Global Biofuel Alliance (GBA)
  - India-Middle East-Europe Economic Corridor (IMEEC)

These initiatives reflect a shared commitment to **climate action** and **sustainable development**.

# Cultural Diplomacy and People-to-People Ties:

- **Cultural exchange** thrives through food, fashion, yoga, and design.
- The **Executive Programme on Cultural Cooperation (2023–27)** promotes art, heritage, and educational ties.
- Around **200,000 Indians** live in Italy, fostering deeper social and economic links.
- The **Migration and Mobility Partnership Agreement (2023)** enables smoother migration for workers, professionals, and students.

### Challenges in the Bilateral Relationship:

**1. Trade and Regulatory Hurdles: Non-tariff barriers, regulatory bottlenecks**, and **logistical constraints** limit potential trade growth.

**2. The Italian Marines Case (2012):** A diplomatic flashpoint that temporarily strained defence cooperation and tested legal frameworks.

**3. Divergent Defence Policies: Italy's military exports to Pakistan** raise concerns for India, impacting strategic trust.

#### Way Forwar<mark>d: A Roa</mark>dmap for Enhanced Engagement

- **1. Effective Implementation of JSAP 2025–29**: Prioritize **trade, innovation, education, defence**, and **sustainability**.
- **2. Foster Innovation Ecosystems:** Set up **joint incubation centres** and **technology parks** in AI, space, green energy, and biotech.
- **3. Streamline Investment Norms:** Reform **FDI policies** and **regulatory frameworks** to encourage mutual investments.

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- 4. Sectoral Diversification:
  - Explore collaborations in:
    - Fashion and luxury goods
    - Pharmaceuticals and food processing
    - Green technology and tourism
    - Advanced manufacturing

# Scientific and Technological Synergy:

During the Italy–India Business, Science, and Technology Forum, both sides emphasized:

- Cooperation in **AI**, **supercomputing**, **space technology**, and **defence innovation**.
- Exploring synergy in **fashion**, **clean energy**, and **digital transformation**.

#### **Conclusion:**

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US-Iran Nuclear Talks 2025: Strategic Shifts, Challenges, and the Trump Factor

**Context:** The **resumption of nuclear negotiations** between the **United States and Iran**—this time in **Muscat, Oman**—has caught many observers by surprise. Despite deep-seated **mutual distrust** and heightened tensions, including recent **US strikes against Iran-aligned Houthis**, both parties chose diplomacy over escalation.

While the talks are **officially "indirect**", the very act of returning to the table marks a **strategic recalibration**, especially on Iran's side. This new chapter may indicate the beginning of a **more pragmatic phase** in a historically volatile relationship.



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### Iran's Strategic Realignment: A Nation Under Pressure

#### Generational Shift in Iranian Society:

With the **average age in Iran now around 32**, most citizens were **not alive during** the 1979 Islamic Revolution, the **Iran-Iraq War**, or the 1989 **succession of Ayatollah Khamenei**. This generational gap has created a **disconnect between rulers and the ruled**.

#### Younger Iranians are:

- Less ideologically driven
- Focused on economic opportunity, civil liberties, and global integration
- Driving protests and reform movements, often met with state suppression

This youth-led demand for **change** is exerting pressure on Iran's leadership to **rethink its long-held policies**.

#### **Economic Distress and Sanctions Fatigue:**

The Iranian economy remains crippled by:

- High inflation and unemployment
- Currency devaluation
- A need for **\$100+ billion in foreign investment** for sustainable growth

Even leaders previously skeptical of the West, like **Supreme Leader Khamenei**, are now reportedly **open to US investment**—a major policy shift. Reform-minded President **Masoud Pezeshkian** and seasoned diplomat **Abbas Araghchi** support re-engagement with the global economy.

#### **Internal Political Alignment:**

Remarkably, even **hardline conservatives** are not blocking talks, reflecting a rare **political consensus** around the need for diplomacy. Reformists are leveraging the economic crisis to promote a **revival of the nuclear deal**.

#### **Regional and Global Dynamics:**

• The once-feared **Axis of Resistance** (Iran's proxy network) has lost its cohesion. *Download Our Application* 









- Saudi Arabia and Gulf states, once opposed to the 2015 JCPOA, now favor regional cooperation and economic integration.
- **Russia**, preoccupied with Ukraine and wary of instability, is quietly pushing Iran toward **diplomatic** solutions.
- **China**, a key trade partner, has also urged Iran to **stabilize regional relations** for economic reasons.

# **Trump's Role: From Maximum Pressure to Strategic Leverage**

# A Tumultuous History of US-Iran Negotiations:

Iran's nuclear diplomacy began with the E3 (UK, France, Germany) in 2003, eventually including the US in 2013. Talks have often been influenced by military threats and shifting American administrations.

# Fallout from Trump's 2018 Withdrawal

In 2018, **President Trump unilaterally exited** the Joint Comprehensive Plan of Action (JCPOA) and reimposed crippling sanctions. This hardened Iran's position, leading to:

- Uranium enrichment reaching 60%, edging closer to weapons-grade
- Khamenei's "no war, no talks" doctrine ٠
- Deep skepticism about future US commitments •

# The Soleimani Assassination: A Turning Point

The **US drone strike on Qassem Soleimani** in January 2020 shocked Iran's leadership, reinforcing the perception that the **Trump** administration favored force over diplomacy. Trust eroded significantly.

# **Biden's Cautious Engagement**

Under **President Biden**, indirect negotiations resumed (Vienna, 2021–22). However, Iran remained noncommittal, wary of another **policy reversal** if Trump returned to power—a concern that now feels prescient in 2025.

# **Prospects for a New Deal: Opportunities and Obstacles:**

# Where Interests Align:

Despite tensions, both parties have **overlapping objectives**:

- Washington wants to prevent nuclear weaponization.
- Tehran seeks sanctions relief and economic recovery.

Iran continues to emphasize that its nuclear program is peaceful, citing Khamenei's religious fatwa against nuclear arms.

# **Key Challenges and Red Lines:**

The potential **stumbling blocks** include:

- US demands for limits on **ballistic missile programs**
- Iran's support for **regional proxy groups** (e.g., Hezbollah, Houthis)
- Israeli opposition to any form of compromise—Tel Aviv has even hinted at military options

# **Trump's Maximalist Strategy Returns:**

Trump is known for starting negotiations with **extreme demands**, only to walk them back for strategic gains. This "art of the deal" approach could inject volatility, yet also open paths to compromise.

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There's speculation that the US may not **enforce a rigid stance**, allowing room for **flexible agreements**possibly involving **tiered sanctions relief** in exchange for **verifiable enrichment limits**.

# Iran's Strategic Flexibility:

#### Iran could:

- Reduce support to less controllable proxies like the Houthis, who act independently
- Seek economic cooperation with Gulf states, diluting Israeli resistance
- Use regional goodwill to counterbalance any Western skepticism

### Role of the Region and the Need for Isolation:

To succeed, negotiations must be **insulated from regional crises** in:

- Gaza
- Syria
- Lebanon

Any escalation in these arenas could **derail talks** and return the US-Iran dynamic to a **conflict trajectory**.

### Conclusion: Cautious Optimism Amid Uncertainty

A **renewed US-Iran nuclear deal is within reach**, but it remains **fragile and conditional**. The evolving **generational, economic, and geopolitical landscape** has pushed Iran to the table. Trump's return—and his unpredictability—adds both **opportunity and risk**.

To navigate this complex moment, both sides must:

- Exercise diplomatic creativity
- Resist external provocations
- Focus on shared strategic interests

The stakes are high—not just for Washington and Tehran, but for the entire Middle East and global non-proliferation regime.

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#### India-Saudi Arabia Bilateral Relations

**Context:** During **Prime Minister Narendra Modi's April 2025 visit** to **Jeddah**, India and Saudi Arabia **signed six major MoUs**, deepening cooperation in energy, investment, digital infrastructure, and culture.

#### Introduction:

India and Saudi Arabia enjoy a **multifaceted partnership**, grounded in centuries of historical ties, vibrant economic relations, and growing strategic cooperation. Amidst global shifts, **PM Modi's 2025 visit** has



reaffirmed their **mutual commitment** to elevating the relationship to new heights.

# **Historical Background:**

- Ties date back centuries, based on trade and people-to-people interactions.
- Diplomatic relations formally established in **1947**.
- Key milestones:
  - King Abdullah's visit (2006)







- PM Modi's visits (2016, 2019, and 2025)
- The 2019 visit led to the formation of a Strategic Partnership Council.

# **Political Relations:**

- Upgraded to Strategic Partnership status.
- Collaborate in multilateral forums: G20, UN, OIC.
- Support for a **multipolar world order** and regional peace initiatives.

# **Economic and Trade Relations:**

- India: 2nd largest trading partner of Saudi Arabia.
- Saudi Arabia: 5th largest partner of India.
- Trade volume (FY 2023–24): USD 42.98 billion
  - Indian exports: USD 11.56 billion
  - Imports (mostly oil): USD 31.42 billion
- India imports ~18% of its crude oil from Saudi Arabia.
- Key Indian exports: rice, machinery, textiles, chemicals, IT services.

# Defence and Security Cooperation:

- Growing ties through:
  - o **Joint naval drills** (Al-Mohed Al-Hindi)
  - **Counter**-terrorism cooperation
  - Intelligence sharing
- Common interests in West Asian peace and Indian Ocean security

#### Indian Diaspo<mark>ra in Sau</mark>di Arabia:

- **Over 2.4 million Indians** reside in Saudi Arabia the largest expatriate group.
- Vital contributors to sectors like healthcare, construction, and services.
- Hajj ties: Over 1.75 lakh pilgrims annually.

# Cultural and Tourism Linkages:

- Boost from Saudi Vision 2030: encouraging cultural openness and tourism.
- Active film, education, and tourism exchanges.
- Emphasis on **people-to-people** and **youth-oriented collaborations**.

# Key Outcomes of PM Modi's April 2025 Visit:

1. Six MoUs Signed:

- Energy: Joint ventures in oil, gas, green hydrogen, and renewables.
- **Digital Infrastructure**: Build **Digital Public Infrastructure (DPI)** and promote **tech innovation**.
- Investment: Saudi Sovereign Wealth Fund to invest in India's logistics, infrastructure, and energy corridors.
- **Pharmaceuticals**: Better market access for Indian drugs in Saudi Arabia.

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- Fintech & Banking: Simplified banking for NRIs and collaborative fintech ecosystems.
- Culture & Tourism: New frameworks under Vision 2030 in film, education, and heritage tourism.

# 2. Strategic Talks on Hajj & Labour Welfare:

- Raised demand for higher Hajj quota.
- **MoUs for labour protection**, dispute redressal, and improved working conditions for Indian workers. ٠
- 3. Expansion of Strategic Partnership Council:
  - New working groups formed on:
    - **Defence technology** 0
    - Space exploration 0
    - Semiconductor manufacturing 0

# **Conclusion:**

India-Saudi Arabia ties are evolving into a strategic, economic, and cultural powerhouse partnership. PM Modi's 2025 visit is a key step forward, building bridges of cooperation that support the shared vision of peace, prosperity, and progress in a multipolar world.

# **Tightening Student Visa Norms: A Growing Concern for Indian Aspirants**



Key Concerns About Indian Student Visas:

1. Steep Drop in Visa Issuance: In February 2025, the US issued only 411 F-1 student visas to Indian nationals—

down 30% from 590 the previous year. This is notably higher than the global average drop of 4.75%, and greater than declines observed for countries like:

- **China** 5.2%
- **Japan** 9.6%
- **Vietnam** 7.4%

Indian students also face longer wait times, averaging 58 days in Delhi, compared to just 2–15 days in East Asian capitals.

- 2. Increase in Visa Revocations: According to the American Immigration Lawyers Association (AILA), 50% of all student visa revocations in early 2025 involved Indian nationals. These were largely triggered by the US State Department's AI-powered "Catch and Revoke" program, which uses social media and law enforcement databases—raising serious concerns over fairness and transparency.
- 3. Legal and Financial Burdens: Students affected by revocations must navigate complex legal pathways to regain their SEVIS status.

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This process often involves:

- Expensive legal fees
- Loss of scholarships or jobs
- Missed academic semesters
- **4. Regional Profiling in Australia:** Australia has reportedly increased **visa scrutiny** for students from five Indian states: **Punjab, Haryana, Gujarat, Uttar Pradesh, and Bihar**—sparking concerns over **profiling** and **discriminatory practices**.

#### **Broader Implications for India:**

- 1. Weakening Soft Power: India, being one of the largest exporters of international students, is seeing a decline in its global academic influence, particularly in crucial domains like AI, biotechnology, and climate science.
- 2. Threat to Demographic Dividend: With 65% of India's population under 35, access to global education is key for skill development. Restrictive visa regimes threaten to stifle productivity, innovation, and youth potential.
- **3.** Risk to Remittances: In **2024**, India received a record **\$129.1 billion** in **remittances**—a figure partially driven by students abroad. Visa curbs could reduce **student migration**, thereby impacting this **economic lifeline**.
- **4. SEVIS Status Removals**: Unlike visa revocations, **SEVIS removals** lead to **immediate consequences**:
  - Loss of work authorization
  - Impact on dependent family members
  - Legal uncertainties that especially affect middle-class students relying on loans or savings
- 5. Shift in Talent Flow: Indian students are now exploring alternate destinations like the Nordic countries and South Korea. This shift alters traditional diaspora-building patterns, particularly in STEM fields and strategic industries.
- 6. Pressure on Indian Higher Education: As overseas options shrink, there's an expected surge in demand for Indian institutions. This will put pressure on Tier-I institutes (IITs, IIMs, AIIMS) and drive urgency for reforms under NEP 2020 to expand quality education capacity.

#### What Can Be Done?

- Leverage Diplomatic Channels: India should invoke the Vienna Convention on Consular Relations (1963) more actively to protect students' rights abroad.
- 2. Reform the Emigration Act, 1983: Bring student visa consultancies under legal purview to enforce registration, accountability, and penalties for fraudulent practices.
- **3. Establish an Emergency Support Fund:** Create an **Overseas Education Protection Fund (OEPF)** under the **Ministry of External Affairs** to aid students facing:
  - Visa revocations
  - Tuition loss
  - Forced deportation

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- 4. Strengthen Domestic Education Ecosystem:
  - Promote foreign universities to set up campuses in India (e.g., GIFT City)
  - Support joint-degree programs, MERUs, and international faculty exchange under NEP 2020
- **5.** Launch a Digital Student Registry: Introduce a voluntary digital database for Indian students abroad to enable:
  - Real-time visa status tracking
  - Proactive embassy intervention
  - AI-based risk alerts, mirroring the US model
- 6. Regulate Education Consultants: Strictly audit and license consultancies to prevent misinformation. Launch government-backed awareness campaigns listing verified consultants to protect students from scams.

# Suspension of the Indus Waters Treaty: Implications for India and Pakistan

**Context:** In response to a recent terror attack in **Pahalgam**, the **Cabinet Committee on Security (CCS)**, chaired by the Prime Minister of India, has decided to **hold the Indus Waters Treaty (IWT) 'in abeyance'** with immediate effect.

#### About the Ca<mark>binet Co</mark>mmittee on Security (CCS):

- Highest decision-making body for national security in India.
- Chaired by the Prime Minister, with key ministers
   (Defence, Home, Finance, External Affairs) as members.
- Coordinates defence policy, internal security, foreign affairs, and high-level intelligence operations.
- The National Security Advisor (NSA) plays a pivotal role in policy coordination.

#### **Understanding the Indus Waters Treaty (1960):**

- Signed between India and Pakistan, brokered by the World Bank.
- India gets rights over Eastern Rivers: Beas, Ravi, Sutlej.
- Pakistan controls Western Rivers: Indus, Chenab, Jhelum.
- India can use western rivers **non-consumptively** (e.g., for hydropower), but cannot obstruct or alter flows.
- Considered one of the **most successful transboundary water treaties** globally.

# Implications of Treaty Suspension for Pakistan:

#### 1. Water Insecurity:

- Heavily reliant on the Indus River system for **agriculture**, **drinking water**, **and hydropower**.
- India's upstream position could be leveraged to **manipulate or delay water flows**, especially in dry seasons.

#### 2. Agricultural Disruption:













Punjab and Sindh, Pakistan's agricultural hubs, may face crop failures, threatening food security and rural livelihoods.

#### 3. Energy Crisis:

**Hydropower dependency** on the Indus Basin means disruptions could **reduce electricity** generation, aggravating power shortages.

#### 4. Diplomatic and Geopolitical Fallout:

- Likely to trigger escalated tensions with India, diplomatic confrontation at international forums (e.g., UN, ICJ, World Bank).
- Pakistan may frame the move as a **breach of international law**, seeking global support and condemnation of India.

#### 5. Internal Instability

- Water shortages could spark **domestic unrest**, **political friction**, and **inter-provincial disputes**, especially between Punjab and Sindh.
- May increase **reliance on China** for strategic and water-related support.

#### **Implications for India:**

#### 1. Strategic Leverage:

- Acts as a **geopolitical signal** to counter terrorism.
- Provides India a **bargaining chip** to pressure **Pakistan** diplomatically and strategically.

#### 2. Legal and Diplomatic Constraints:

- The IWT has **no unilateral exit clause**; withdrawal must be mutual or justified under international law.
- India risks being viewed as a violator of treaty norms, affecting global perception and bilateral relations.

#### 3. Infrastructure and Environmental Concerns:

- Full use of Western Rivers requires **massive infrastructure investment** (dams, barrages, storage).
- Could raise **environmental issues** related to ecosystems, aquatic biodiversity, and local communities.

#### 4. Regional Instability:

- Heightened tensions may trigger **military skirmishes** or border escalations.
- Unstable conditions in Pakistan may lead to **spillover effects** including refugee inflow and militant infiltration.

#### Legal Dimensions: Can India Suspend the IWT?

- No exit clause in the treaty.
- Article IX and Annexures F & G lay out step-by-step dispute resolution:

#### $\rightarrow$ Permanent Indus Commission $\rightarrow$ Neutral Expert $\rightarrow$ Arbitration.

- Under Article 62 of the Vienna Convention, a "fundamental change of circumstances" can be invoked for withdrawal, but it remains contentious and subjective.
- The **World Bank and UN** may intervene to ensure treaty continuity due to its global significance.

#### **Did You Know?**



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- 25% of Pakistan's GDP depends on the Indus River system.
- 80% of cultivated land and 237 million people depend on its waters.
- Major urban centers like Karachi, Lahore, Multan source water from this basin.

#### **Conclusion:**

The **suspension of the Indus Waters Treaty** is a **high-stakes move** that could reshape South Asia's **diplomatic, environmental, and security landscape**. While it provides India with **strategic leverage**, it risks **international backlash**, and may deepen instability in Pakistan. Both nations, and the international community, must tread carefully to avoid **water becoming a trigger for conflict** in an already tense region.

#### Pakistan Suspends Simla Agreement After India's Response to Terror Attack

**Context:** In a **dramatic diplomatic shift**, **Pakistan has announced the suspension of the 1972 Simla Agreement**, following India's strong response to the recent **terror attack in Pahalgam**, Jammu and Kashmir. This move has sparked serious concerns over **regional peace**, especially around the **Line of Control (LoC)**.



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#### What is the Sim<mark>la Agreement?</mark>

The **Simla Agreement** was a **landmark bilateral treaty** 

signed on **2nd July 1972** in **Shimla**, between **Indian Prime Minister Indira Gandhi** and **Pakistani President Zulfikar Ali Bhutto**. It was framed after the **1971 India-Pakistan War**, which led to the **creation of Bangladesh**.

Key Provisions:

- **Respect for Sovereignty**: Both countries agreed not to interfere in each other's **internal affairs**.
- **Bilateral Dispute Resolution**: All disputes, including **Kashmir**, were to be resolved **bilaterally**, without third-party involvement.
- **Redrawing the Ceasefire Line**: The old ceasefire line was converted into the **Line of Control (LoC)**.
- **Normalization of Ties**: Restoration of **trade**, **travel**, and **diplomatic channels** was encouraged.
- **Release of POWs**: India released **over 93,000 Pakistani prisoners of war**, one of the largest releases post-conflict.

**Note**: While the agreement laid the foundation for peaceful bilateralism, it lacked enforcement mechanisms and left **the Kashmir issue unresolved**, turning the **LoC into a de facto border**.

#### What Does the Suspension Mean?

# From Bilateralism to Internationalization:

• Pakistan may now attempt to **internationalize the Kashmir issue**, inviting **UN**, **China**, or the **OIC** to mediate—**violating the Simla framework**.

# **Risks of Proxy Warfare:**

• Past Pakistani actions, including the **1984 Siachen conflict** and the **1999 Kargil War**, were in breach of the agreement. Its suspension could **embolden proxy warfare** tactics once more.

# Increased Military and Diplomatic Tensions:











Though symbolic in the short term, this move could escalate military posturing and derail India's ongoing developmental efforts in Jammu & Kashmir, especially post Article 370 abrogation.

#### **Impact on Regional Cooperation:**

Disruption of bilateral ties may also affect **SAARC** and other regional platforms, weakening collective action on terrorism and economic development.

### How Should India Respond? Enhancing LoC Security

#### 1. Deploy Anti-Drone Defense Systems:

- Install AI-based drone detection and radar systems
- Collaborate with Israel's "Drone Dome" for high-precision responses •
- 2. Strengthen Satellite & UAV Surveillance:
  - Use Heron TP drones and real-time satellite imagery •
  - Employ **AI analytics** to detect infiltration and tunnel construction

### 3. Fortify Counter-Infiltration Grids:

- Improve coordination between Army, BSF, police, and intelligence •
- Continuously update **Standard Operating Procedures (SOPs)** based on seasonal patterns

### 4. Revive Village Defence Committees (VDCs):

- Especially in areas like Anantnag
- Provide **training**, weapons, and integrate locals into early warning networks

# 5. Modernize Border Fencing:

- Implement smart fencing with laser walls, infrared sensors, and seismic detectors •
- Prioritize vulnerable sectors such as Gurez, Uri, and Poonch

# **Conclusion: A Time for Strategic Recalibration**

The suspension of the Simla Agreement is not just a diplomatic setback but an opportunity for India to recalibrate its security strategy. By:

- Strengthening border defenses
- Exposing Pakistan's role in terror networks, and
- Advocating for its re-listing in the FATF grey list

India can turn this challenge into a **strategic advantage** on both the **security and diplomatic fronts**.

# The Bandung Conference: A Turning Point in Global Politics

**Context:** In **1955**, the Indonesian city of **Bandung** hosted a landmark event that reshaped the geopolitical landscape—the **Bandung Conference**. Held **70 years ago**, this historic gathering brought together 29 newly independent nations from Asia and Africa, united by their shared history of colonialism and a vision for a sovereign future.



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The conference marked the **first large-scale Afro-Asian summit**, setting the stage for what would later become a powerful voice in international affairs—the **Global South**. In a Cold War era dominated by two superpowers, the conference boldly asserted that emerging nations would not be mere pawns in a bipolar world order.

# The Purpose: Decolonization and Collective Voice

The **primary objective** of the Bandung Conference was to **strengthen economic and cultural cooperation** among developing nations while **rejecting all forms of colonialism, imperialism, and neocolonialism**. The participating countries recognized the need for a **unified front** to address global inequalities and forge an **independent path of development**.

# The Ten Principles of Bandung (Dasasila Bandung):

The spirit of Bandung was enshrined in **Ten Foundational Principles**, which laid the moral and diplomatic groundwork for future cooperation:

- 1. Respect for human rights and adherence to the UN Charter
- 2. Sovereignty and territorial integrity of all nations
- 3. Equality among all races and nations, large or small
- 4. Non-intervention in the internal affairs of states
- 5. **Right to self-defense**, in line with the UN Charter
- 6. No military alliances serving big power interests
- 7. Avoidance of force or aggression in international relations
- 8. Peaceful dispute resolution through dialogue and negotiation
- 9. Mutual interests and cooperation among nations
- 10. Commitment to justice and international obligations

These principles remain **timeless ideals** for international diplomacy and are echoed in today's multilateral forums.

# The Birth of the Non-Aligned Movement (NAM):

The Bandung spirit gave rise to the **Non-Aligned Movement (NAM)**, formally established in **1961 in Belgrade**, Yugoslavia. The movement was led by **five visionary leaders**:

- Jawaharlal Nehru (India)
- Gamal Abdel Nasser (Egypt)
- Kwame Nkrumah (Ghana)
- Sukarno (Indonesia)
- Josip Broz Tito (Yugoslavia)

NAM emerged as a platform for countries to **remain independent** of both Western and Soviet blocs during the Cold War, advocating for **sovereignty, peace, and development** without external interference.

NAM is the **second-largest international organization after the United Nations**, currently comprising **120 member states**, representing over **55% of the world's population**.

# Current Relevance: Bandung's Legacy in a Multipolar World

Today, as the world experiences **shifting power dynamics** and rising tensions among global powers, the Bandung message is more relevant than ever. Calls for a **just, inclusive, and multipolar world order** echo

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the original aspirations of the 1955 conference. Issues such as **economic inequality**, **digital colonialism**, and **climate justice** are modern challenges that resonate deeply with Bandung's core ideals.

#### **Conclusion: A Symbol of Unity and Resistance**

The **Bandung Conference** remains a **powerful symbol of dignity, unity, and independence** for the Global South. It signaled the rise of a new global consciousness—one grounded in **mutual respect**, **peaceful coexistence**, and **collaborative progress**.

As we mark the **70th anniversary** of this transformative event, it is a moment to **reinvigorate the Bandung Spirit** and work collectively toward a **fairer, more equitable global future**.

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#### Commemorating the 50th Anniversary of the Biological Weapons Convention (BWC)

**Context:** The **Biological Weapons Convention (BWC)**, marking its **50th anniversary** in 2025, stands as the **first multilateral treaty** to fully ban a class of **Weapons of Mass Destruction (WMDs)**. The treaty was **opened for signature in April 1972** and officially entered into force on **March 26, 1975**.

Understanding the Biological Weapons Convention (BWC)

**Full Name and Purpose** : Formally titled, **"The Convention on the Prohibition of the Development, Production, and** 



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**Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction,**" the BWC is a critical component in the global effort to prevent the use of biological and toxin weapons.

#### **Definition of Biological and Toxin Weapons:**

Biological and toxin weapons are either **microorganisms** such as **viruses**, **bacteria**, or **fungi**, or **toxic substances** naturally produced by living organisms. These weapons are **deliberately engineered and released** to cause **disease and death** in **humans**, **animals**, or **plants**.

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#### **Examples of Biological Weapons**

- Anthra<mark>x</mark>
- Botulinum toxin
- Plague

#### **Potential Consequences:**

The use of biological weapons can lead to catastrophic outcomes, including:

- Food shortages
- Environmental devastation
- Severe economic losses
- Widespread illness
- Public fear and distrust

#### The Genesis of the BWC:

The **BWC** was negotiated during a series of discussions held at the **Conference of the Committee on Disarmament** in **Geneva, Switzerland**. This multilateral effort was driven by the shared global understanding that biological weapons posed a unique and terrifying threat to human, animal, and plant life, as well as to global security and stability.

#### **Key Provisions of the BWC:**

The Biological Weapons Convention imposes stringent prohibitions on:

1. Development of biological and toxin weapons.

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- 2. Production and stockpiling of such weapons.
- 3. Acquisition and transfer of biological weapons.
- 4. **Use** of biological and toxin weapons in warfare.

The **BWC** supplements the **1925 Geneva Protocol**, which only prohibited the **use** of biological weapons, extending the ban to **development** and **stockpiling** as well.

#### **Global Membership and Reach:**

- **188 States Parties** have ratified the BWC, reflecting its broad **international support**.
- There are **four Signatory States**: **Egypt**, **Haiti**, **Somalia**, and **Syria**.
- **India** is a member of the **BWC**, contributing to the global commitment to peace and security by refraining from the use of biological weapons.

### Impact of the BWC: A Global Achievement in Disarmament:

#### Universal Commitment to Peace:

The BWC has played a pivotal role in **eliminating** the threat of biological weapons from state actors and has been a cornerstone in the **global disarmament framework**. The treaty's near-universal membership demonstrates the **global commitment** to preventing the catastrophic consequences of biological warfare.

**Challenges and the Need for Strengthening Enforcement**: While the BWC has been instrumental in curbing the proliferation of biological weapons, **verification** and **enforcement** mechanisms remain challenges. Ongoing discussions continue to explore ways to strengthen the **treaty's effectiveness** in addressing emerging threats and ensuring full compliance by all states.

# Looking Ahe<mark>ad: The</mark> Future of the BWC:

As the world commemorates the **50th anniversary** of the **BWC**, it is an opportune moment to reflect on its achievements and the work still required to combat evolving threats in the **biological warfare domain**. The **advancement of science and technology**, alongside geopolitical challenges, underscores the need for continued global cooperation and vigilance to maintain the security and safety of all nations from the dangers of **biological weapons**.

# Maharashtra Establishes Dedicated Cell for Mercy Petitions

**Context:** The **Maharashtra government** has established a **dedicated cell** under the **Additional Secretary (Home)** to handle **mercy petitions** filed by **death row convicts**. This move follows the **Supreme Court's directive** to all states to set up such cells to **prevent delays** in the execution of death penalties, which the court noted can have a **"dehumanising effect"** on convicts.



#### **Understanding Mercy Petitions:**

#### What is a Mercy Petition?

A **mercy petition** is a **formal plea for clemency** filed by a convict (typically those on **death row** or serving long sentences) seeking relief in the form of:

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- Pardon,
- Commutation,
- Remission,
- Respite, or
- Reprieve.

These petitions are directed to the **President of India** or the **Governor of a State** as a **last resort**, once all judicial remedies have been exhausted.

No fixed time limit is prescribed for the President's decision on a mercy petition.

### **Constitutional & Legal Provisions:**

#### **Relevant Articles:**

- Article 72 (President): Grants power to grant pardons, reprieves, respites, remissions, and commutations of sentences for:
  - Offenses against Union laws. 0
  - Cases involving court-martial. 0
  - Death sentences.
- Article 161 (Governor): Empowers the Governor to grant clemency for offenses against State laws, excluding court-martial cases.

#### Key Judgment:

Maru Ram vs. Union of India (1981): The Supreme Court established that the President must act based on the advice of the Council of Ministers in mercy petitions.

#### Philosophy Behind Mercy Petitions:

- 1. Right to Life (Article 21): Mercy petitions safeguard the fundamental right to life and personal liberty by allowing for compassionate reconsideration.
- 2. Rectification of Judicial Errors: They provide an opportunity to correct judicial oversights or errors, ensuring fairness in justice.
- 3. Adherence to International Norms: Aligns India with global conventions promoting human rights and dignity (e.g., Universal Declaration of Human Rights).

#### **Types of Pardoning Powers in India:**

Туре	What Changes?	Example
Pardon	Completely cancels conviction & sentence.	Treated as not guilty.
Commutation	Changes the sentence to a lesser one.	Death $\rightarrow$ Life imprisonment.
Remission	Reduces sentence duration.	10 years $\rightarrow$ 6 years.
Respite	Grants lesser punishment for valid reasons.	Pregnant woman given lighter sentence.
Reprieve	Temporarily delays execution.	Time granted to file a petition.

# **Comparison of Pardoning Powers: President vs. Governor:**

Aspect	President (Article 72)	Governor (Article 161)
Authority	President of India	Governor of a State

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Jurisdiction	Union laws, court-martial cases, death penalties.	Offenses under State laws.
Military Law	Can pardon or reduce sentences for court- martial.	No power over court-martial cases.
Death Sentence	Can grant pardon and commute death sentences.	Can only <b>commute</b> , not <b>pardon</b> .
Binding Advice	Acts on advice of the <b>Central Council of</b> <b>Ministers</b> .	Acts on advice of the <b>State Council of</b> <b>Ministers</b> .

#### **Conclusion:**

The creation of a **dedicated cell for mercy petitions** in Maharashtra reflects a significant step towards ensuring **fairness and humanity** in the justice system. Mercy petitions are essential to maintaining a **balance between justice and compassion**, ensuring that the system remains **aligned with constitutional values and international human rights standards**.

Lok Sabha Approves the UMEED Bill, 2025: A Milestone in Waqf Property Management

**Context:** The **Lok Sabha** has passed the **Waqf (Amendment) Bill, 2025**, now renamed as the **Unified Waqf Management, Empowerment, Efficiency, and Development (UMEED) Bill**. Alongside this, the **Mussalman Wakf (Repeal) Bill, 2024** has also been approved, leading to the repeal of the outdated **Mussalman Wakf Act, 1923**.



Background and Objective:

In 2024, two significant bills were introduced:

- 1. Waqf (Amendment) Bill, 2024
- 2. Mussalman Wakf (Repeal) Bill, 2024

The primary objective of the **Waqf (Amendment) Bill, 2025** is to **amend the Waqf Act, 1995**, addressing challenges related to **Waqf property management** while improving the **administration and efficiency** of Waqf boards.

The **Mussalman Wakf (Repeal) Bill, 2024** aims to repeal the outdated **Mussalman Wakf Act, 1923**, thereby enhancing **uniformity, transparency, and accountability** in Waqf property management under the **Waqf Act, 1995**.

#### **Understanding Waqf:**

• Waqf refers to properties dedicated exclusively for religious or charitable purposes as per Islamic law. Once designated as Waqf, the property becomes irrevocable and cannot be sold or used for other purposes. The person who dedicates the property is known as the wakif, and the property is managed by a mutawalli.

#### **Historical Context:**

The concept of Waqf in India dates back to the **Delhi Sultanate** when **Sultan Muizuddin Sam Ghaor** dedicated villages to the **Jama Masjid of Multan**. Over the centuries, Waqf properties expanded significantly, especially during the rise of Islamic dynasties.

The **Mussalman Waqf Validating Act of 1913** legally protected the institution of Waqf in India. *Download Our Application* 







#### **Constitutional and Governance Framework:**

According to the Constitution, **charitable and religious institutions** fall under the **Concurrent List**, allowing both **Parliament and State Legislatures** to make laws on this subject.

Currently, Waqf properties are governed by the **Waqf Act**, 1995, which replaced earlier laws from 1913, 1923, and 1954.

#### Key Amendments in the UMEED Bill:

#### 1. Composition of the Central Waqf Council:

- The Union Minister in charge of Waqf becomes the ex-officio chairperson.
- The council includes:
  - Members of Parliament (MPs)
  - Nationally eminent persons
  - Retired Supreme Court/High Court judges
  - Experts in Muslim law
- The Bill **removes the Muslim requirement** for MPs, former judges, and eminent persons.
- Mandates two non-Muslim members in the council.
- 2. Composition of Waqf Boards:
  - State governments are empowered to nominate one person from each group.
  - Non-M<mark>uslim me</mark>mbers required: two.
  - Inclusivity measures:
    - At least one member each from Shias, Sunnis, and Backward Muslim classes.
    - **Two Muslim women members**.
- 3. Composition of Tribunals:
  - Removes the expert in Muslim law.
  - Comprises a District Court judge (Chairman) and a Joint Secretary rank officer.

#### 4. Appeal Mechanism:

• Allows **appeals against Tribunal decisions** to the **High Court** within **90 days**, unlike the previous provision where decisions were **final**.

#### 5. Survey and Property Management:

- The **Survey Commissioner** will be replaced by the **District Collector** or other senior officers to oversee the **survey of Waqf properties**.
- Government properties identified as Waqf will no longer be treated as such.

#### 6. Financial Transparency:

- Waqf institutions earning over **1** lakh will undergo state-sponsored audits.
- Establishes a **centralized portal** for **Waqf property management**, ensuring **efficiency and transparency**.
- 7. Property Dedication and Women's Rights:
  - Only **practicing Muslims (for at least five years)** can dedicate property, restoring **pre-2013 rules**.

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• Women must **receive inheritance** before the Waqf declaration, with **special provisions for widows**, **divorced women**, and **orphans**.

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Concerns Raised:

- **Non-Muslim Members in Waqf Boards:** Critics argue that including **non-Muslim members** could result in **non-Muslim dominance**, unlike boards for **Hindu and Sikh endowments**.
- **Expertise in Waqf Tribunals:** Removal of **Muslim law experts** may hinder effective resolution of **Waqf-related disputes**.
- **Five-Year Requirement:** The criterion for **creating Waqf** after practicing Islam for five years is seen as **arbitrary**.

**Conclusion:** The **UMEED Bill, 2025** is a significant move towards **modernizing Waqf property management**. By addressing **administrative challenges** and promoting **gender inclusion**, the bill aims to create a **more transparent and efficient Waqf management system**. However, the inclusion of **non-Muslim members** and removal of **Muslim law experts** have sparked debates regarding its potential **impact on community representation**.

# Parliamentary Committee Report on Welfare of Other Backward Classes (OBCs)

**Context:** The Parliamentary Committee on Welfare of Other Backward Classes (OBCs) recently submitted its comprehensive report to the **Eighteenth Lok Sabha**, addressing critical issues surrounding the **Creamy Layer (CL) status** among OBCs and recommending significant policy changes.



#### About the Cr<mark>eamy La</mark>yer Concept:

The concept of the **Creamy Layer** refers to the **more socio-economically** 

advanced members among OBCs, who are excluded from reservation benefits to ensure affirmative action reaches the genuinely disadvantaged sections. This concept emerged from the landmark Indra Sawhney Case (1992).

# Key Highlights from Indra Sawhney Case (1992):

- The **Supreme Court upheld the 27% reservation** for OBCs in civil posts and services under the Government of India.
- However, it mandated the **exclusion of the Creamy Layer** to ensure equitable distribution of benefits.
- Following the judgment, the **Ram Nandan Prasad Committee** was constituted to identify criteria for determining the **Creamy Layer**.

# Criteria for Creamy Layer (Based on Ram Nandan Prasad Committee Report):

The **Creamy Layer** was defined based on two categories:

- 1. **Occupational Criteria:** Individuals whose parents are or were employed in specific categories of government services.
- 2. Economic Criteria: Individuals with an annual income above a prescribed threshold.

The **threshold income limit** was last revised to **8 lakh** in **2017**.

#### Key Observations by the Committee:

# 1. Lack of Uniformity in Creamy Layer Criteria:

The Committee observed that **uniform yardsticks** are not being followed across various states when applying the **income/wealth test** to determine **Creamy Layer status**.

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• **Recommendation:** States should adopt a **uniform formula** to ensure consistency and fairness in the application of **Creamy Layer criteria**.

#### 2. Review of the Existing Income Limit:

- The Committee noted that the current **income limit of 8 lakh** is inadequate, **depriving a significant segment** of the OBC population from reservation benefits.
- **Recommendation:** The **income limit should be substantially raised** after **consulting with relevant stakeholders** to better reflect the present socio-economic realities.

#### Additional Facts & Knowledge:

- 1. **Historical Context:** The concept of the **Creamy Layer** was introduced to ensure that economically advanced individuals within the OBC category do not corner the benefits meant for the truly marginalized.
- 2. **Previous Revisions:** The income limit has been periodically revised, with the last revision occurring in **2017**. Earlier limits were **1 lakh (1993)**, **2.5 lakh (2004)**, **and 4.5 lakh (2008)**.
- 3. **Demand for Revision:** Many experts and social groups have been urging the government to raise the income limit to **12 lakh or more** to accommodate rising standards of living and inflation.
- 4. **Impact of Inconsistencies:** Due to disparities in applying the **Creamy Layer criterion**, genuine beneficiaries in some states remain excluded from **reservation benefits**.

### Supreme Court Directs States to Follow Established Norms for Arrests

**Context:** The **Supreme Court of India** has recently reaffirmed the necessity for **law enforcement agencies** across all states to adhere strictly to constitutional and statutory safeguards during arrests and custodial procedures. The directive was emphasized during a ruling related to Somnath Vs. State of Maharashtra (2023), where the Court reiterated its earlier guidelines from the landmark D.K. Basu v. State of West Bengal case (1997).



# **Background & Context:**

#### The Somnath Case (2023):

In this case, the **Supreme Court restated principles** laid down in the **D.K. Basu case (1997)**, emphasizing the need for **transparency**, **accountability**, **and protection of individual rights** during arrests. The Court expressed concern over **persistent non-compliance by police forces** and issued directives to all states to ensure adherence to established norms.

# The D.K. Basu Case (1997):

The **D.K. Basu v. State of West Bengal case** was a landmark judgment that laid down comprehensive guidelines to prevent **custodial violence and protect fundamental rights**. It established safeguards aimed at enhancing **transparency and accountability** in the arrest process.

Supreme Court Guidelines in D.K. Basu Case (1997):



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# 1. Proper Identification:

- Officers making an arrest must **clearly display identification badges** and **name tags** with their designation.
- This is essential for **accountability and transparency** during the arrest process.

# 2. Mandatory Arrest Memo:

- A memo of arrest must be prepared at the time of arrest, including the exact time and date of the arrest.
- The memo must be **attested by at least one witness** (preferably a family member or a respectable person from the locality) and **countersigned by the arrestee**.

# 3. Informing Relatives/Friends:

- **Immediate intimation** of the arrest must be given to a **relative or friend** of the arrestee as soon as practicable.
- This notification ensures **transparency and prevents wrongful detention**.

# 4. Inspection Memo:

- Upon request, the arrested person must undergo a **medical examination** at the time of arrest, and any injuries must be **recorded in an Inspection Memo**.
- This memo should be signed by both the arrestee and the arresting officer to maintain transparency.

# 5. Medical Examination During Detention:

- The arrestee must undergo a medical examination every 48 hours during detention by a certified doctor.
- This safeguard is essential to prevent custodial torture and ensure physical well-being.

# 6. Right to Consult a Lawyer:

• During interrogation, the arrestee must be allowed to **consult with their lawyer**, ensuring adherence to **Article 22(1) of the Indian Constitution**.

# Additional Facts & Knowledge:

- 1. **Constitutional Safeguards:** Articles **20 and 22 of the Indian Constitution** provide protection against arbitrary arrest and detention.
- 2. **Custodial Deaths:** Despite guidelines, India continues to report cases of **custodial deaths and police brutality**, making adherence to these norms even more crucial.
- 3. **UN Guidelines:** India is a signatory to the **United Nations Convention against Torture (UNCAT)**, although the convention has not yet been ratified. Adherence to Supreme Court guidelines is crucial for upholding international human rights standards.
- 4. **Technological Solutions:** The use of **Body Cameras, CCTV Monitoring, and Digital Documentation** of arrests is being promoted to enhance accountability.

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#### Cabinet Approves Vibrant Villages Programme-II (VVP-II)

**Context:** In a major step toward securing and developing India's remote border areas, the **Union Cabinet has approved the "Vibrant Villages Programme-II (VVP-II)"** for the **financial years 2024–25 to 2028–29**. This ambitious initiative builds on the success of **VVP-I**, and reflects India's strategic commitment to a **"Viksit Bharat" (Developed India) by 2047**.

What is VVP-II?

A Strategic Expansion of Rural Border Development:

- Scheme Type: A Central Sector Scheme with 100% funding by the central government, unlike VVP-I, which was a Centrally Sponsored Scheme.
- Coverage: Targets strategic villages along international land borders (ILBs) across 17 states and union territories, excluding northern border blocks already covered under VVP-I (2023–24).
- **Vision**: To transform isolated border villages into **vibrant**, **secure**, **and self-reliant communities**, playing a key role in both **development and national security**.

#### Key Objectives of VVP-II:

- Enhance Quality of Life: Improve basic infrastructure and public services in remote villages.
- Boost Livelihoods: Create sustainable income opportunities through value chains, SHGs, and cooperatives.
- Strengthen Security: Encourage local participation to serve as the "eyes and ears" of internal security forces, helping to curb trans-border crimes.
- Preserve Culture & Promote Tourism: Celebrate local festivals, heritage, and organize awareness drives to foster cultural pride and rural tourism.

Salient Features of VVP-II:

#### **Robust Infrastructure Development:**

- Development of all-weather roads under Pradhan Mantri Gram Sadak Yojana Phase IV (PMGSY-IV).
- Investments in **housing**, **sanitation**, **drinking water supply**, **electricity**, and **SMART classrooms** to modernize education.

#### Livelihood & Value Chain Enhancement:

- Promotion of local crafts, agriculture, and animal husbandry through cluster-based models.
- Financial and capacity-building support for **Self-Help Groups (SHGs)** and **cooperatives**, tailored to **border-specific challenges**.

#### **Converging Welfare Schemes:**

- Seamless integration of central and state welfare schemes to ensure last-mile delivery and universal coverage.
- Implementation under a "whole-of-government" approach, promoting synergy across ministries.

#### Cultural Revitalization & Tourism Promotion:

• Hosting of **local fairs**, **festivals**, **and national day celebrations** to preserve **traditional customs** and attract **tourism**.



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• Encouragement of **home-stay tourism** and **eco-tourism models** in scenic border regions.

# Implementation Through PM Gati Shakti:

• Execution of the programme will be monitored and facilitated via the **PM Gati Shakti National Master Plan**, ensuring **efficient inter-departmental coordination** and **timely delivery** of infrastructure projects.

# Why VVP-II Matters:

Greenlighting **VVP-II** represents more than just rural development—it marks a bold move towards:

- Securing India's borders through development-led security.
- Empowering remote populations and bridging regional disparities.
- Transforming border villages into models of innovation, resilience, and cultural pride.

As India marches toward **Viksit Bharat@2047**, initiatives like VVP-II are critical to ensure that **no citizen is left behind**, especially those in the most remote corners of the nation.

# Bihar Gears Up to Host Khelo India Youth & Para Games in 2025

**Context:** In a major boost to the sports ecosystem, **Bihar** is all set to host the **Khelo India Youth Games** and the **Khelo India Para Games** in **May 2025**. This marks a significant moment for the state, as it steps into the national sporting spotlight under the flagship **Khelo India initiative**.

Launched in **2018**, the **Khelo India programme** is a landmark movement aimed at **reviving India's sports culture**, fostering **youth engagement**, and **nurturing future Olympians**.



# Core Pillars of the Khelo India Mission:

# Talent Identification & Sports Competitions:

- Organizes a series of national-level competitions including the Youth Games, University Games, and Winter Games.
- Acts as a **talent-scouting platform**, enabling the government and federations to spot and groom **young sporting prodigies**.

# Sports Infrastructure Development:

- Undertakes the **construction and upgradation** of **sports facilities** across the country.
- Focuses on creating **world-class training environments** in both urban and rural areas to **bridge accessibility gaps**.

# Khelo India Centres & Sports Academies:

- Establishes **specialized training centers** and **national sports academies**.
- Provides **high-performance coaching**, **sports science support**, and **mentorship** to athletes across disciplines.

# Fit India Movement:

- Promotes a **healthy lifestyle** and **daily physical activity** through nationwide campaigns, fitness assessments, and school-level initiatives.
- Encourages citizens to embrace fitness as a core component of national development.

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#### Inclusivity & Cultural Integration:

- Advocates **gender equality**, **disability inclusion**, and the promotion of **indigenous sports** like **Kalaripayattu**, **Mallakhamb**, and **Gatka**.
- Ensures that **sports become a unifying force**, accessible to all sections of society.

# Significance of Bihar Hosting the Games:

- Bihar's hosting of these events will **boost regional sports culture**, inspire local youth, and **upgrade state-level infrastructure**.
- It will also provide an **economic and tourism boost**, as thousands of athletes, coaches, and spectators are expected to participate.
- Hosting the **Khelo India Para Games** reflects a strong commitment to **inclusive sports**, celebrating the **spirit and talent of differently-abled athletes**.

### Khelo India: Shaping India's Sporting Future

The **Khelo India programme** is more than just a sports initiative—it is a **nation-building effort** that blends **youth empowerment, national pride**, and **global aspirations**. With Bihar now joining the ranks of host states, the movement continues to gain momentum toward building a **fit, inclusive, and sports-driven India**.

# Cape Town Convention, 2001 & India's Legislative Response

**Context:** The **Rajya Sabha** has passed the **Protection of Interests in Aircraft Objects Bill, 2025,** marking a significant milestone in India's commitment to the Cape Town Convention.

#### Key Provisions of the Bill:

• Legal Empowerment: The Central Government is authorized to formulate rules for implementing the Cape Town Convention and its Aircraft Protocol within India.



- Enhanced Creditor Rights: In case of default, creditors or lessors are allowed to repossess aircraft within two months or within a mutually agreed timeline.
- **Domestic Oversight**: The **Directorate General of Civil Aviation (DGCA)** is designated as the **national registry authority**, aligning domestic systems with international standards.
- **Mandatory International Registration**: All **financial interests in aircraft** must be registered with the **International Registry** as per the Cape Town Convention norms.

#### Why This Matters for India:

- Improves India's aviation financing ecosystem by making it more creditor-friendly
- Attracts more international leasing and investment in the aviation sector
- Helps prevent aircraft repossession delays, which previously led to concerns from lessors
- Supports fleet expansion of Indian airlines by easing lease terms

#### **Fun Fact:**

Several Indian carriers in the past faced **aircraft repossession issues** due to defaults. The new law seeks to **avoid such disputes**, making the aviation sector more resilient.

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#### **Final Takeaway:**

The enactment of this Bill is a strategic step toward strengthening India's position in the global aviation market. By aligning with the **Cape Town Convention**, India not only enhances **investor confidence** but also paves the way for a modern, well-regulated aviation finance environment.

What is the Cape Town Convention, 2001?

The Cape Town Convention is a landmark international treaty designed to support asset-based financing and leasing of high-value mobile equipment—such as aircraft, helicopters, and aircraft engines.

#### **Key Highlights:**

- Adopted: November 2001
- **Location**: Cape Town, South Africa
- Institutions Involved:
  - International Civil Aviation Organization (ICAO) 0
  - International Institute for the Unification of Private Law (UNIDROIT) 0

**Core Objectives:** 

- Facilitate international financing of aircraft and related equipment
- Protect the rights of creditors and investors
- **Establish a centralized International Registry** for financial interests
- Harmonize legal frameworks across jurisdictions to reduce uncertainty and risk •

#### Did You Know?

The Convention is complemented by sector-specific protocols. The Aircraft Protocol is the most prominent, followed by protocols for railway rolling stock and space assets.

India's Involvement: From Signatory to Legislation

India became a **signatory** to the Convention in **2008**, but had **not ratified** it for years due to the lack of enabling domestic legislation. That changed with a recent development in 2025.

#### UGC's New Equivalence Regulations for Foreign Degrees (2025)

**Context:** In line with the **National Education Policy (NEP) 2020**, the University Grants Commission (UGC) has unveiled the "Recognition and Grant of Equivalence to Qualifications Obtained from Foreign **Educational Institutions Regulations, 2025."** 

Effective from April 2025, this reform replaces the role of the Association of Indian Universities (AIU) in issuing equivalence certificates and introduces a structured, transparent, and globally aligned framework for recognizing foreign academic qualifications in India.



#### What the New UGC Regulations Cover:

These regulations are applicable to academic qualifications-degrees, diplomas, and certificatesobtained from:

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- Foreign institutions, including their offshore campuses
- Online or distance learning programs (based on public feedback to 2023 draft regulations)
- School-level qualifications abroad, provided the student has completed **12 years of education**

The recognized foreign qualifications are valid for:

- Admission into Indian higher education institutions
- Research opportunities in India
- **Employment**, where UGC-recognized degrees are required

Note: Professional degrees like **medicine**, **law**, **nursing**, **pharmacy**, and **architecture** still fall under their respective statutory councils and are not covered under this regulation.

# Eligibility Criteria: What Makes a Qualification Valid?

The UGC lays out clear guidelines for granting equivalence:

- 1. The **foreign institution must be recognized** by accrediting bodies in its home country.
- 2. The entry-level and academic standards (e.g., credits, internships, thesis) should be comparable to Indian programs.
- 3. The program must be completed in **full compliance** with the foreign institution's norms.
- 4. **Distance and online degrees** are eligible—but must come from properly accredited institutions.
- 5. **Franchise-based arrangements**—where a local institution operates under the name of a foreign university without real affiliation—will **not be recognized**.

# A New Online Process for Students:

UGC will streamline the process through a **dedicated online portal**:

- Students submit applications with required documents.
- A standing committee of subject experts reviews within 10 working days.
- UGC communicates its decision within **15 days**.
- If rejected, a **review committee** can re-examine the application upon appeal.
- Once approved, the **equivalence certificate is valid for academic and professional use** across all **UGC-regulated institutions**.

# From AIU to UGC: Why the Shift Matters

Previously, equivalence was managed by the **Association of Indian Universities (AIU)**—a non-statutory body.

While functional, it lacked a **formal regulatory structure**, causing **inconsistencies and delays**.

# Now, under UGC:

- The process becomes statutory and standardized
- Accountability is increased
- It directly aligns with India's push for global academic mobility

# UGC Chairperson M. Jagadesh Kumar emphasized that this move supports the NEP 2020's goal of internationalization.

# Maintaining Quality and Safeguarding Trust:

By insisting on **accreditation from legitimate bodies** and rejecting **franchise setups**, UGC ensures:



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- Credibility of foreign degrees
- Protection from **fraudulent or substandard courses**
- A robust review mechanism for redressal

This strengthens overall **confidence among students**, **educators**, **and employers** alike.

# **Conclusion: A Step Toward a Globally Aligned Education System**

The **2025 UGC Equivalence Regulations** represent a **bold and forward-looking reform** that strengthens India's educational foundation:

- Promotes transparency and fairness
- Facilitates international academic exchange
- Supports India's ambition to become a global education hub

With more Indian students heading abroad and foreign learners looking to study in India, this framework is **timely, transformative, and truly global in vision**.

# Supreme Court Overrules Tamil Nadu Governor on Bill Assent

**Context:** In a **landmark ruling**, the **Supreme Court of India** declared Tamil Nadu Governor **R N Ravi's** action of **withholding assent to 10 state Bills** as **unconstitutional** and **legally invalid**.

# This historic<mark> judgme</mark>nt:

- Reinforces the limited discretionary role of Governors
- Reaffirms the primacy of democratically elected state governments
- Addresses rising Centre-State tensions, especially in Opposition-ruled states
- Sets a precedent that could impact similar ongoing cases—like the Kerala Governor's delay in assenting to state Bills

#### **Constitutional Role of the Governor in Assenting to Bills:**

- Article 163: Defines the Governor's general powers—requiring them to act on the advice of the Council of Ministers, except in a few discretionary matters.
- Article 200: Specifically governs the Governor's options when a Bill is presented for assent:

# **Governor's Four Constitutional Options:**

- 1. Grant assent to the Bill
- 2. Withhold assent
- 3. Return a non-Money Bill for reconsideration
- 4. Reserve the Bill for Presidential consideration

#### Key Proviso of Article 200:

If a **non-Money Bill** is returned and **passed again by the legislature**, the **Governor must grant assent**. However, the Constitution **does not define a specific timeframe**, leading to **loopholes**.

# Issue of Delay and Constitutional Implications:

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- In practice, Governors—especially in **Opposition-ruled states**—have **indefinitely delayed** assent, causing **legislative gridlocks**
- This inaction functions as a "**pocket veto**", stalling governance
- Article 200 uses the word **"shall"**, emphasizing a **mandatory duty** to act within a **reasonable time**

# Key Supreme Court Judgments on Governor's Assent Powers

# Nabam Rebia Case (2016):

- Court ruled that the Governor cannot indefinitely withhold assent
- If dissatisfied, the Governor must return the Bill with recommendations
- Stressed transparent communication between the Governor and Legislature

# Punjab Case (2023) – State of Punjab vs Governor Banwarilal Purohit

- Governor had refused assent citing procedural irregularities
- SC upheld the **Punjab government's stance**, emphasizing:

"The Governor, as an unelected Head of State, cannot obstruct democratic legislation."

# Supreme Court Ruling in the Tamil Nadu Case: Setting New Timelines

Going further than past judgments, the Court **introduced specific timeframes** for action under Article 200:

# Timeframes Introduced by the Court:

Governor's Action	Time Limit	
Withhold assent or reserve a Bill (on advice of Ministers)	Within 1 month	
Return a Bill (against Ministerial advice)	Within 3 months	7
Reserve a Bill for the President (against advice)	Within 3 months	
Assent to a re-passed Bill after reconsideration	Within 1 month	

**Inaction beyond these periods** will now be **subject to judicial review**, ensuring **transparency and accountability**.

# Use of Article 142: Delivering Complete Justice

The Court invoked **Article 142** of the Constitution to **deem all 10 pending Bills as assented to**, citing:

- Unjustified delay by the Governor
- Violation of constitutional responsibilities
- "Scant respect" shown to judicial guidance

Article 142 empowers the Court to **deliver complete justice**, overriding technical barriers when no remedy exists.

The **Governor is a constitutional figure**, not an elected representative. Their role is to **support democratic functioning**, not obstruct it.











#### Supreme Court Invokes Article 142 to Clear 10 Tamil Nadu Bills

**Context:** In a **landmark ruling**, the **Supreme Court of India** used its extraordinary powers under **Article 142** to **grant assent to 10 Bills** passed by the **Tamil Nadu Legislative Assembly** that had been **pending with the Governor**. This move effectively bypassed the **Governor's inaction** and sent a strong message about the need for timely legislative procedures.



#### What is Article 142 of the Constitution?

**Article 142** empowers the **Supreme Court** to pass any **order or decree necessary to deliver complete justice** in any matter before it.

#### **Key Features:**

- Binding Nationwide: Orders are enforceable across the entire territory of India.
- Guardian Role: Allows the SC to safeguard constitutional values, fundamental rights, and public interest.
- Beyond Judiciary: Enables the Court to function in quasi-legislative and executive capacities in exceptional cases.

*Fun Fact*: Article 142 is often referred to as the **"Justice Article"** due to its broad scope to ensure fairness, even beyond statutory provisions.

#### Why Did the **Court Act**?

The Court ruled that **Governors cannot indefinitely delay or withhold assent** to Bills **once passed or re-passed** by the **State L**egislature.

#### Timelines Se<mark>t by the</mark> Court:

- 1 Month: To act on a re-passed Bill.
- **3 Months**: If the Governor withholds assent contrary to Cabinet advice.

This ruling **redefines** the relationship between the **Centre and States**, curbing the **Governor's discretionary powers and upholding legislative autonomy**.

#### How is a Bill Passed by a Governor?

According to Article 200, once a State Legislature passes a Bill, the Governor has four options:

- 1. Assent to the Bill
- 2. Withhold assent
- 3. Reserve it for the President's consideration
- 4. Return it (except a Money Bill) with suggestions for reconsideration

#### **Reconsidered Bills:**

If re-passed **without changes**, the **Governor is bound to give assent**. They **cannot reserve it again** under Article 200.

#### **Role of the President (Article 201)**

If a Bill is **reserved for the President**, the President may:

• Assent

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- Withhold assent
- **Return** (if not a Money Bill) for **reconsideration** by the State Legislature If re-passed, the President **is not obligated** to give assent — a clear contrast to the Governor's role.

# States' Concerns and the Federal Question:

# Key Issues Raised by States:

- Delay in Assent disrupts timely policymaking
- Undermining Autonomy when State List matters are interfered with
- Discretionary Misuse when Governor acts against Cabinet advice
- Federal Imbalance due to indirect Union Executive influence
- Lack of Guidelines leads to inconsistency and opacity

*Insight*: Many states argue that **Articles 200 and 201**, in their current form, **challenge the spirit of cooperative federalism**.

### Significance of the Ruling:

- Affirms supremacy of elected legislatures
- Limits Governor's discretionary delays
- Strengthens the principle of federalism
- Promotes transparent and time-bound lawmaking

This ruling is a major stride toward upholding India's federal framework and ensuring legislative efficiency.

#### Conclusion: The Need for Reform

To **prevent future constitutional logjams**, experts and states alike are calling for:

- Clear and uniform guidelines for Governors' discretion
- Strict time limits for assent decisions
- Stronger safeguards for the autonomy of state legislatures

Panchayat Advancement Index (PAI) Baseline Report 2022-23

**Context:** The **Ministry of Panchayati Raj** has recently released the **first-ever Panchayat Advancement Index (PAI) Baseline Report** for the fiscal year **2022–23**. This pioneering initiative is a step toward strengthening **rural governance**, aligning with India's commitment to the **2030 Sustainable Development Goals (SDGs)**. The PAI serves as a tool to measure and guide the progress of **Gram Panchayats (GPs)** across the country using a **datadriven**, **bottom-up development** approach.



# What is the Panchayat Advancement Index (PAI)?

The **PAI is a composite index** built upon **435 unique local indicators** (comprising **331 mandatory** and **104 optional**) spread over **566 data points**, covering **9 key themes** under the framework of **Localization of SDGs (LSDGs)**.

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It reflects a collaborative effort involving multiple Union Ministries, State Governments, and UN Agencies, and is aligned with the National Indicator Framework (NIF) developed by the Ministry of Statistics and Programme Implementation (MoSPI).

#### **Core Themes of the PAI:**

The PAI evaluates the performance of Panchayats based on the following **nine thematic areas**:

- 1. Poverty Alleviation
- 2. Health and Nutrition
- 3. Child Development and Education
- 4. Water and Sanitation
- 5. Environmental Sustainability
- 6. Infrastructure Development
- 7. Social Justice and Inclusion
- 8. Good Governance
- 9. Women Empowerment

#### Key Indicators Assessed:

Each Panchayat is evaluated on diverse and critical metrics such as:

- Infrastructure: Roads, electricity, sanitation, drinking water. •
- Health & Education: Healthcare access, school enrollment, literacy. ٠
- **Economic Status**: Employment, income generation, agricultural productivity.
- **Social Indicators**: Gender equality, poverty levels, inclusion.
- **Governance Efficiency**: Transparency, citizen participation, grievance redressal.
- Environmental Practices: Green cover, waste management, resource sustainability. •

# **Performance Classification of Panchayats:**

Panchayats are ranked into **five categories** based on their composite scores:

- Achiever (90+ points): None qualified in this cycle
- **Front Runner (75–90 points)**: 699 Panchayats (0.3%) •
- **Performer (60–75 points)**: 77,298 Panchayats (35.8%) •
- **Aspirant (40–60 points)**: 1,32,392 Panchayats (61.2%)
- **Beginner (Below 40 points)**: 5,896 Panchayats (2.7%)

Validated Data: Out of 2,55,699 Gram Panchayats, a total of 2,16,285 GPs submitted validated data through the dedicated **PAI Portal**, ensuring robust analysis.

# **State-Wise Insights: Leaders and Laggards:**

**Top Performing States:** 

- **Gujarat** emerged as the leader with **346** Front Runner Panchayats.
- Telangana followed with 270 Front Runners.
- Maharashtra, Madhya Pradesh, and Uttar Pradesh showed strong representation in the Performer category.

**States Requiring Focused Attention:** 










• **Bihar**, **Chhattisgarh**, and **Andhra Pradesh** had a higher share of **Aspirant Panchayats**, indicating significant **developmental gaps** and the need for targeted interventions.

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# Purpose and Long-Term Impact:

## **Promoting Evidence-Based Governance**

PAI offers a **standardized monitoring mechanism** that enables:

- Transparent identification of developmental disparities
- Better allocation of resources
- Encouragement of intra-state competition for development

# **Empowering Local Institutions:**

The PAI empowers Panchayats to:

- Formulate locally tailored development plans
- Engage citizens through participatory planning
- Improve service delivery mechanisms

# Driving India's SDG Ambitions:

Through PAI, India reinforces its global commitment to the **SDG 2030 Agenda**, rooted in **inclusive**, **participatory**, and **sustainable local governance**.

## Additional Insights: Why PAI Matters

- **First-of-its-kind in the world**: Few nations have adopted such a **granular and inclusive index** for rural governance.
- **Digital Integration**: The **PAI Portal** acts as a centralized platform for real-time data collection, validation, and dissemination.
- Boost to Grassroots Democracy: Encourages self-assessment and improvement among Panchayats, fostering a spirit of healthy competition.

## **Conclusion:**

The **Panchayat Advancement Index** is a landmark initiative in India's journey toward **inclusive rural development**. By bridging the gap between **national priorities and local realities**, PAI is set to become a **cornerstone for decentralized planning**.

With increased transparency, accountability, and performance-driven evaluation, the PAI holds immense potential to **transform rural India**, empower communities, and create a model for **sustainable**, **equitable growth** from the grassroots up.

# **Breakthrough Prize 2025**

**Context:** The **Breakthrough Prize Foundation** has announced the **winners for the 2025 Breakthrough Prize**, popularly known as the **"Oscars of Science."** 

# About the Breakthrough Prize

- Established in: 2013
- Founded by:





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- **Sergey Brin** 0
- Anne Wojcicki  $\circ$
- Yuri and Julia Milner 0
- **Award Categories:** 
  - Life Sciences 0
  - **Fundamental Physics**
  - **Mathematics**  $\circ$
- Prize Money: \$3 million awarded in each category.

# **Breakthrough Prize in Life Sciences:**

# For Weight-Loss Drugs:

- Drugs: Ozempic and Wegovy
- Awardees:
  - Daniel J. Drucker  $\cap$
  - Joel Habener  $\circ$
  - Jens Juul Holst
  - Lotte Bjerre Knudsen 0
  - Svetlana Mojsov 0
- **Contribution:** 
  - Discovery and characterization of the **GLP-1 hormone**, which led to the development of 0 effective drugs for diabetes and obesity treatment.

# For Multiple Sclerosis (MS) Treatment:

- Awardees:
- Alberto Ascherio  $\circ$
- **Stephen L. Hauser** 0
- **Contribution:** 
  - Identified the critical role of **B-cells** in **Multiple Sclerosis**, leading to targeted therapies. 0
  - Established the **Epstein-Barr Virus** as the leading cause of MS.

# For Gene-Editing Technologies:

- Awardee: David R. Liu
- **Contribution:** 
  - Developed **base editing** and **prime editing** technologies. 0
  - These tools enable precise DNA editing without cutting the double helix, allowing 0 correction of defective genes.

# **Breakthrough Prize in Mathematics:**

- Awardee: Dennis Gaitsgory
- Achievement:

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Download Our Application ---- Played a key-role in the proof of the geometric Langlands conjecture.--Freedom UPSC with Dhananjay Gautam





• This is part of the broader **Langlands Program**, connecting various fields of mathematics like number theory, algebra, and geometry.

## **Breakthrough Prize in Fundamental Physics:**

- Awarded to:
  - Collaborations at Large Hadron Collider (LHC), CERN:
    - o **ALICE**
    - o ATLAS
    - CMS
    - o LHCb
- Achievements:
  - Detailed study of the **Higgs boson** to understand how **particles gain mass**.
  - Discovery of **new particles** contributing to the understanding of the **strong nuclear force**.
  - Validated **fundamental theories of physics** and explored why **matter exists** in the universe.

# **Concerns Arise Over Amendments to RTI Act Amid Data Privacy Reforms**

**Context:** The **Union Minister for Information and Technology** has stated that **personal information required to be disclosed under existing laws** will still be accessible through the **Right to Information (RTI) Act**, even after the **Digital Personal Data Protection (DPDP) Act** is implemented. However, many civil society groups and activists remain concerned that recent **amendments may hinder transparency and public accountability**.



# Key Change: Amendment to Section 8(1)(j) of the RTI Act

Under the proposed **Digital Personal Data Protection (DPDP) Rules**, the **RTI Act (2005)** will be amended to incorporate a **blanket prohibition on the disclosure of personal information**, regardless of whether it serves the **public interest**.

## Concerns Raised:

- Limits access to information vital for social audits, investigations into misuse of public funds, and exposing corruption.
- Hampers the RTI's role in **verifying government welfare programs** like the **Public Distribution System (PDS)** and **NREGS**.
- Critics argue the amendment **disrupts the balance** between **privacy and transparency** maintained in the original Act.
- They **reject** the claim that this aligns with the **Supreme Court's 2017 ruling** on the **right to privacy** under **Article 21**.

## **Government's Justification:**

## The government claims the amendment:

• Will not curtail transparency, and









• Will allow disclosure of personal data when legally mandated.

Monthly Current Affairs

The **2017 Supreme Court judgement** that recognized **privacy as a fundamental right** is cited as the **basis for the reform**.

## RTI (Amendment) Act, 2019: A Recap

To the Point

- **Tenure Reduced**: The term of the **Chief Information Commissioner (CIC)** and **Information Commissioners (ICs)** was reduced from **5 years to 3 years**.
- **Centralized Control**: Their **salaries and service conditions** are now determined by the **Central Government**, rather than being on par with **Election Commissioners**.

## **RTI Rules, 2022: Digitization Push**

- **Online Filing**: Citizens are encouraged to file RTI applications through the **RTI Online Portal**.
- **Streamlined Processes**: Revisions made to improve **appeals** and **complaints procedures**.

# The Right to Information Act (RTI), 2005 - An Overview

## Purpose:

To promote transparency and empower citizens by granting access to information from public authorities.

#### Scope:

- Applies to **all government departments** and **organizations** substantially funded by the government.
- Ensures access to **records, files, contracts, correspondence**, and more.

## Exclusions:

• National security, **confidential investigations**, and **sensitive data** are exempted.

## **Timelines**:

• Responses must be provided within 30 days, extendable to 45 days in special cases.

## **Penalties**:

• Officials face penalties for **wrongful denial** or **misleading information**.

# The Road Ahead

- Digital Personal Data Protection Act (DPDP) is not yet operational, as the rules are still in draft form.
- **Civil society organizations** are urging the government to **reconsider the amendments**, fearing erosion of **public accountability**.
- The **core strength of the RTI Act** lies in its ability to empower the public and **expose corruption** a function that must not be compromised under the guise of privacy.

## **Conclusion**:

While **data protection** is a legitimate concern in the digital age, it must not come at the **cost of transparency and democratic accountability**. The **RTI Act** has been a cornerstone of **citizen empowerment** and **good governance** in India. Any amendment should aim to **strengthen**, not **weaken**, the public's right to know.

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Mehul Choksi Arrested in Belgium: India Moves for Extradition in 13,500 Crore PNB Scam

**Context: Mehul Choksi**, a key figure in the massive **13,500 crore Punjab National Bank (PNB) fraud**, has been **arrested in Belgium**. India has officially **requested his extradition** to face charges. Choksi, who had been a **citizen of Antigua and Barbuda since 2018**, relocated to Belgium last year citing **cancer treatment**.



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## What's Next for Choksi?

#### India-Belgium Extradition Treaty:

India and Belgium share a long-standing **extradition treaty (since 1901)** based on the principle of **dual criminality**—the offence must be punishable in both nations. However, **political offences or claims of persecution** are exempt.

#### Legal Timeline:

India must **submit substantial evidence** within **two months**, or Belgium may be forced to **release Choksi**.

#### Agencies on the Case:

Choksi's arrest was driven by coordinated efforts from the CBI (Central Bureau of Investigation) and the ED (Enforcement Directorate). Both agencies are preparing a detailed case that aligns with Belgian legal requirements.

## Mutual Legal Assistance Treaty:

• A **2020 Mutual Legal Assistance Treaty** between India and Belgium is expected to **ease cooperation** in legal procedures, including extradition.

## Potential Legal Hurdles for India:

## 2021 Dominica Abduction Controversy:

• Choksi's legal team is likely to bring up the **alleged 2021 abduction** from Antigua to Dominica. Photos revealed him **bruised and injured**, raising **serious human rights concerns**.

## **Claims of Coerced Consent:**

• His lawyers allege that he was **forced to sign** a return consent form under duress—an effort to **bypass Antigua's legal safeguards**. His **UK-based lawyer** maintains that this violated his **fundamental rights**.

## Interpol's Red Corner Notice Withdrawal:

• In 2023, **Interpol revoked its Red Corner Notice** against Choksi, citing the **Dominica incident** and a **potentially unfair trial** in India.

## Health and Prison Conditions:

• Choksi is expected to argue that **poor health**, **inadequate prison conditions**, and **possible human rights violations** in India render extradition **unsafe and unjust**.

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#### **Citizenship Concerns:**

• Although arrested in Belgium, Choksi's **Antiguan citizenship** could pose complications. His legal team may argue that **Belgium must consult Antigua** before approving extradition to a **third country**.

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# **Criminal Allegations Against Mehul Choksi:**

## **Gitanjali Group Expansion:**

• Coming from a family of **diamantaires**, Choksi expanded the **Gitanjali Group**, launching luxury jewellery outlets in India and overseas. He and his nephew, Nirav Modi, also invested heavily in celebrity endorsements, featuring stars like Kate Winslet and Rosie Huntington-Whiteley.

## **PNB Scam Modus Operandi:**

Between **2014 and 2017**, Choksi and Modi allegedly worked with **corrupt PNB officials** to issue ٠ fraudulent Letters of Undertaking (LoUs). These LoUs were used to obtain overseas credit to fund their operations and luxury lifestyles.

## Loan Defaults & Scam Discovery:

The LoUs were repeatedly **rolled over** beyond the legal 90-day repayment window. Eventually, the **ballooning debt** led PNB to uncover the fraud and approach the **CBI**—by which time both men had fled India.

#### Fraud Scale & Fake Assets:

Choksi is accused of defrauding PNB of 6,000+ crore. The ED seized assets worth over 5,000 crore, • though lab tests revealed that many **diamonds were fake**. The total **current value** of his seized assets is estimated at 2,500 crore.

India's Prison Conditions Threaten Global Extradition Efforts, Warns Justice Lokur

**Context:** India's deteriorating **prison infrastructure** is emerging as a major roadblock in its international extradition efforts, especially for high-profile economic fugitives. Former Supreme Court Judge Justice Madan B. Lokur has raised critical concerns about the human rights standards in Indian jails and their impact on the country's legal credibility abroad.



## Alarming Warnings from Justice Lokur:

At the launch of the **India Justice Report 2025**, Justice Lokur, currently serving as Chair of the **UN** • Internal Justice Council, highlighted that unless India improves its custodial conditions, extraditions from nations like the UK, Canada, and European Union countries will continue to be denied on humanitarian grounds.

## **Background: India's Pursuit of Fugitives:**

India has been actively seeking the return of several economic offenders, such as Mehul Choksi, Nirav Modi, and Vijay Mallya, accused of large-scale financial fraud. However, these efforts are increasingly hampered by international courts' reluctance to send individuals back to what they view as inhumane prison conditions.

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## A UK Court's Blow to India's Case:

A pivotal moment came when a **UK appellate court refused** to extradite **Sanjay Bhandari**, a defence consultant facing charges of **tax evasion and money laundering**. The court cited **Tihar Jail's substandard conditions** and India's **failure to provide credible assurances** regarding prisoner welfare.

"This verdict sets a **troubling precedent**, affecting over **100 pending extradition cases**," warned Justice Lokur.

# **Disturbing Incidents from Indian Prisons:**

## Recent episodes have intensified global scrutiny:

- Tillu Tajpuria, a Tihar inmate, was beaten to death on CCTV while guards stood by.
- **Christian Michel**, linked to the AgustaWestland scam, refused bail, preferring jail over **restrictive bail conditions**.
- Jagtar Singh Johal and Ankit Gujjar both died in custody, raising serious questions about oversight and accountability.

# India Justice Report 2025: Eye-Opening Insights:

This year's report provides a **data-rich snapshot** of systemic failures in India's justice machinery:

# **Police Force**

- Only 1 civil police officer per 831 citizens.
- 17% of police stations lack CCTV monitoring.
- 30% lack women's help desks.
- No Sta<mark>te/UT m</mark>eets its women recruitment quotas.

## Prison System:

- Uttar Pradesh leads in overcrowded prisons.
- 91% of Delhi's jail inmates are undertrials, reflecting severe delays in justice.
- Mental health support is nearly non-existent in many facilities.

## Judiciary and Legal Aid:

- In **Bihar**, **71% of cases** in lower courts are pending for over **three years**.
- Per capita spending:
  - Judiciary: 182
  - Prisons: 57
  - Legal Aid: 6
- **No State** allocates more than **1% of its total budget** to the judiciary.

# Global Human Rights Standards Pose a Challenge:

Courts in **Europe and North America**, bound by **strict human rights charters** (e.g., **European Convention on Human Rights, Canadian Charter of Rights and Freedoms**), are unlikely to allow extraditions to India unless **tangible reforms** are demonstrated in:

- **Prison infrastructure** (clean water, health facilities, and hygiene),
- **Surveillance systems** (functional CCTV and real-time oversight),

• **Prison staff accountability** and **training** in rights-based detention practices.







#### **Comparative Insight: How India Ranks Globally:**

- As per **World Prison Brief**, India ranks **5th** globally in terms of **prison population**, yet allocates **far less per prisoner** than nations like the **UK**, **Germany**, **or South Africa**.
- The **UN Standard Minimum Rules for the Treatment of Prisoners** (also known as the **Nelson Mandela Rules**) continue to be **routinely violated** in India.

#### **Conclusion: A Call for Urgent Reform**

India's **democratic reputation** and its **position in international law forums** are at risk due to the persistent **neglect of custodial conditions**. As Justice Lokur emphasized, **legal strength** alone is not enough — **humane delivery of justice** is equally vital.

Without immediate reform in **prison management**, **judicial delays**, and **rights protections**, India's **extradition requests will falter**, and its **international legal standing** will face continued erosion.

## Supreme Court Raises Concerns Over Waqf Law Amendments Amid Legal Uproar

**Context:** In a major judicial intervention, the **Supreme Court of India** has critically examined key provisions of the **Waqf (Amendment) Act, 2025**, currently under challenge through more than **100 petitions**. The amendments have sparked a significant debate over constitutional, religious, and property rights.



#### Supreme Court's Intervention: A Landmark Judicial Review

A bench led by **Chief Justice Sanjiv Khanna**, along with **Justices P.V. Sanjay Kumar** and **K.V. Viswanathan**, has expressed serious reservations regarding certain provisions in the amended law that may **undermine the traditional waqf framework** in India.

Three Core Issues Flagged in the Waqf (Amendment) Act, 2025:

## 1. Denotification of Waqf-by-User Properties:

The amendment **removes** recognition for waqf-by-user properties, i.e., lands used for religious or charitable purposes over centuries without formal registration.

- **Petitioners argue** this change could **strip legal status** from nearly **4 lakh** of the **8 lakh waqf properties** in India.
- The court acknowledged the **historical importance** of such properties, many of which existed **prior to British land registration systems**.

## 2. Inclusion of Non-Muslims in Waqf Bodies:

The Act now permits **non-Muslims to serve** as **ex-officio members** of **Waqf Boards and the Central Waqf Council**.

- The bench questioned whether **religious institutions** should be governed by individuals **outside the faith**.
- Petitioners contend this **violates Article 26** of the Constitution, which guarantees the right of religious communities to **manage their own affairs**.

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## 3. Collector's Authority to Decide Property Status:

The amendment empowers the **District Collector** to **determine if a property is waqf or government-owned**.

• The court warned this could **breach due process**, as it allows an **executive authority to act as a judge**, creating a **potential conflict of interest**.

# Judicial Observations and Interim Relief Proposal:

While the Supreme Court emphasized its reluctance to stay legislative acts, **CJI Khanna noted this case is an exception**, given its **far-reaching impact**.

# **Proposed Interim Relief (Not Yet Formally Ordered):**

- Properties already judicially recognized as waqf (including waqf-by-user) should not be denotified.
- Government officials may **inquire into land status**, but **cannot change property designation** without judicial review.
- Non-Muslim appointments may continue in Waqf bodies, provided Muslims remain the majority.

The court refrained from issuing a formal order as **Solicitor General Tushar Mehta** sought additional time to present the **government's position**. The matter is scheduled for **further hearing**.

## **Petitioners' Key Concerns:**

- Violation of Religious Freedom: The amendment allegedly infringes on Article 26, eroding the autonomy of the Muslim community.
- Historical Precedent Ignored: Petitioners stressed that waqf-by-user was acknowledged even in the Ayodhya judgment.
- Burden of Proof: Forcing donors to "prove" religious usage is seen as an unjustified intrusion into faith-based practices.

## Government's Defense:

Representing the Centre, **Solicitor General Mehta** argued:

- Waqf registration has been compulsory since the **1923** Act, including waqf-by-user properties.
- **Only two out of 22 members** in waqf bodies may be non-Muslims, and these are **ex-officio roles**.
- The **Collector's role is procedural** and subject to **judicial oversight**.

Despite these explanations, the court remained **unconvinced**, especially on **religious rights** and **property access issues**.

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Supreme Court's Wake-Up Call on Child Trafficking in India

**Context:** In a recent strong observation, the **Supreme Court of India** has issued a critical warning to parents and authorities, urging them to stay **vigilant against the rising menace of child trafficking**. The Court pointed out how **traffickers misuse** 



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juvenile protection laws to coerce children into illegal activities and organized crimes.

# **Understanding Child Trafficking:**

**Child trafficking** refers to the **recruitment, transportation, transfer, harboring, or receipt of a child** for the purpose of **exploitation**.

# Major Forms of Child Trafficking:

- **Forced Labor**: Children are coerced into working in **domestic help**, **agriculture**, **construction**, and other labor-intensive industries.
- **Sexual Exploitation**: A significant number of children are forced into **prostitution** or **online sexual exploitation**.
- Illegal Adoption: Criminal networks abduct children and sell them under the guise of adoption.

# **Current Scenario & Statistics:**

- Between **2018 and 2022**, **over 10,000 cases** of child trafficking were reported, but only **1,031 convictions** were secured.
- States like Uttar Pradesh, Bihar, and Andhra Pradesh record the highest number of trafficked children.
- As per NCRB 2022 data, 3,098 children under 18 were rescued.

# Key Challeng<mark>es in Tac</mark>kling Child Trafficking:

- Low Conviction Rate: Despite arrests, the conviction rate is under 5%, indicating weaknesses in investigation and prosecution.
- Lack of Awareness: Many cases remain unreported due to fear, stigma, and lack of legal knowledge.
- Inter-State Criminal Networks: Traffickers exploit state borders, making it hard for enforcement agencies to crack down effectively.

# Legal and Institutional Framework in India:

# **Constitutional and Legal Safeguards:**

- Article 23 of the Indian Constitution: Prohibits trafficking in human beings and forced labor.
- Immoral Traffic (Prevention) Act, 1956 (ITPA): Penalizes trafficking, especially for sexual exploitation.
- **Protection of Children from Sexual Offences (POCSO) Act, 2012**: Safeguards children from **sexual abuse** and **pornography**; establishes **special courts**.
- Juvenile Justice (Care and Protection of Children) Act, 2015: Identifies children at risk and ensures rehabilitation via Child Welfare Committees.
- Bharatiya Nyaya Sanhita (BNS), 2023:
  - Section 143 & 144: Relate to human trafficking offenses.
  - Section 111: Covers organized crimes, including trafficking for prostitution.

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 Bhartiya Nagarik Suraksha Sanhita (BNSS): Recognizes trafficking as a cognizable and nonbailable offense.

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**Institutional Support Mechanisms:** 

- Anti-Human Trafficking Units (AHTUs): 827 units established nationwide, including in BSF and SSB forces.
- **Crime Multi Agency Centre (Cri-MAC)**: A **24x7 digital platform** by MHA to share crime data across agencies.
- Ujjawala Scheme: A comprehensive program by the Ministry of Women and Child Development for rescue, rehabilitation, reintegration, and repatriation of trafficking victims.

**Global Efforts Against Child Trafficking:** 

- **UN Palermo Protocol (2000)**: A landmark treaty to combat human trafficking through **prevention**, **protection**, and **prosecution**.
- **UNODC Global Report on Trafficking in Persons (2024)**: Shows a **25% surge** in trafficking victims, with **children comprising 38%** of those affected.
- International Labour Organization (ILO): Works to eliminate child labor via programs like the International Programme on the Elimination of Child Labour (IPEC).

## **Conclusion:**

The **Supreme Court's remarks** underline the urgent need for **collective action** against child trafficking. This includes:

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- Parental awareness
- Swift legal action
- Robust enforcement
- Stronger inter-state coordination

By recognizing the **magnitude of the issue**, enhancing **legal mechanisms**, and promoting **community vigilance**, India can take significant strides toward **eradicating this grave crime** and ensuring a **safe**, **protected future** for every child.

Criminalisation of Civil Disputes: Supreme Court's Concern, Causes, and Solutions

**Context:** Chief Justice of India **Sanjiv Khanna** recently raised serious concerns about the increasing tendency to **convert civil disputes into criminal cases**, particularly in **Uttar Pradesh**. His observations came during a case where two individuals facing a cheque bounce charge were also booked under severe criminal provisions, including **breach of trust**, **intimidation**, and **criminal conspiracy**.



The Chief Justice emphasized that such misuse of criminal law **undermines the legal process** and **threatens the rule of law**.

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## CJI's Remarks on Criminalising Civil Disputes:

CJI Khanna condemned the **growing practice of giving civil disputes a criminal flavor** to harass or intimidate the other party. He stressed that this misuse risks **eroding public trust** in the legal system and could cause **breakdowns in the rule of law**.

# Modus Operandi: How Civil Cases Are Converted to Criminal Cases:

The common method involves **alleging dishonest intent from the beginning** of a civil transaction. For example:

- If **Person A lends money** to **Person B** and the money isn't returned, it should ideally be a civil dispute.
- However, **Person A** might allege that **Person B** never intended to repay and filed a **criminal complaint** under **Section 420 IPC** (now Section 318 of the **Bharatiya Nyaya Sanhita**), accusing **cheating or fraud**.

This **misrepresentation of intent** turns a civil issue into a criminal case, adding pressure on the accused to settle quickly.

# Why Are People Choosing Criminal Law Over Civil Law?

- 1. Perceived Inefficiency of Civil Law:
  - Civil litigation is often **slow**, expensive, and **tedious**.
  - Especially in **family disputes**, prolonged legal battles cause emotional and financial stress.
- **2. Criminal Law as a Pressure Tactic:** Criminal charges bring **quicker hearings, fear of arrest**, and **reputational damage**, making them a tool to coerce or force a settlement.
- 3. Influence and Incentivization: In some cases, influential individuals or corrupt practices result in FIRs being filed even when the matter is clearly civil in nature.

Backlog of Cases in Indian Courts:

# According to the National Judicial Data Grid (NJDG):

- Over **1.08 crore civil cases** are pending in **district courts**.
- **68%** of these have been pending for **over a year**.
- Out of 4.52 crore total pending cases, 76% (3.44 crore) are criminal cases.

This backlog **fuels the shift** from civil to criminal cases, as criminal proceedings are seen as a faster route to resolution.

## **Courts' Consistent Stand Against Misuse:**

The **Supreme Court of India** has consistently warned against using criminal law to settle civil scores.

Key Judgments:

- **G. Sagar Suri vs. State of U.P. (2000)**: The Court warned against using criminal proceedings as **shortcuts** for civil remedies.
- **C. Subbiah @ Kadambur Jayaraj vs. Superintendent of Police (2024)**: The Court noted that a purely civil dispute had been given a **criminal color** alleging fraud and breach of trust.

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These judgments reinforce that **criminal charges should not be used to settle private disputes** rooted in civil law.

# Way Forward: Court's Recommendations to Prevent Abuse

## Hold Frivolous Complainants Accountable:

In Indian Oil Corporation vs. NEPC India Ltd. (2006), the Court stated that:

- People using criminal law despite **knowing the matter is civil** must face consequences.
- Baseless criminal proceedings should be dismissed, and civil remedies pursued instead.

# Use of Section 250 CrPC and BNSS Section 395

The Court recommended the **frequent use of Section 250 CrPC**, which allows compensation to be awarded to falsely accused individuals. In the **Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023**, this is covered under **Section 395**.

- This acts as a deterrent for filing malicious or frivolous criminal complaints.
- Encourages the **judiciary to penalize misuse** of criminal law more often.

# Frequently Asked Questions (FAQs):

- **1. What is criminalisation of civil disputes:** It refers to the **misuse of criminal law** to address issues that are fundamentally **civil in nature**, such as contractual breaches, money recovery, or property disputes.
- **2.** Why is it a problem: It clogs criminal courts, harasses individuals, and undermines the legal process by bypassing civil procedures and protections.
- **3. Can civil cases be legally converted into criminal cases:** Only if **criminal intent is present from the start**. Otherwise, such conversions are **misuse of law** and courts may penalize them.
- **4.** What is Section 250 CrPC: This section allows courts to order compensation to be paid to wrongfully accused individuals, discouraging frivolous criminal proceedings.

**Conclusion:** The **criminalisation of civil disputes** is a growing concern in India's justice system. While the **pressure and speed** of criminal cases may tempt parties to misuse them, such actions **erode trust**, **clog courts**, and **violate legal rights**. The **Supreme Court's repeated warnings**, combined with **systemic reforms and strict enforcement of penalties**, are vital to restoring the sanctity of both **civil** and **criminal legal processes**.

Judiciary and Constitutional Boundaries: Vice-President's Remarks Ignite National Discourse

**Context:** In a thought-provoking address, **Vice-President Jagdeep Dhankhar** questioned certain facets of India's judiciary, reigniting long-standing debates on **judicial powers**, **accountability**, and **constitutional interpretation**.

His remarks touched upon sensitive issues, including:

• Judicial review

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- Use of Article 142
- Judicial directives to constitutional authorities











- **Bench composition**
- Transparency in internal judicial affairs

# India's Judiciary: A Constitutional Pillar:

The Supreme Court of India serves as the guardian of the Constitution and protector of fundamental rights. Through tools like:

- Judicial review
- **Article 142** ... it ensures **checks and balances** on the executive and legislative branches.

However, the **scope** and **transparency** of these powers often lead to sharp scrutiny.

# Vice-President Dhankhar's Remarks: Key Concerns

At a recent public event, Vice-President Dhankhar spotlighted five contentious areas:

- 1. Lack of Transparency in Judicial Inquiries Criticized opaque mechanisms in handling judicial misconduct, referencing a high-profile **Delhi High Court incident** involving cash recovery.
- 2. Judicial Directives to High Offices Raised concerns over a Supreme Court judgment that prescribed action timelines to the **President and Governors**, stating this may intrude upon constitutional boundaries.
- 3. Judiciary's Accountability Deficit Unlike the executive or legislature, the judiciary lacks direct public accountability mechanisms, he argued.
- 4. Size of Constitution Benches Cited Article 145(3), suggesting that requiring five judges for constitutional matters may be outdated with today's **34-member Supreme Court**.
- 5. Use of Article 142 Warned that the judiciary's extraordinary powers under Article 142 sometimes override **representative democracy** principles.

# A Nation Divided: Supporters vs. Critics

Dhankhar's remarks have drawn a **mixed reaction**:

# **Supporters say:**

- The judiciary **must evolve** with public expectations.
- Calls for **transparency** are necessary for public trust.
- Accountability mechanisms could balance unchecked powers.

# **Critics argue:**

- Remarks from a high office may be seen as **infringement** on **judicial independence**.
- Judicial review and Article 142 are **constitutionally mandated tools** that ensure justice when other institutions fail.

# Judicial Activism: Overreach or Necessary Intervention?

Historically, **Article 142** has enabled bold, justice-oriented decisions:

- Bhopal gas tragedy compensation (1989) •
- Vishaka guidelines on workplace harassment (1997)
- *Cancellation of illegal coal block allocations* (2014) •
- Permanent Commission for Women Officers in Armed Forces (2024) ٠
- *Guidelines on Unlawful Demolitions* (2024)

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These rulings reflect the judiciary's **activist role** in plugging administrative gaps.

# Timeline Mandates & Judicial Review:

The **power of judicial review** is considered a **basic feature** of the Constitution. Legal experts have upheld the Supreme Court's recent timeline ruling, noting:

- It was consistent with **past precedents**.
- It aligned with a **2016 Ministry of Home Affairs Office Memorandum**, which advised prompt action by constitutional authorities.

# Bench Strength & Article 145(3):

- Article 145(3) mandates at least five judges to decide constitutional matters.
- With the SC now expanded to **34 judges**, some believe this threshold could be reconsidered for better efficiency, while others argue that:

"More isn't always faster — logistics and deliberation matter."

# Judicial Independence & Constitutional Sovereignty:

# India's model blends:

- British-style Parliamentary Sovereignty
- American-style Judicial Supremacy

# This hybrid system allows:

- Judicial scrutiny of laws and executive actions.
- Retention of constitutional supremacy.

Any attempt to **reform judicial appointments** (e.g., reintroducing the NJAC) must safeguard **judicial independence**, not dilute it.

Tamil Nadu Bans Raw Egg Mayonnaise: A Bold Move for Public Health

**Context:** In a significant **public health decision**, the **Tamil Nadu government** has announced a **one-year ban**—effective from **April 8**, **2025**—on the **manufacture**, **storage**, **distribution**, **and sale** of **mayonnaise made with raw eggs**. The move is aimed at **preventing foodborne illnesses** in India's **hot and humid** climate, which heightens the risk of **bacterial contamination**.



What is Mayonnaise?

**Origin and Composition:** 

**Mayonnaise** is a popular **cold emulsion sauce** believed to have originated in **France or Spain**. Today, it's a **global staple** in **fast food** and **homemade cooking**, especially as a **spread** or **dressing**.

# **Basic Ingredients**

- Egg yolk
- Vegetable oil
- Vinegar or lemon juice
- Salt and seasonings
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The **egg yolk proteins** act as **emulsifiers**, binding the **oil and acid** into a **smooth, stable mixture**.

## Why Raw Eggs are Risky

## Health Hazards of Raw Egg Mayonnaise:

• Raw eggs can harbor **harmful bacteria** such as **Salmonella** and **E. coli**, which are **not eliminated** unless properly cooked or pasteurized.

Fact Check: According to the World Health Organization (WHO), Salmonella causes over 93.8 million foodborne illnesses and 155,000 deaths globally each year.

#### Why Indian Conditions Are More Dangerous:

- High temperatures and poor refrigeration increase spoilage risks.
- **Street vendors** and **unregulated kitchens** often lack **cold storage**, leading to **unsafe mayonnaise preparation**.

#### **Know the Pathogens:**

- Salmonella: Causes fever, diarrhoea, vomiting, and abdominal pain
- E. coli: Some strains can cause kidney failure (e.g., E. coli 0157:H7)

## High-Risk Groups:

- Children
- Elderly
- People with weakened immune systems

## Expert Opinion: Why the Ban is Justified:

Health experts and nutritionists have welcomed the move, citing:

- Raw egg-based mayo as high-risk food
- The need for regulations on temperature-sensitive food items
- Availability of safer alternatives like eggless or pasteurized egg mayonnaise

**Did You Know?** Pasteurized eggs are **heat-treated** to eliminate bacteria without cooking the egg, making them safe for raw applications like mayonnaise.

## Impact on the Food and Fast-Food Industry:

## **Urban Food Chains and Local Vendors:**

- Many eateries use **homemade or locally-sourced mayonnaise**, which may not follow **food safety standards**.
- The ban will **encourage** a shift toward:
  - Eggless mayonnaise (already dominant in India)
  - Pasteurized egg-based alternatives

## **Market Trends:**

• India's eggless mayo market is estimated to grow at a **CAGR of over 9%**, driven by **vegan trends**, **cost-efficiency**, and **religious dietary preferences**.

## Not an Isolated Incident:

Tamil Nadu follows **Telangana**, which imposed a similar **one-year ban** in **November 2024**.

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This step aligns with Tamil Nadu's history of **proactive health regulations**, such as:

- The gutka and paan masala bans
- Enforcement of food labeling norms
- Crackdown on adulterated milk and oil

## Broader Health Policy Trend in India:

Tamil Nadu's decision reflects a **larger national shift** toward:

- Food safety awareness
- Preventive health measures
- Child and adolescent protection

# Other Recent Bans in India:

- Punjab banned caffeinated energy drinks for children and near schools.
- Scientific assessments are underway to analyze long-term effects of these foods.

**Public health experts** argue that **prevention-based bans** are crucial in **reducing foodborne disease burdens**, especially in developing nations.

## Supreme Court Suggests Minimum Vote Requirement for Unopposed Elections

**Context:** In a significant move, the **Supreme Court of India** has proposed that when only **one candidate** contests an election, they should not be declared elected **automatically**. Instead, the candidate must **secure a minimum prescribed share of votes** to be formally elected.

This suggestion came during the hearing of a petition filed by the **Vidhi Centre for Legal Policy**, challenging the constitutional validity of **Section 53(2) of the Representation of the People Act, 1951** which currently permits uncontested wins without any voting process.

## **Background: The Petition and Core Arguments**

#### About the Petition:

- Filed: August 2024
- Petitioner: Vidhi Centre for Legal Policy

The petition claims that in uncontested elections, voters are **denied their fundamental right** to express dissent through the **"None of the Above" (NOTA)** option.

Reference to Landmark Judgment

The petition cites the Supreme Court's **2013 judgment** in **People's Union for Civil Liberties vs Union of India**, which established that the **right to cast a negative vote** is protected under **Article 19(1)(a)** of the Constitution.

## Main Argument:

• **NOTA** must be available **irrespective** of the number of candidates.

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• Voters' ability to **reject candidates** is essential for **true democracy**.

# Uncontested Elections: Historical Context in Lok Sabha

# According to the petition:

- 26 Lok Sabha constituencies witnessed unopposed elections between 1951 and 2024.
- As a result, **over 82 lakh voters** were **deprived of their right to vote**.

# **Breakdown of Uncontested Elections:**

- 1957: 7 seats
- 1951 & 1967: 5 seats each
- 1962: 3 seats
- 1977: 2 seats
- 1971, 1980, 1989, 2024: 1 seat each

# **Recent Example:**

In **2024**, **Mukeshkumar Dalal** (BJP) from **Surat** was elected unopposed after all other candidates withdrew or were disqualified.

# State Assembly Elections:

The petition also highlights that **unopposed victories** are **more common in State Assembly elections**, underlining a deeper systemic issue.

# Response from the Election Commission of India (ECI):

Key Points fr<mark>om ECI's</mark> Affidavit:

- Rare Occurrence: Only 9 out of 20 Lok Sabha elections saw unopposed wins.
- **Recent Trend:** Since **1989**, only **one uncontested MP** has been elected.
- Growing Political Participation: Increasing number of candidates has reduced uncontested elections significantly.

# ECI's Stand on NOTA:

- **NOTA** is available **only when polling occurs**.
- NOTA is **not a contesting candidate** and thus **irrelevant** in unopposed situations.

# Need for Legislative Amendments:

• Recognizing NOTA or enforcing a minimum vote requirement would require **changes to the Representation of the People Act, 1951** and the **Conduct of Elections Rules, 1961**.

# Supreme Court's Perspective:

# Minimum Vote Threshold Suggestion:

• The Court suggested that a sole candidate must secure a minimum percentage of votes, such as **10% or 15%**, from the **entire electorate** to be declared elected.

# **Democracy and Majority Principle:**

- The **Supreme Court** emphasized that in a **true democracy**, even uncontested winners should have **affirmative support** from a **minimum number of voters**.
- It questioned the fairness of letting a candidate **enter Parliament by default**, without voter validation.











#### Advice to the Government:

The Court urged the **Union Government** to **consider legislative measures** addressing this issue, stating that **Parliament** is best suited to define the specifics.

## Extra Insight: Why This Matters for Indian Democracy

- **Strengthening Voter Rights**: Ensuring minimum approval protects the **integrity of the electoral process**.
- **Discouraging Political Manipulation**: Prevents parties from achieving uncontested victories through intimidation, withdrawal, or technical disqualifications.
- **Global Examples**: Countries like **France** and **Australia** require minimum turnout or specific vote percentages in some elections to validate results.

#### **Conclusion:**

The **Supreme Court's suggestion** for introducing a **minimum vote threshold** for unopposed elections aims to **safeguard democratic legitimacy** and **empower voters**. Whether through legislative action or broader electoral reforms, this debate could redefine the **future of Indian democracy** by ensuring that **every elected representative truly commands public support**.

# **UDAN Scheme: Revolutionizing Regional Air Connectivity**

**Context:** The **UDAN (Ude Desh ka Aam Naagrik) Scheme** recently celebrated its **8th anniversary**, marking a significant milestone in making **air travel more accessible, affordable**, and **inclusive** for the common citizens of India.



## What is the UDAN Scheme?

#### About the Initiative:

# Launched under the National Civil Aviation Policy (NCAP), 2016, the

**UDAN scheme** aims to **democratize air travel** by enhancing **regional connectivity**, especially for **Tier-2** and **Tier-3** cities.

It operates on a **market-driven model** supplemented with **financial support** to make aviation economically viable for airlines and passengers alike.

The **Airports Authority of India (AAI)** acts as the **nodal agency** for its effective implementation.

**Fact:** The scheme's tagline, "*Ude Desh ka Aam Naagrik*", literally means "**Let the common citizen of the country fly**".

## **Objectives and Significance of UDAN:**

- **Promote balanced regional growth** by connecting underserved and unserved airports.
- Make air travel affordable for the common citizen.
- Boost economic development in smaller towns by facilitating business, tourism, and investment.
- Enhance air infrastructure across the country, including remote and isolated regions.

## Key Features of the UDAN Scheme:











- **1. Viability Gap Funding (VGF):** Airlines receive **financial support** to cover potential losses, ensuring operations remain viable even on less profitable routes.
- **2. Regional Connectivity Fund (RCF):** Funded through a **small levy** on major flight routes, this supports the **VGF payments** needed for regional routes.
- **3.** Airfare Cap: Airfares are capped at affordable rates (approximately 2,500 for a one-hour flight) to keep flying within reach of the middle and lower-income groups.
- **4.** Tax Concessions: Reduced taxes on Aviation Turbine Fuel (ATF) and other operational incentives help airlines lower their operational costs.
- **5.** Collaborative Governance: Strong partnership between the Centre, State governments, AAI, and private airport operators to ensure smooth execution and monitoring.

# **Evolution and Growth of the UDAN Scheme:**

# **Major Achievements:**

- 625 routes operationalized, connecting 90 airports, including 15 heliports and 2 water aerodromes.
- **Over 1.49 crore passengers** have benefited from affordable regional flights.
- India's airport network expanded dramatically from 74 airports (2014) to 159 airports (2024).

# Key Innovations Introduced Under UDAN:

- 1. UDAN Yatr<mark>i Cafes: Affordable Cafeterias</mark> launched at Kolkata and Chennai airports, providing quality meals at reasonable prices for travelers.
- 2. Seaplane Operations: UDAN 5.5 initiated to explore over 50 water bodies for potential seaplane connectivity, enhancing access to remote areas and boosting tourism.
- 3. Krishi UD<mark>AN Sche</mark>me:
  - A special wing under UDAN to **support farmers** by providing **affordable air logistics** for **agriproduce**, especially from **Northeast India**, **hilly**, and **tribal regions**.
  - **Objective:** Increase value realization for farmers and reduce wastage of perishable goods.
- **4. Lifeline UDAN:** Introduced during the **COVID-19 pandemic** to **transport essential medical supplies** and **PPE kits** to **remote regions** via air logistics, ensuring critical support.











## Deep-Sea Mining: Uncovering Lasting Ecological Impacts

**Context:** A recent study published in **Nature**, titled **'Long-term Impact and Biological Recovery in a Deep-Sea Mining Track,'** reveals alarming findings about the effects of deep-sea mining. Conducted by scientists from **Britain's National Oceanography Centre**, the research shows that an area of the **Pacific Ocean seabed mined over 40 years ago** has not fully recovered.



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The results arrive at a critical time, as **36 countries** recently gathered at a **UN International Seabed Authority (ISA) meeting in Jamaica** to debate whether

mining companies should be permitted to extract valuable metals from the ocean floor.

#### What is Deep-Sea Mining?

Deep-sea mining refers to the extraction of **valuable minerals and metals** from the ocean floor, often located at depths beyond **200 meters**. The process is divided into three main categories:

- 1. **Collecting Polymetallic Nodules:** Harvesting metal-rich rocks scattered across the ocean floor.
- 2. **Mining Seafloor Sulphide Deposits:** Extracting materials from hydrothermal vents, often rich in precious metals.
- 3. **Removing Cobalt Crusts:** Stripping minerals from underwater mountains and volcanic structures.

#### Why It Matters:

Deep-sea mining is attracting interest because of its potential to provide essential materials such as **nickel**, **cobalt, rare earth elements, and copper**—all critical for technologies like **renewable energy systems**, **electric vehicles, and everyday electronics**.

#### Technological Innovations:

The technology for deep-sea mining is still evolving, with companies exploring methods such as:

- Vacuum-based Extraction: Using massive pumps to collect materials from the seabed.
- **AI-Driven Robots:** Deploying sophisticated machines to **selectively gather polymetallic nodules**.
- Underwater Mining Machines: Designed to extract resources from underwater mountains and volcanic regions.

#### **Strategic Importance:**

With **onshore reserves depleting** and the **global demand for critical minerals rising**, governments and corporations are increasingly eyeing the **deep sea** as the next frontier for resource extraction.

#### Key Findings of the Study

The study focused on a **small-scale mining experiment conducted in 1979** within a section of the **Pacific Ocean seafloor**. Researchers examined an **8-meter strip** of seabed during an expedition in **2023** to assess the long-term impacts.

#### **Major Findings:**

- 1. **Long-Term Damage:** Mining led to **significant sediment disruption** and a **decline in larger marine species**, indicating that the ecosystem has not fully recovered even after **four decades**.
- 2. **Partial Recovery:** While some species are **beginning to recolonize**, the process is **slow and incomplete**, raising concerns about the long-term viability of deep-sea ecosystems.

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- 3. **Broader Environmental Concerns:** Previous studies have highlighted additional negative effects of deep-sea mining, such as:
  - Harmful Noise and Vibrations
  - Sediment Plumes disrupting habitats
  - Light Pollution impacting deep-sea species

A **2023 study** published in **Current Biology** concluded that deep-sea mining **significantly reduces animal populations** and has broader ecological impacts than previously estimated.

# **Implications for Policy and Regulation:**

The findings of this study are expected to play a crucial role in shaping **future regulations** by the **International Seabed Authority (ISA)**.

#### Key Takeaways:

- The research suggests that while **partial recovery is possible**, **full restoration** of deep-sea ecosystems could take **decades or longer**.
- Data from this study contributes to the **Seabed Mining and Resilience to Experimental Impact** (SMARTEX) project, which aims to support informed decision-making about the ecological and societal impacts of deep-sea mining.

# The Future of Deep-Sea Mining: Clarion Clipperton Zone (CCZ):

The **Clarion Clipperton Zone (CCZ)** is a **mineral-rich region** in the **North Pacific Ocean**, located between **Hawaii and Mexico**. It is known for its abundance of **polymetallic nodules** containing valuable minerals such as:

- Manganese
- Nickel
- Copper
- Cobalt

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These materials are essential for manufacturing electric vehicles, solar panels, and other clean energy technologies.

## The Debate Continues:

As interest in deep-sea mining grows, the ISA is currently evaluating whether and under what conditions mining should be allowed. The recent study adds substantial weight to the argument for a **moratorium on deep-sea mining**, particularly in ecologically sensitive areas like the **CCZ**.

## **Conclusion: A Call for Precaution:**

The findings underscore the **lasting impact** of deep-sea mining on fragile marine ecosystems. While technological advancements and resource demands continue to drive interest in deep-sea mining, the **long-term ecological risks** cannot be ignored.

Future regulations must be guided by robust scientific research, prioritizing **sustainability, biodiversity protection, and responsible resource management**.

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#### Kasampatty Sacred Grove: A Jewel of Biodiversity and Culture

**Context:** The **Kasampatty Sacred Grove**, also known as the **Veera Kovil Sacred Grove**, is a sacred and ecologically rich site nestled in **Kasampatty village** of **Dindigul District**, Tamil Nadu. This sacred grove has recently been **notified as a Biodiversity Heritage Site** by the Tamil Nadu government, underscoring its significance in preserving both **natural heritage** and **cultural values**.



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A Glimpse into Kasampatty Sacred Grove :

- Location: Kasampatty Village, Dindigul District, Tamil Nadu
- Area: 4.97 hectares
- **Proximity:** Near the **Alagarmalai Reserve Forest**, surrounded by **lush mango plantations** that enrich the grove's fertility.

#### Flora and Fauna of the Grove:

The **Kasampatty Sacred Grove** is a **biodiversity hotspot**, hosting a wide variety of species:

- **48 plant species**, including rare and medicinal varieties.
- 22 shrub species and 21 lianas (woody vines).
- **29 herb species** that contribute to the grove's ecological balance.
- Over 12 bird species, small mammals, reptiles, and numerous insects, showcasing its genetic richness and ecosystem diversity.

This extraordinary diversity makes the grove a **critical site for conservation** and **environmental education**.

## Biodiversity Heritage Sites (BHS): A National Effort to Protect Nature

A **Biodiversity Heritage Site** (BHS) is a unique and highly valued ecosystem with extraordinary biodiversity. These sites are recognized for their cultural, ecological, and aesthetic significance.

## **Key Characteristics of BHS:**

- **Richness of Species:** Both **wild** and **domesticated species**, along with **intra-specific categories**.
- High Endemism: Presence of species found nowhere else.
- **Rare and Threatened Species:** Including **keystone species** and species with **evolutionary significance**.
- **Cultural Significance:** BHS sites have important **cultural, ethical, or aesthetic values**, sometimes linked to long-standing human association with the land.
- Fossil Beds: Some sites feature remnants of preeminent biological components, like ancient fossils.

## Kasampatty Sacred Grove's Designation as a BHS:

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- Tamil Nadu Government declared the Kasampatty Sacred Grove as the state's second BHS under the Biological Diversity Act, 2002.
- This designation helps protect the **biological diversity** and ensures **sustainable management** of the site while **respecting the cultural heritage** of the local community.

# Understanding the Biological Diversity Act, 2002:

The **Biological Diversity Act, 2002**, empowers state governments to designate areas as **Biodiversity Heritage Sites** in consultation with local bodies. This act aims to:

- **Conserve biodiversity** and prevent the **degradation of ecosystems**.
- Enhance the quality of life for local communities through sustainable practices.
- Ensure that **local traditions and practices** are respected while maintaining the grove's ecological health.

# Historical Context and Future of Kasampatty Sacred Grove:

- The grove's **sacred status** has long been respected by the local community, who have nurtured its **ecological richness** through **spiritual practices**.
- The Tamil Nadu government's move to protect this site enhances efforts to preserve the grove's biodiversity and cultural significance.

# Additional Facts and Knowledge:

- Sacred Groves in India: India is home to over 13,000 sacred groves, each preserving local flora and fauna, representing a unique blend of cultural reverence and ecological importance.
- Biodiversity Importance: Protecting sacred groves like Kasampatty ensures the continuation of traditional ecological knowledge, which is crucial for the conservation of endangered species and ecosystems.
- **Cultural Significance**: These groves have been places of **worship and spiritual significance** for centuries, fostering a deep connection between **nature and culture**.

The **Kasampatty Sacred Grove** stands as a testament to the harmonious relationship between nature and culture. Its new status as a **Biodiversity Heritage Site** marks a significant step in preserving **India's natural heritage** and protecting the invaluable species that call it home.

# Tensions Rise in the Arctic as Global Powers Compete for Strategic Control

**Context:** The Arctic, once a frozen and remote region, has quickly become a **strategic hotspot** on the global stage. **Climate change** is causing the ice caps to melt at an unprecedented rate, opening up new trade routes and revealing **vast untapped natural resources**. These developments have led to increased interest from major powers, intensifying the competition for control of this critical region. **If tensions are not managed properly**, the Arctic could become a focal point for **military conflicts** and political struggles.



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# Why the Arctic Matters: Strategic and Economic Value:

- 1. Natural Resources: The Arctic is home to 13% of the world's undiscovered oil and 30% of its untapped natural gas reserves. It also boasts rich deposits of rare earth elements, copper, and phosphates, and is crucial for fishing industries. These resources, long buried under ice, are now becoming accessible due to global warming.
- 2. New Shipping Routes: The melting ice is opening up vital new shipping lanes, like the Northeast Passage along Russia's Arctic coast. This route could reduce travel time between East Asia and Europe by nearly 8,000 km, making it a game-changer for global trade. China is particularly invested in this opportunity, proposing the creation of a "Polar Silk Road" to bypass traditional chokepoints such as the Suez Canal.

# Legal Framework and Territorial Disputes:

Unlike the **Antarctic**—which is governed by an international treaty system—the Arctic's territorial disputes are handled under the **United Nations Convention on the Law of the Sea (UNCLOS)**. Nations can claim seabed areas beyond their **200-nautical-mile Exclusive Economic Zones (EEZs)** if they can prove geological continuity with their continental shelf.

- The Arctic Council consists of eight nations: U.S., Canada, Russia, Denmark (via Greenland), Norway, Sweden, Finland, and Iceland. Although the Council aims to promote environmental protection and scientific collaboration, geopolitical rivalries have placed significant strain on its cohesion.
- Nations like **Canada**, **Denmark**, and **Russia** have submitted overlapping claims to the **UN Commission on the Limits of the Continental Shelf**. If these claims are approved, countries could gain control over vast portions of the Arctic seabed.

# Key Points of Tension in the Arctic:

- 1. U.S. and Canada Dispute: The Northwest Passage, a potential shortcut for shipping, is a major flashpoint. Canada claims it as its internal waters, while the U.S. insists it's an international strait, emphasizing the right to freedom of navigation. This ongoing disagreement adds to tensions between the two neighboring countries.
- 2. **Greenland's Strategic Importance**: Former U.S. President **Donald Trump's attempt to buy Greenland** from **Denmark** sparked controversy, especially given the **Pituffik U.S. military base** located there. This move raised alarm bells in **Denmark** and **Europe**, leading to strengthened security commitments.
- 3. **Russia's Assertiveness**: **Russia** has the most advanced Arctic infrastructure, including the world's only **nuclear-powered icebreaker fleet**. It has also revived several **Soviet-era military bases** and planted its flag on the Arctic seabed during a 2007 submarine expedition. Russia's claims over parts of the **Svalbard Islands**, which belong to **Norway**, have further fueled tensions with NATO allies.
- 4. **NATO's Growing Presence**: The **admission of Sweden** and **Finland** into **NATO** has shifted the balance in Arctic geopolitics. NATO now conducts **military exercises** near Russian borders, increasing the **military stakes** in the region.

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5. China's Arctic Ambitions: Despite not being an Arctic nation, China has declared itself a "Near-Arctic State" and is actively pursuing Arctic shipping routes. China's collaboration with Russia, including joint naval drills, demonstrates the growing strategic ties between the two nations, which alarms Western powers.

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## **Broader Implications for Global Security:**

The **Arctic's strategic value** extends far beyond its natural resources. As **global powers** vie for control of the region, it is becoming a **high-stakes arena** for energy politics, military posturing, and trade competition.

- The **absence of clear legal frameworks** and the **limited scope for multilateral cooperation** raise the risk of **conflict**.
- Environmental concerns are also critical. Increased shipping and drilling activities could accelerate the ecological degradation of the Arctic, which is already under immense stress due to climate change.

## **Conclusion: The Arctic as the New Global Frontier**

As the **ice retreats**, the Arctic is rapidly becoming a **center of geopolitical rivalry**. Nations are eager to stake their claims to its **energy resources** and **shipping lanes**. The potential for conflict looms large, and without **robust international cooperation**, the Arctic could evolve into a major **flashpoint** in a world that is becoming increasingly **multipolar**.

#### **Energy Statistics India 2025**

**Context:** The **Ministry of Statistics and Programme Implementation (MoSPI)** has released its annual publication, **'Energy Statistics India 2025'**, through the **National Statistics Office (NSO)**. This comprehensive report provides insights into **India's evolving energy landscape** and future projections.



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## India's Energy Scenario in 2025:

Total Energy Supply and Demand:

- Supply: Approximately 1,800 Million Tonnes of Oil Equivalent (MToE) an annual increase of 4.5% compared to 2024.
- Demand Drivers:
  - Industrial Growth: 40%
  - Transportation: 25%
  - Residential Consumption: 20%

## **Energy Mix (Sources and Shares):**

- **Coal: 48%** (Dominant but declining gradually)
- **Oil: 28%** (Mainly for transportation and industrial use)
- Natural Gas: 8% (Growing, especially for cleaner energy initiatives)
- Renewables (Solar, Wind, Hydro, Biomass): 12% (Rapid growth, especially solar and wind)
- Nuclear: 4% (Stable but with planned expansion)

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# Fossil Fuel Reserves and Production:

Coal:

- Total Reserves: 320 billion tonnes.
- Top States:
  - o Odisha: 25.47%
  - o **Jharkhand: 23.58%**
  - Chhattisgarh: 21.23%
  - West Bengal: 8.72%
  - Madhya Pradesh: 8.43%
- **Concentration:** Approximately **85%** of total reserves are in these states.
- Annual Production: 950 million tonnes (meeting 85% of domestic demand).
- Global Rank: 2nd largest coal producer, after China.

# Lignite:

- Total Estimated Reserves (as of April 2024): 47.30 billion tonnes.
- Top State: Tamil Nadu (79% of total reserves).

# Crude Oil:

- Highest Reserves: Western Offshore region (32% of total reserves).
- Other Key Areas: Assam region (22% of total reserves).

# Natural Gas:

- Largest Reserves: Western Offshore region (31%).
- Followed By: Eastern Offshore region (24%).

# Renewable Ener<mark>gy Growth</mark>:

Potential by Source:

- Wind Power: ~55% of total renewable potential.
- Solar Energy and Hydro: Also significant contributors.

# Geographical Distribution:

- Top States:
  - Rajasthan: 20.3%
  - Maharashtra: 11.8%
  - **Gujarat: 10.5%**
  - Karnataka: 9.8%
- More than 50% of renewable potential concentrated in these states.

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# Capacity Expansion (2024-2025):

- Solar Power: 175 GW (Up from 150 GW in 2024).
- Wind Power: 50 GW (Up from 45 GW in 2024).

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Hydro and Biomass Energy:

- Hydropower: 52 GW (12% of total electricity generation).
- Biomass & Waste-to-Energy: 15 GW, promoting sustainable practices in rural areas.

# **Electricity Generation and Consumption Trends:**

- Installed Capacity: 450 GW (Increased from 420 GW in 2024).
- Total Electricity Generation: 1,700 TWh (terawatt-hours).
- Per Capita Consumption: 1,500 kWh/year (Reflecting economic growth and urbanization).
- **Transmission Losses:** Reduced to **17%** during FY 2023-24 (compared to **23%** in FY 2014-15), thanks to **Smart Grid Initiatives**.

**Energy Efficiency and Sustainability Measures:** 

# **Government Policies and Initiatives:**

- National Hydrogen Mission: Promoting Green Hydrogen for industrial use.
- **Perform, Achieve, and Trade (PAT) Scheme:** Encouraging energy-efficient technologies across industries.
- FAME-III: Accelerating the adoption of **Electric Vehicles (EVs)** and developing charging infrastructure.

# Carbon Emissions and Climate Targets:

- Projected Emissions (2025): 2.9 billion tonnes of CO<sub>2</sub> a 4% decline due to increased renewable usage.
- Net-Zero Goal: Commitment to achieving net-zero emissions by 2070.

# Future Outlook (2026-2030):

## **Projections:**

- **Renewable Share:** Expected to reach **25%** by **2030**.
- Energy Demand Growth: Projected 5% annual increase, driven by economic expansion.

# **Challenges Ahead:**

- **Dependence on Fossil Fuels:** Continued reliance on **coal and imported crude oil**.
- Energy Security Risks: Geopolitical uncertainties affecting oil and gas imports.
- Infrastructure Bottlenecks: Urgent need for grid modernization and renewable storage solutions.

Euphaea wayanadensis: A Newly Discovered Jewel of the Western Ghats

**Context:** A new species of **damselfly**, named **Euphaea wayanadensis**, has been discovered in the **Wayanad region** of the **Western Ghats**, **Kerala**. This exciting discovery, published in the **peer-reviewed journal ENTOMON**, marks **Kerala's 191st recorded odonate species** and the **223rd documented species from the Western Ghats**.



Taxonomic Classification:











- Family: Euphaeidae (Commonly known as Gossamerwings)
- Genus: Euphaea
- Species: Euphaea wayanadensis

# Historical Sightings & Identification:

- First Sightings: 2013 at the Kalindi River, Thirunelli in Wayanad district, Kerala.
- Further Sightings:
  - **2013 to 2019:** Continued observations in Wayanad.
  - 2019 to 2023: Additional sightings in Aralam (Kannur, Kerala) and the western slopes of Coorg (Karnataka).

# **Identification Challenges**

- Initially **misidentified as** *Euphaea pseudodispar*, a species commonly found in **Maharashtra**.
- Later confirmed as a distinct species through **detailed morphological study and genetic analysis**.

# Key Morphological Features:

# 1. Distinctive Hind Wing:

 Features a longer black patch compared to closely related species, making it a key identification marker.

# 2. Striking Colouration:

- Males exhibit broader and uninterrupted humeral and antehumeral stripes.
- The brilliant metallic blue or green body contrasts sharply with their dark wings, enhancing visibility.

# 3. Unique Ge<mark>nital Str</mark>ucture:

• The **male genital vesicle** displays structural traits that are **distinct from related species** in the *Euphaea* genus.

# Habitat and Distribution:

# **Preferred Habitat:**

- Thrives in **fast-flowing streams** with **rocky beds** and **abundant aquatic vegetation**.
- Commonly found in **evergreen and semi-evergreen forest regions** along stream banks.

# Geographical Distribution:

• Highly restricted to the **Western Ghats**, primarily in the **Wayanad region (Kerala)**, **Aralam (Kannur, Kerala)**, and **western slopes of Coorg (Karnataka)**.

# Seasonal Activity:

• Active throughout the year except during the dry seasons of March and April.

# **Conservation Concerns:**

- **Highly Restricted Distribution:** Makes it particularly **vulnerable to habitat loss** and **climate change**.
- Habitat Fragmentation: Increasing deforestation and human encroachment threaten its natural habitat.

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Water Pollution: Contaminants from agricultural run-off and urbanization pose significant threats to its survival.

## Additional Facts & Knowledge:

- 1. Ecological Role:
  - As a **predator of small insects**, *Euphaea wayanadensis* helps maintain **ecosystem balance** by controlling pest populations.

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- 2. Indicator Species:
  - Damselflies and dragonflies are excellent bioindicators due to their sensitivity to changes in water quality and habitat conditions.
  - The presence of *Euphaea wayanadensis* signifies a **healthy freshwater ecosystem**.
- 3. Western Ghats Biodiversity Hotspot:
  - The Western Ghats is recognized as one of the world's eight "hottest hotspots" of biological 0 diversity.
  - It harbors approximately **160** species of odonates (dragonflies and damselflies), with 0 many endemic to the region.
- 4. Conservation Status:
  - While Euphaea wayanadensis is newly discovered, its restricted distribution and 0 specialized habitat preferences could warrant a "Vulnerable" or "Endangered" status if formally assessed under IUCN criteria.

## **Conclusion:**

The discovery of **Euphaea wayanadensis** not only enriches the biodiversity catalog of the **Western Ghats** but also highlights the urgent need for **conservation measures**. As a **bioindicator species**, its presence and health are vital signs of the region's ecological well-being.

## Fluoride Contamination in India: A Growing Concern

Context: The Uttar Pradesh Jal Nigam has reported excessive fluoride levels in the groundwater of **120 hamlets**, affecting nearly **2 lakh people**. Some villages recorded fluoride concentrations of **2 mg/L or more**, exceeding the safe limit of 1-1.5 mg/L.



- What is Fluoride?
  - Fluoride is a naturally occurring element commonly found in • groundwater due to the weathering of rocks and minerals.
  - It is beneficial for **dental health** in small amounts but becomes **toxic at higher concentrations**.

Safe Limit: 1-1.5 mg/L (as per the Bureau of Indian Standards - BIS). Harmful Levels: Above 1.5 mg/L can cause serious health issues.

## Health Risks of Excessive Fluoride Consumption

## 1. Skeletal Fluorosis:

- Weakening of bones and joints. 0
- Stiffness, pain, and deformities in severe cases.

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#### 2. Dental Fluorosis:

- Discoloration and pitting of teeth.
- More harmful during the **developmental stages of children**.

# 3. Neurological Damage:

• High exposure over time can affect **cognitive development in children**.

## 4. Other Risks:

Possible links to **thyroid problems, kidney damage, and reproductive issues**.

# Other Groundwater Contaminants in India:

Contaminant	Affected States	Health Risks
Arsenic	West Bengal, Bihar, Jharkhand, Uttar Pradesh	Skin lesions, cancer, cardiovascular diseases
Uranium	Punjab, Haryana, Rajasthan, Gujarat (12 states)	Kidney damage, bone toxicity
Iron	Rajastha <mark>n, Jharkhand, Assam</mark>	Liver damage, heart diseases
Other Metals	Antimony, Cadmium, Copper, Barium	Toxicity, hypertension, liver & kidney damage

# States with High Fluoride Contamination:

- 1. Rajasthan:
  - Highest fluoride contamination in India.
  - **Particul**arly severe in **arid regions** with high rock mineral content.
- 2. Telangana & Western Andhra Pradesh:
  - Fluoride contamination due to **natural geological formations**.

# 3. Eastern Karnataka:

• Dry climate contributes to the concentration of fluoride in groundwater.

# 4. Uttar Pradesh (Newly Reported):

• Over **120 hamlets** affected with fluoride levels exceeding **2 mg/L**.

# Why is Fluoride Contamination Increasing?

- **Over-extraction of groundwater** for agriculture and industrial use.
- Lack of adequate rainwater recharge in arid regions.
- **Deteriorating infrastructure** for water purification and management.

# Seasonal Variations:

- Fluoride levels spike during dry, pre-monsoon months, especially in arid regions of Western India.
- Reduced water availability leads to **concentration of dissolved minerals**, including fluoride.

# **Mitigation Measures:**

1. Rainwater Harvesting:

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#### 2. Defluoridation Techniques:

Activated alumina filtration, Nalgonda technique, and Reverse Osmosis (RO) are effective methods.

#### 3. Awareness Programs:

Educating communities on safe drinking water practices and the health impacts of fluoride. 0

## 4. Monitoring and Mapping:

0 Continuous monitoring of groundwater quality, particularly in **high-risk areas**.

## **Key Takeaways:**

- Fluoride contamination is a serious issue affecting millions across India.
- Addressing this problem requires a **multi-pronged approach**, involving **policy changes**, community awareness, and technological interventions.
- The **new reports from Uttar Pradesh** highlight the need for **urgent intervention and remediation** efforts.

Star-Rating System for Environmental Clearances Withdrawn by Environment Ministry

**Context:** In a significant development, the **Ministry of Environment**, Forest and **Climate Change (MoEF&CC)** has formally **withdrawn the Star-Rating System** that was designed to evaluate the performance of **State Environmental Impact** Assessment Authorities (SEIAAs). This move comes after legal scrutiny and an order by the National Green Tribunal (NGT), raising questions about the balance between administrative efficiency and environmental protection.



# **Background: What Was the Star-Rating System?**

# Launched On: January 17, 2022

**Objective:** To **incentivize faster environmental clearances** and promote the **Ease of Doing Business** by evaluating SEIAAs on their efficiency and timeliness in processing applications.

**Origin**: The system was initiated after a **November 2021 high-level meeting** chaired by then **Cabinet** Secretary Rajiv Gauba.

# How the Star-Rating Worked:

**Key Evaluation Criteria**:

- **Time taken** to process and grant **environmental clearances**.
- Adherence to the prescribed timelines under the EIA Notification 2006.
- **Performance metrics** at both **pre-approval** and **approval** stages.

## **Rating Scale**:

- Ratings ranged from **0 to 7 stars**, based on performance.
- Applied to **Category B projects**, which are assessed by SEIAAs.
- **Category A projects** remained under the **central MoEF&CC's jurisdiction**.

# **Technology Integration: The PARIVESH Platform**

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- The rating system was embedded in the **PARIVESH 1.0** platform—India's single-window digital interface for environmental clearance processes.
- There were plans to **migrate and enhance** the system under **PARIVESH 2.0**, including revised scoring criteria. However, these plans are now **suspended** following the withdrawal.

# Legal Challenge and NGT Intervention:

Petitioner: Meenava Thantai, a fishermen's collective from Tamil Nadu.

# **Kev Concerns Raised**:

- The system was alleged to be **arbitrary** and **legally unsound**.
- Critics argued it **diluted environmental scrutiny** by prioritizing speed over substance.
- Feared a weakened Environmental Impact Assessment (EIA) process, particularly for ecologically sensitive areas.

# NGT Verdict:

- On March 27, 2025, the NGT declared the January 2022 Office Memorandum (OM) introducing the star-rating as **inoperative**.
- The MoEF&CC acknowledged the concerns and stated that a revised set of performance evaluation criteria may be introduced after careful review.

# **Broader Implications:**

**Key Issues in Environmental Governance:** 

- Balancing development with ecological integrity.
- The increasing role of the National Green Tribunal in ensuring judicial oversight over environmental policy.
- Debates over "Ease of Doing Business" vs. "Environmental Safeguards".

# Lessons and Way Forward:

- The withdrawal signals the need for **more nuanced and inclusive frameworks**. •
- Future models must integrate scientific rigor, transparency, and stakeholder engagement, rather than relying solely on quantitative efficiency metrics.

# **Conclusion: Rethinking Ratings in Environmental Oversight**

While the **Star-Rating System** aimed to promote **administrative efficiency**, it raised valid concerns about the quality of environmental decision-making. The government's decision to withdraw the system demonstrates its recognition of the **complexity of environmental governance**.

Looking ahead, the Centre may develop a revised framework that blends performance measurement with robust environmental safeguards, ensuring that India's ecological priorities are not overshadowed by procedural speed.

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To the Point Monthly Current Affairs



SC Orders Probe into Forest and Wildlife Law Violations in Agasthyamalai Landscape, Tamil Nadu

**Context:** In a landmark move, the **Supreme Court of India** has ordered an investigation into alleged violations of forest and wildlife laws in Tamil Nadu's Agasthyamalai landscape, specifically related to the encroachment of Singampatti Zamin forest lands.

These forest areas were cleared over time for the cultivation of **tea**, **coffee**, and rubber plantations, allegedly without proper environmental clearances.

#### Key Case: A. John Kennedy v. State of Tamil Nadu & Others

The case highlights the **conflict between commercial interests and ecological integrity**. The lands in question were gradually brought under increasing levels of protection:

- 1978: Declared part of the Kalakkad-Mundanthurai Reserved Forest
- **2007**: Notified as **Core Critical Tiger Habitat**
- 2012: Designated as a Wildlife Sanctuary and part of Kalakad Mundanthurai Tiger Reserve (KMTR)

The elevation in legal protection led to the **eviction of tea estate workers**, raising socio-ecological concerns.

## Supreme Court's Key Observations:

## **Forests as Ecological Lungs:**

- The Court emphasized that "forests are the lungs of the ecosystem", playing a vital role in regulating climate, rainfall, and biodiversity.
- Citing the Ministry of Environment, it noted that 13,000 sq. km of forest land across India is under illegal encroachment.

Tiger Conservation & Ecosystem Balance

Referencing the landmark T.N. Godavarman Thirumulpad v. Union of India case, the Court reiterated:

"The tiger perishes without the forest, and the forest perishes without the tiger."

Tigers are umbrella species—their conservation ensures the health of the entire forest ecosystem.

## **Ecocentric Approach Over Anthropocentric:**

- Drawing from the **2024 Telangana v. Mohd. Abdul Qasim** decision, the Court upheld an **ecocentric** jurisprudence, where nature is valued for its intrinsic worth, not just for human utility.
- This shift aligns with **global environmental ethics**, emphasizing biodiversity rights alongside human interests.

## **Understanding the Agasthyamalai Landscape:**

## Location:

- Straddles the southern Western Ghats, across Tamil Nadu and Kerala. •
- Recognized as one of the **hottest biodiversity hotspots** in the world. •

## **Kev Protected Areas:**

Kalakad-Mundanthurai Tiger Reserve (KMTR) – Tamil Nadu

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- Periyar Tiger Reserve Kerala
- Srivilliputhur Grizzled Squirrel WLS, Meghamalai WLS, Tirunelveli WLS

## Hydrological Importance:

• Over **14 rivers originate** or pass through this landscape, including the **Thamirabarani River**, vital for agriculture and drinking water.

## **UNESCO Recognition:**

- The Agasthyamalai Biosphere Reserve is part of the UNESCO Man and the Biosphere (MAB) Programme.
- Comprises the **Shendurney**, **Peppara**, and **Neyyar Wildlife Sanctuaries** (Kerala) along with KMTR (Tamil Nadu).

## Why This Matters:

- This case reflects the **increasing role of the judiciary** in **balancing environmental protection with human development**.
- It sets a precedent for stricter scrutiny of **land-use changes** in **ecologically sensitive zones**, particularly in **biodiversity hotspots** like the Western Ghats.
- The focus on an **ecocentric approach** represents a **paradigm shift in Indian environmental jurisprudence**, aligning legal frameworks with **climate goals and biodiversity conservation**.

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# Seaweed Farming in India: A Green Revolution from the Sea

**Context:** India is actively promoting **seaweed farming** as a **sustainable**, **eco-friendly**, and **profitable industry** under the **Pradhan Mantri Matsya Sampada Yojana (PMMSY)**.

**Goal**: Boost **seaweed production to 1.12 million tonnes** over the next five years.

What are Seaweeds?

Seaweeds are macroscopic algae that grow in marine and shallow coastal waters, especially on rocky shores.



**Types of Seaweeds:** 

- **Microscopic**: e.g., *Phytoplankton* vital for the **marine food chain**.
- **Macroscopic**: e.g., *Giant kelp* forms underwater forests like marine redwoods.
- Color Variants:
  - Red Algae (434 species in India)
  - Brown Algae (194 species)
  - Green Algae (216 species)

India has documented around **844 seaweed species** in its coastal waters.

## Seaweed Cultivation: A Sustainable Solution

## Why It's Eco-Friendly:

Requires **no land, freshwater, fertilizers, or pesticides**.

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- Grows in **shallow seawater**, ideally:
  - **Salinity** ≥ 30 ppt
  - **Water Depth**  $\geq$  1.0 meter at low tide
  - **Temperature**: 26–30°C
  - Mild water currents
  - Transparent, clean water with sandy or rocky bottoms

# Health & Nutritional Benefits of Seaweeds

Seaweeds are called the "Medical Food of the 21st Century" for good reason.

# **Key Benefits:**

- **Nutrient-Dense**: Contains **54 trace elements**, vitamins, minerals, and amino acids.
- Disease Prevention: Fights cancer, diabetes, arthritis, cardiovascular issues, and high blood pressure.
- **Digestive Health**: Rich in **fiber and prebiotics**, improves gut health.
- Thyroid Function: Natural iodine source.
- Immunity Booster: Contains polysaccharides and bioactive compounds.
- Anti-inflammatory & Antimicrobial: Useful for burns, rashes, and wounds.
- **Cancer Research**: Some species show **anti-cancer potential** (e.g., leukemia and tumor treatments).

Fun Fact: The Japanese have used seaweed (nori) in sushi for over 1,500 years!

## Socio-Economic Significance:

## Economic Potential:

- Global seaweed market: US\$ 5.6 billion
- Projected to grow to **US\$ 11.8 billion by 2030** (World Bank)

# Livelihood & Empowerment:

- Ideal for marginalized coastal communities
- Promotes women's empowerment through Self-Help Groups (SHGs)

# Industrial Uses:

- ~60 seaweed species are **commercially valuable**
- Used in food, cosmetics, fertilizers, pharmaceuticals, and gelling agents

# Seaweed in Agriculture:

- Seaweed is a recognized **biostimulant**, helping in:
  - $\circ$  Crop yield improvement
  - Soil health
  - Plant resistance to drought and disease

# Regulated under the Fertilizer (Control) Order, 1985

• Supports organic farming as a natural fertilizer

#### Environmental & Ecological Importance: *Download Our Application*










- Acts as a **natural carbon sink**, absorbing **CO**<sub>2</sub>
- Improves ocean health and provides marine habitats
- Requires no harmful inputs like fertilizers or pesticides

# Government Initiatives:

#### **Key Programs:**

- Pradhan Mantri Matsya Sampada Yojana (PMMSY) Core scheme promoting seaweed farming
- Target: 1.12 million tonnes production in five years

### **R&D & Infrastructure Support:**

- **CSIR-CSMCRI** introduced **tissue culture** for mass cultivation of *Kappaphycus alvarezii* (used for **carrageenan** production)
- Multipurpose Seaweed Park in Tamil Nadu
- Seaweed Brood Bank in Daman & Diu
- Implemented by National Fisheries Development Board (NFDB)

### Key Challenges:

Challenge	Description
Awareness Gap	Lack of knowledge among coastal communities
Infrastructure	Poor facilities for drying, processing, and storage
Ecological Risks	Unsustainable practices may harm marine ecosystems
Market Bar <mark>riers</mark>	Limited access to markets, no price standards
Climate Sensitivity	Susceptible to changes in temperature and salinity

### The Way Forward:

# OGETHER WE SCALE HEIGHTS.

### Solutions & Sug<mark>gestions</mark>:

- **Boost R&D**: Develop climate-resilient seaweed strains
- Encourage PPPs: Attract private investments for processing and exports
- Skill Development: Train fisherfolk, women, and youth under PMMSY
- Establish National Guidelines: Ensure eco-friendly and sustainable farming

# UNHRC Affirms Link Between Ocean Protection and Human Rights

**Context:** In a **historic move**, the **United Nations Human Rights Council (UNHRC)** has adopted a groundbreaking **resolution** that officially recognizes the **interconnectedness of ocean conservation and the human right** to a **clean, healthy, and sustainable environment**. This is the **first time** such a link has been formally acknowledged on the global stage.



# Key Highlights of the Resolution:

• States now have a **duty to protect marine ecosystems** as part of their broader **human rights obligations**.









- Ocean degradation poses a direct threat to humanity, disproportionately impacting vulnerable and marginalized communities.
- Despite the existence of over **600 international agreements**, marine ecosystems continue to suffer from:
  - Climate change
  - **Overfishing**
  - Pollution
  - Unsustainable extractive activities
  - Deep-sea mining

Human Rights and Ocean Protection: Deeply Intertwined

# **Right to Food:**

- Healthy oceans are essential for global nutrition.
- Fisheries provide vital sources of protein and micronutrients for millions.
- **Coral reef ecosystems** alone support the food security of around **500 million people** globally.

# Right to Livelihood:

- Approximately 2.4 billion people live within 100 kilometers of the coast.
- Many depend on fisheries, coastal tourism, and ecosystems like mangroves and coral reefs for their income and employment.
- Ocean-related industries represent a key pillar of the **blue economy**.

# Right to a He<mark>althy En</mark>vironment:

- Oceans help regulate global climate, filter air and water, store carbon, and mitigate natural disasters like hurricanes and tsunamis.
- The ocean absorbs about 25% of global CO<sub>2</sub> emissions and generates more than 50% of the planet's oxygen.

### **Rights of Future Generations:**

- Oceans function as a **carbon sink**, playing a crucial role in ensuring a **stable climate** for future generations.
- Protecting marine biodiversity ensures **intergenerational equity** and long-term **climate resilience**.

# **Extra Insight: Why This Resolution Matters:**

- This resolution supports the growing global recognition of the **"triple planetary crisis" climate change, biodiversity loss,** and **pollution**.
- It strengthens the **2021 UN recognition** of the **right to a healthy environment** as a **universal human right**.
- It will likely influence **international negotiations** like the **Global Plastics Treaty**, and shape future **environmental governance** frameworks.

# **Did You Know?**

- The **deep sea**, often considered Earth's final frontier, holds immense biodiversity but is under threat from **deep-sea mining** and **plastic accumulation**.
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• **Mangroves** store up to **four times more carbon** than terrestrial forests, making them critical for **climate change mitigation**.

#### Meet Theobaldius konkanensis - A Unique Land Snail from Maharashtra

**Context:** A **remarkable new species** of land snail has been discovered in the lush forests of the **Konkan region of Maharashtra**, **India**. Named *Theobaldius konkanensis*, this fascinating mollusk is the latest addition to the biodiversity of the **Northern Western Ghats**, a global biodiversity hotspot.

#### **About the Species:**

- **Theobaldius konkanensis** is a **terrestrial land snail** that is **endemic** to the **Northern Western Ghats**.
- This species was uncovered through a collaborative effort by Indian and UK researchers.
- It thrives in tropical evergreen and semi-evergreen forests, predominantly during the monsoon months from June to September.

#### Habitat and <mark>Behavio</mark>r:

- The snail is typically found on the **forest floor**, hiding in **leaf litter** and on **moist fallen branches**.
- Outside the monsoon season, only **empty shells** are usually seen.
- Interestingly, it is diurnal and nocturnal, meaning it's active both during the day and night.
- Researchers observed that the snails prefer well-shaded, damp environments under the dense forest canopy.

#### **Distinctive Features:**

- The shell of *T. konkanensis* is **slightly flattened** with a **prominent central dome**.
- Near the snail's **neck**, where the shell begins, there is a **triangular projection** that gives it a unique shape.
- The **protective operculum** (the "lid" that covers the shell opening) has a **raised edge** and is adorned with **tiny spines**.
- The shell is **corneous yellow** with elegant **brown striations**, and the body is **stout and rounded**, making it easy to distinguish from other land snails.

#### Why This Discovery Matters:

- This discovery highlights the **rich yet understudied biodiversity** of the **Konkan region**.
- It underlines the **importance of conserving forest ecosystems**, especially in the **Western Ghats**, which host countless endemic and rare species.
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New species discoveries such as this also contribute to understanding **evolutionary relationships** and the ecology of lesser-known fauna.

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### **Did You Know?**

- The genus *Theobaldius* belongs to the family **Cyclophoridae**, known for their **operculate shells** (they can "close the door" to their shells like a trapdoor).
- The Western Ghats, though covering just 6% of India's land area, are home to more than 7,400 species of plants and animals, with over 1,500 species found nowhere else on Earth.
- Land snails play a critical role in the ecosystem, aiding in decomposition and serving as food for birds, mammals, and reptiles.

### In Conclusion:

The discovery of *Theobaldius konkanensis* not only adds to the taxonomic wealth of India but also acts as a reminder of how much of nature is still waiting to be discovered. As we continue to explore and understand our planet, such findings reinforce the need for biodiversity research, habitat protection, and environmental education.

#### **IUCN Unveils First Green Status Assessment for the Lion**

**Context:** The **International Union for Conservation of Nature (IUCN)** has released the first-ever Green Status assessment for the lion (*Panthera leo*), marking a significant step in understanding not just extinction risk, but also species recovery and conservation effectiveness.



#### What is the IUCN Green Status of Species?

- Introduced at the 2012 IUCN World Conservation Congress, the Green Status of Species aims to complement the well-known **IUCN Red List.**
- While the **Red List** highlights the **risk of extinction**, the **Green Status** evaluates the **recovery** potential of species and the success of conservation efforts.
- This tool helps track how far a species has moved toward full ecological recovery and what steps are still needed.

#### **Objectives of the Green Status:**

- **Measure Conservation Impact**: Determine how human intervention has aided or hindered species recovery.
- Highlight Conservation Successes: Recognize areas where positive changes have been achieved, even if the species still faces threats.
- Support Restoration Goals: Guide future conservation actions to bring species back to a fully functional state in their ecosystems.

#### Lion's Green Status: A Mixed Picture

#### **Assessment Overview:**

**Current Green Status: Largely Depleted** 

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- Red List Status: Still classified as Vulnerable
- **Human Impact**: Human activities, including **habitat loss**, **poaching**, and **conflict**, are preventing the lion from being **ecologically functional** across its historical range.

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#### **Regional Overview:**

- **Extinct Regions**: The lion has become **regionally extinct** in **North Africa** and **Southwest Asia**.
- **Conservation Bright Spots**: Intensive conservation efforts in regions like **West Africa**, **Southern Central Africa**, **South Africa**, and **India** have **prevented possible extinction** and supported local recovery.

#### Green Status Categories (8 Total):

- 1. Extinct in the Wild
- 2. Critically Depleted
- 3. Largely Depleted
- 4. Moderately Depleted
- 5. Slightly Depleted
- 6. Fully Recovered
- 7. Non-Depleted
- 8. Indeterminate

More than **100 species** now have **Green Status** assessments, providing a clearer picture of global conservation progress.

#### Did You Know?

- Lions once roamed from **Europe to India**, but today their range is mostly confined to **sub-Saharan Africa** and a small protected population in **India's Gir Forest**.
- The Asiatic lion, a subspecies found only in India, has seen a population increase thanks to strict protection and community involvement.
- The **Saltwater Crocodile**, although not at immediate risk of extinction, also appears in Green Status assessments, emphasizing that even **common species may still need recovery actions**.

#### Why This Matters:

The **Green Status of Species** is a game-changer. It shifts conservation from merely **avoiding extinction** to **actively restoring** species to their **full ecological role**. This approach encourages **long-term planning**, **sustainable recovery**, and the celebration of **conservation achievements**.

The Arctic Boreal Zone (ABZ): From Carbon Sink to Carbon Source

**Context:** A groundbreaking **2024 study published in** *Nature* reveals a major climate shift: over **30% of the Arctic Boreal Zone (ABZ)** has **ceased absorbing carbon** and is now **emitting it**, largely due to **rising wildfires and permafrost thaw**. This trend poses significant concerns for the **global carbon balance**.



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These findings align with the **NOAA's 2024 Arctic Report Card**, which also emphasized that the **Arctic tundra** is becoming a **net carbon source**—a drastic transformation in one of the planet's key climate regulators.

# What is the Arctic Boreal Zone (ABZ)?

The Arctic Boreal Zone (ABZ) is a vast ecological region within the Arctic Circle, stretching across:

- Alaska
- Northern Europe
- Siberia

# **Key Features:**

- Comprises tundra, boreal forests, wetlands, and permafrost zones.
- Historically functioned as a **carbon sink**, storing CO<sub>2</sub> in:
  - Frozen **organic material**
  - Dense coniferous forests
  - Peat-rich wetlands

# Significance:

The ABZ plays a vital role in the Earth's carbon cycle, acting as a buffer against global warming by storing vast amounts of carbon dioxide.

# Escalating Wildfires: A Climate Trigger

Recent wildfi<mark>re trends</mark> are accelerating the decline of the ABZ as a carbon sink:

# Global Fire Hotspots (Early 2025):

- USA: Severe wildfires across Texas, Oklahoma, and California
- **Japan**: Destructive blazes in **Ofunato**
- India: Fire incidents dropped in hotspots, but states like Uttarakhand, Odisha, and Chhattisgarh still see high fire activity

# Impact on Carbon Emissions:

- January 2025: Wildfires released 800,000 tonnes of carbon, a 4x increase from a decade ago
- Globally, wildfires contribute an estimated 69 million tonnes of CO<sub>2</sub> emissions annually in India alone

**Result**: These fires release previously stored carbon into the atmosphere, **undoing decades of climate mitigation efforts**.

# **Thawing Permafrost: A Carbon Time Bomb**

- As temperatures rise, **permafrost**—once frozen for centuries—**begins to thaw**
- This thawing releases trapped methane and CO<sub>2</sub>, accelerating global warming
- This creates a **feedback loop**:

# ▶ More warming $\rightarrow$ More thawing $\rightarrow$ More carbon release

# From Sink to Source: The ABZ Shift

Over **30% of the Arctic Boreal Zone** has **transitioned from a carbon sink to a carbon source**, reversing its historic role. This shift is due to:

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- **Thawing permafrost**
- Frequent and intense wildfires •
- **Prolonged heatwaves and rising land temperatures**

This change not only threatens the region's ecological balance but also **undermines global climate targets** such as the Paris Agreement.

## Why This Matters Globally:

# **Disruption of the Global Carbon Cycle:**

The ABZ is no longer buffering excess carbon, placing greater pressure on other carbon sinks like:

- **Tropical rainforests**
- Soils
- **Oceans**

# **Accelerating Climate Change:**

The release of stored carbon and methane from the ABZ contributes to:

- **Higher global temperatures**
- Sea-level rise
- Extreme weather patterns

# What Needs to Be Done?

# **Kev Recommendations:**

- **Global cooperation** to limit warming below 1.5°C
- Enhanced fire monitoring systems in boreal and tundra zones
- Investments in carbon-negative technologies
- **Support for Indigenous-led conservation efforts** in the Arctic •

**Restoration of wetlands** and peatlands to enhance carbon retention

### Conclusion: A Climate Alarm from the North

The Arctic Boreal Zone, once a guardian of Earth's carbon balance, is now flashing red on the climate radar. Its transformation into a **carbon source** signals a **new urgency** in the global fight against climate change.

# India's First-Ever Climate Change Station Inaugurated in the Himalayas

**Context:** India has achieved a significant milestone in climate science by inaugurating the first-ever high-altitude climate research station at Nathatop, in the Union Territory of Jammu & Kashmir. This state-of-the-art facility will serve as a vital hub for atmospheric and climate research in the fragile Himalayan ecosystem.



### **Strategic Location:**

Situated at an altitude of **2,250 meters above sea level**, Nathatop offers **clean air, minimal human** interference, and low pollution, making it an ideal site for high-precision climate studies.

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It lies in the **northwestern Himalayas**, a region highly sensitive to **climate change** and **glacial** 

### **Research Focus Areas:**

retreat.

The center will enable **advanced research** in:

- Cloud microphysics and formation
- Aerosol-cloud interactions
- Weather patterns and variability in the western Himalayas
- Greenhouse gas monitoring
- Impact of black carbon on snow and glaciers

# **ICE-CRUNCH: Indo-Swiss Collaboration:**

- The launch coincided with the unveiling of **ICE-CRUNCH** *Ice Nucleating Particles and Cloud Condensation Nuclei Properties in the North-Western Himalayas.*
- A joint Indo-Swiss research project aimed at studying:
  - Ice-Nucleating Particles (INPs) which play a critical role in snow formation and cloud dynamics.
  - **Cloud Condensation Nuclei (CCN)** tiny solid or liquid particles essential for **cloud development** and precipitation.
- Insights from this project will help improve regional climate models and predict monsoon behavior and extreme weather events more accurately.

### Significance and Global Relevance: 🥂

- Strengthens India's leadership in climate science and atmospheric research, especially in highaltitude environments.
- Supports India's commitment to achieve Net-Zero emissions by 2070, as per its Nationally Determined Contributions (NDCs) under the Paris Agreement.
- Vital for **glacier monitoring**, **water security**, and **disaster preparedness** in the Himalayan belt.

### Did You Know?

- **The Himalayas**, often called the **"Third Pole"**, store more ice than anywhere outside the polar regions and supply water to over **1.5 billion people** across Asia.
- **Black carbon**, from biomass and fossil fuel burning, accelerates **glacial melting** in the Himalayas a growing area of concern.
- India is also expanding its **cryosphere research** through institutions like the **National Centre for Polar and Ocean Research (NCPOR)** and **Indian Institute of Tropical Meteorology (IITM)**.

# Sea Lions: Unusual Aggression Linked to Algal Bloom and Neurotoxins

**Context:** A recent **algal bloom** along the **California coast** has led to the release of a **neurotoxin**, causing **sea lions** to exhibit **uncharacteristically aggressive behavior**. This has resulted in multiple **attacks on beachgoers** and **surfers**.



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# About Sea Lions: The Social Marine Mammals

Scientific Classification: Download Our Application \_\_\_\_











- Family: Otariidae, which encompasses five sea lion species:
  - California Sea Lion
  - o Northern Sea Lion
  - Southern Sea Lion
  - Australian Sea Lion
  - New Zealand Sea Lion

#### Habitat & Distribution:

- Found along the **Western coasts of North America**, stretching from **southeast Alaska** to **central Mexico**.
- Prefer **rocky shores** and **sandy beaches**, where they haul out to rest, breed, and give birth.

### **Physical Traits:**

- External ear flaps distinguish sea lions from seals.
- Long foreflippers enable them to move efficiently on land and in water.
- Males can weigh up to **1200 pounds (545 kg)**, with a mane-like fur around their necks, particularly noticeable in mature males.

### Social Behavior:

- Typically **non-aggressive** and **social**, sea lions live in **large colonies**.
- Known for their playful nature, **intelligent** problem-solving abilities, and strong family bonds.

# What is Causing the Sea Lions' Aggression?

Although generally calm, sea lions have recently displayed **violent and erratic behavior**, which has raised concerns among beachgoers and marine researchers alike. The culprit behind this sudden change is **domoic acid**, a neurotoxin produced by **toxic diatom algae**.

### Domoic Acid: The Neurotoxin

- **Produced by:** The algae **Pseudo-nitzschia**, which forms blooms under **nutrient-rich conditions** in the ocean.
- Effects on Marine Life:
  - The **toxin** enters the **marine food chain**, affecting smaller fish and, in turn, larger predators like sea lions who consume these contaminated fish.
  - Domoic acid causes **neurological damage**, leading to symptoms like **disorientation**, **aggression**, and **seizures** in sea lions.
  - In severe cases, it can lead to **death** or long-term damage to brain function.

# **Impact of Algal Blooms:**

- Algal blooms occur when **nutrient levels** in the ocean rise, often due to **human activities** such as agricultural runoff or changes in ocean currents.
- These blooms can be **harmful to both marine life** and humans, as the toxins can accumulate in shellfish, posing health risks.

# **Understanding the Risks: Neurotoxin Effects on Sea Lions**

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Sea lions, typically gentle creatures, are now exhibiting lethal aggression due to the effects of domoic acid on their nervous systems. In addition to aggression, these mammals may experience:

- **Confusion and disorientation**
- Difficulty swimming •
- **Seizures** or uncontrolled movements
- Erratic behavior, including attacks on humans or other animals

This sudden shift in behavior has raised alarms, as these once-friendly animals become dangerous due to their altered brain chemistry.

# **The Bigger Picture: Environmental Implications**

The increasing frequency of **algal blooms** and the spread of **neurotoxins** like **domoic acid** signal broader environmental changes. Factors contributing to this phenomenon include:

- **Climate change**, which may be altering ocean temperatures and currents, contributing to more frequent and intense algal blooms.
- **Pollution**, particularly nutrient runoff from agriculture and urban areas, exacerbating the conditions for these toxic blooms.

### What Can Be Done?

- Monitoring and research are key to understanding how toxic algal blooms affect marine ecosystems and how they can be mitigated.
- Regulations on nutrient runoff and environmental protection measures could help reduce the occurrence of harmful blooms.

# Conclusion: Protecting Both Sea Lions and Humans

The unusual aggression displayed by sea lions along the California coast highlights the **direct impact** of environmental changes on marine wildlife. The **presence of domoic acid** in the food chain has turned these typically **peaceful creatures** into a public safety concern, underlining the need for **sustainable** environmental practices and better monitoring of ocean health.

By understanding the interplay between toxic algae, marine life, and climate change, we can work towards protecting both sea lions and human beachgoers alike.

# Plastic Parks in India: A Step Towards Sustainable Industrial Growth

**Context:** India's **Plastic Parks Scheme** is playing a transformative role in promoting industrial development and ensuring environmental sustainability within the nation's plastics sector.

### What is a Plastic Park?

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A **Plastic Park** is a specially developed **industrial zone** dedicated to **plastic-based** industries. These parks aim to:

- Synergize and consolidate the capacities of the domestic plastic processing industry •
- Attract investments and boost production and exports •
- **Generate employment opportunities** •

Promote sustainable growth through effective waste management and recycling systems Download

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## Why Plastic Parks Matter:

Plastic Parks are central to India's mission of:

- **Efficiently managing plastic waste**
- Encouraging recycling and reuse ٠
- Strengthening the chemical and plastic processing industries •

India is now the **12th largest plastic exporter** globally, with exports rising significantly from **\$8.2 billion** in 2014 to \$27 billion in 2022, thanks to strategic initiatives like the Plastic Parks Scheme.

### **Current Status:**

So far, 10 Plastic Parks have received approval across various states, acting as special plastic-industrial hubs that cater to the growing needs of the industry.

### **Challenges in the Sector:**

Despite being one of the largest industries, India's plastics sector remains highly fragmented, largely composed of micro, small, and medium enterprises (MSMEs). This fragmentation limits the ability to leverage large-scale opportunities in the global market.

### **Government's Role and Support:**

To address these challenges, the Government of India has introduced a robust scheme through the Department of Chemicals and Petrochemicals. Key highlights include:

- Development of need-based Plastic Parks with modern infrastructure
- Provision of common facilities through a cluster development approach
- **Financial support** covering up to **50% of the project cost**, with a ceiling of **40 crore per park**

This approach aims to boost **domestic capabilities**, increase **private investment**, enhance **exports**, and encourage **innovation** in the plastics sector.

# Conclusion: A Vision for the Future

The **Plastic Parks Scheme** represents a **pioneering initiative** to revamp the **infrastructure** of plastic processing in India. By promoting innovation, sustainability, and global competitiveness, the scheme is ensuring that India's growth in the **plastic trade** is **inclusive**, **responsible**, and **future-ready**.

# **Reviving Roots: Preserving Traditional Seed Varieties for a Sustainable Future**

**Context:** In the aftermath of the **Green Revolution** and the expansion of **modern** agricultural practices, traditional seed varieties are rapidly vanishing. These native seeds, which once thrived in diverse ecological and cultural settings, are now being replaced by high-yielding hybrid varieties.



#### What are Traditional Seeds?

Also known as indigenous or heirloom seeds, these are naturally evolved over generations and passed down through farming communities. Their unique features include:

- **Open-pollinated** and reusable by farmers
- Rich in genetic diversity
- Well-adapted to local climatic and soil conditions

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• Deeply rooted in traditional knowledge systems and culture

# **Benefits of Traditional Seeds:**

- 1. Climate Resilience:
  - Naturally tolerant to droughts, floods, and extreme weather conditions
  - Require less irrigation and fewer chemical inputs
- 2. Biodiversity Conservation: Help preserve agro-biodiversity, which is essential for ecosystem health and future crop improvement
- **3. Nutritional Value:** Traditional grains like **millets and pulses** are rich in **fiber, protein**, and **micronutrients**, offering healthier alternatives to polished grains
- 4. Economic Sustainability:
  - Lower input costs due to seed saving practices
  - Reduce dependency on commercial seed markets and agrochemicals
- 5. Cultural & Heritage Significance:
  - Integral to local festivals, rituals, and culinary traditions
  - Example: Navara rice from Kerala, used in Ayurvedic medicine and temple offerings

# Why Are Traditional Seeds Declining?

- **1. Policy Prioritization of HYVs:** 
  - The Green Revolution emphasized high-yielding varieties (HYVs) of wheat and rice
  - **Government incentives, MSP**, and procurement programs mainly support HYVs

# 2. Market an<mark>d Consu</mark>mer Bias:

- Public distribution systems and urban markets focus on **polished grains**
- Low consumer awareness limits demand for indigenous varieties

# 3. Weak Institutional Support:

- Limited presence of **community seed banks** and conservation efforts
- Inadequate research and development for traditional seed improvement

# 4. Commercialization of Agriculture:

- Rise of agribusinesses and input-heavy farming has pushed GM and hybrid seeds
- Mechanization and intensive input use have **displaced low-input traditional practices**

# Key Initiatives and Success Stories:

# 1. Odisha Millet Mission:

- Focuses on **reviving millets** in tribal districts
- Ensures nutritional security, market access, and farmer empowerment

# 2. Community Seed Banks:

• Active in Andhra Pradesh, Odisha, and Karnataka

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- Facilitate seed conservation, exchange, and revival of native crops
- 3. M.S. Swaminathan Research Foundation: The Tribal Agrobiodiversity Centre in Jeypore, Odisha conserves over 1,200 rice varieties
- 4. Global Contributions: FAO and Bioversity International lead efforts to document and protect agricultural biodiversity
- 5. Paramparagat Krishi Vikas Yojana (PKVY): Promotes organic farming based on traditional seed systems and local wisdom

## The Road Ahead:

# 1. Policy Shift:

- Integrate traditional grains into MSP, PDS, and midday meal schemes
- Include climate-resilient crops in the National Food Security Mission

# 2. Strengthen Seed Sovereignty:

- Scale up **community seed banks** and **regional conservation hubs**
- Encourage Participatory Plant Breeding (PPB) involving farmers and scientists

# 3. Branding & Market Access:

- Launch awareness campaigns promoting health and environmental benefits
- Promote **GI tags**, **organic certification**, and **online marketplaces** for indigenous crops

# 4. Education and Research:

- Revamp agricultural education to include traditional ecological knowledge
- Allocate **research funding** for improving **yields and resilience** of native varieties

**Conclusion:** Saving traditional seeds is not just about preserving the past—it's about **securing the future**. These seeds embody **resilience**, **nutrition**, **and sustainability**, offering solutions to climate challenges and food security. A holistic approach blending **policy**, **community participation**, **innovation**, and **awareness** can bring traditional seeds back to the heart of India's agricultural landscape.

# Phawngpui National Park: Jewel of the Blue Mountains

**Context:** In a concerning development, **forest fires** have recently ravaged parts of **Phawngpui National Park** in Mizoram, impacting **nearly one-ninth of the park's total area**. According to state forest officials, the fires have posed a serious threat to the region's rich biodiversity and ecological balance. Rapid response efforts are underway to control the damage and prevent further destruction.

### About Phawngpui National Park:

Also known as the Blue Mountain National Park, Phawngpui is a



breathtaking natural sanctuary nestled in the **southeastern corner of Mizoram**, close to the **India-Myanmar border**. With its stunning elevation of **2,157 meters above sea level**, it is the **highest peak in Mizoram**, offering panoramic views of the **Chhimtuipui River** and distant **Myanmar hill ranges**.

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#### Size and Significance:

- Area: 50 sq. km
- **Cultural Importance**: Regarded as a **sacred site** by the **Mizo community**, who believe it is inhabited by the **spirits of their ancestors**.
- Often shrouded in mist, the park **appears blue from afar**, lending it its poetic name.

## **Rich Flora: A Montane Marvel**

Phawngpui is a treasure trove of **Montane Subtropical forests**, featuring:

- Lush oak and rhododendron forests
- Rare and endemic species of **bamboo**
- Picturesque grassy glades adding to its scenic beauty

### Incredible Fauna: A Wildlife Haven

The park supports a remarkable array of wildlife, including:

- Birds:
  - Blyth's Tragopan (rare)
  - Dark-rumped Swift
  - Mrs. Hume's Pheasant the state bird of Mizoram
- Mammals:
  - **Endangered species** such as the **Slow Loris**, **Tiger**, and **Leopard**
  - o Leopard Cat, Serow, Goral, Asiatic Black Bear
  - **Primates** like the **Stump-tailed Macaque** and **Capped Langur**

### Did You Know? - Fascinating Facts

- **Phawngpui** is part of the **Indo-Burma Biodiversity Hotspot**, one of the most biologically rich but threatened ecosystems in the world.
- The park is a hotspot for **birdwatchers**, particularly during the migratory season.
- It falls under the **Eastern Himalaya Endemic Bird Area**, attracting ornithologists from across the globe.
- The region's high-altitude climate and varied elevation provide unique microhabitats for flora and fauna.

### **Call to Action:**

With climate change and human activity increasing the frequency of **forest fires**, it's crucial to support **conservation efforts** and promote **sustainable tourism** to protect this ecological and cultural treasure.

# Rediscovery of a Living Fossil: Typhloperipatus williamsoni

**Context:** A team of scientists has **rediscovered** a rare and ancient species of **velvet worm**, *Typhloperipatus williamsoni*, after a gap of **111 years**. This remarkable finding took place in the **Siang Valley** of **Arunachal Pradesh**, India — the very region where it was first documented over a century ago.



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#### About Typhloperipatus williamsoni:

• Belonging to the phylum **Onychophora**, this velvet worm is considered one of the **oldest living fossils** on Earth.

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- Onychophorans have existed for over **350 million years**, surviving numerous mass extinction events including the one that wiped out the dinosaurs.
- The group is extremely rare today, consisting of only **two families** and fewer than **200 species** globally.
- *T. williamsoni* was first collected in **December 1911** during the **Abor Expedition** led by **Stanley Kemp**, then superintendent of the **Indian Museum**, **Calcutta**.

### A Unique Evolutionary Puzzle:

Recent **molecular analysis** reveals that *T. williamsoni* and its relatives in **South Asia** diverged from their **Neotropical (Central and South American)** and **African** cousins around **237 million years ago**. This suggests an ancient **Gondwanan lineage**.

What's truly fascinating is that unlike many invertebrates from **India and Southeast Asia**, which typically show close ties to **Australian species**, the **Asian onychophorans** — like *T. williamsoni* — have **no known** relatives in Australia. This makes them a rare biogeographical anomaly and a key subject for studying continental drift and evolutionary isolation.

### What Makes Velvet Worms So Special?

- Velvet worms are **soft-bodied**, **segmented invertebrates** that hunt using a **slimy adhesive** they shoot to entangle prey.
- They bridge the evolutionary gap between **arthropods** (like insects and crustaceans) and **annelids** (like earthworms).
- They breathe through spiracles but cannot regulate water loss making them highly sensitive to humidity and microclimatic changes.
- Their survival across ages speaks to their **adaptability** and the unique ecological **niches** they inhabit.

### **Conservation and Scientific Importance:**

The rediscovery of *Typhloperipatus williamsoni* not only adds to the biodiversity records of **India's Northeast** but also highlights the **urgent need for conservation** in **biodiversity hotspots** like Arunachal Pradesh.

It stands as a reminder that **many ancient lifeforms** may still be hiding in Earth's unexplored corners — waiting to reshape our understanding of **evolution**, **ecology**, and **continental history**.

# Ramgarh Lake: Reviving Jaipur's Historic Water Legacy

**Context:** The **revival of the iconic Ramgarh Lake**, once the primary **water source for Jaipur**, has officially begun. Located near the **Jamwa Ramgarh subdivision** in Rajasthan's capital district, the lake is being rejuvenated to restore its ecological, cultural, and historical significance.



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### Location & Historical Background:

- Ramgarh Lake is situated 32 km northeast of Jaipur, in the Jamwa Ramgarh region of Rajasthan.
- This **man-made reservoir** was constructed in **1876** by the then ruler **Sawai Ram Singh II** to address the region's growing water needs.
- Spanning an area of around **15.5 sq. km**, the lake stretches **4 km in length** and **2 km in width**, making it one of the largest water bodies near Jaipur during its prime.

### A Lost Lifeline:

- In earlier times, **Ramgarh Lake was the main source of drinking water for Jaipur**.
- It was naturally replenished by four rivers **Roda, Banganga, Tala**, and **Madhoveni** which flowed from the surrounding Aravalli hills.
- Due to extensive **deforestation**, **encroachments**, and **illegal mining** in the catchment area, these rivers have **dried up**, leading to the lake's desiccation over the years.

# A Sanctuary for Nature:

- The forests surrounding Ramgarh Lake are home to a variety of wildlife species including Nilgai, Chital, and lions.
- Recognizing its ecological value, the area was declared a Wildlife Sanctuary in 1982 by the Government of India.
- The lush ecosystem makes it a vital habitat for biodiversity and a potential hotspot for eco-tourism and conservation efforts.

# Sporting & Cultural Significance:

- Ramgarh Lake once hosted the rowing event during the prestigious 1982 Asian Games, marking its place in India's sporting history.
- Nestled between the lake and the Aravalli Hills, the Ramgarh Polo Ground is considered one of the finest polo grounds in India, adding a royal touch to its legacy.
- Nearby lies the **Jamwa Mata Temple**, a revered shrine located just below the lake, drawing both spiritual seekers and tourists alike.

### Looking to the Future:

With the ongoing **revival project**, authorities aim to:

- Rejuvenate the catchment area through afforestation and conservation
- Restore natural inflow by rehabilitating the feeder rivers
- Promote sustainable tourism around the lake and sanctuary
- Preserve historical and cultural assets, including temples and sports grounds

### **Did You Know?**

• The lake's embankment, crafted in the **19th century**, is an engineering marvel made without modern machinery.

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## **Ramgarh Lake: A Symbol of Heritage and Hope**

As work continues to breathe life back into this historic gem, **Ramgarh Lake stands as a reminder** of our intertwined relationship with nature, culture, and sustainable development. It is not just a water body—it is a living chapter of Jaipur's history and a beacon for ecological renewal.

# World's First Global Carbon Tax on Shipping Industry

Context: In a landmark decision, India and 62 other countries have voted in favor of the world's **first-ever global carbon tax**, which will be imposed on the shipping industry by the United Nations' International Maritime **Organization (IMO)**. This bold initiative marks a significant step toward reducing greenhouse gas emissions from one of the world's most carbonintensive industries.



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# What is a Carbon Tax?

A carbon tax is a penalty imposed on businesses or industries that produce excessive greenhouse gas (GHG) emissions. It is designed to incentivize companies to lower their carbon footprint and shift toward greener practices.

### How the Carbon Tax Works:

- Levying per ton: The tax is usually calculated based on the quantity of GHG emissions produced, often assessed per ton of carbon dioxide (CO2) released.
- **Objective:** The primary goal is to encourage companies to adopt **cleaner technologies**, reduce emissions, and move toward sustainable practices that benefit both the environment and the economy.
- **Type of Tax**: A **Pigouvian tax**, aimed at correcting the **negative externality** of carbon emissions.

### **Types of Carbon Taxes:**

There are several models for imposing a carbon tax, each suited to different environmental and economic contexts:

- 1. Emissions-Based Tax: This tax is directly levied on the amount of GHG emissions produced by an entity, encouraging businesses to reduce their carbon footprint by improving energy efficiency.
- 2. Goods-Based Tax: Applied to carbon-intensive goods such as gasoline, coal, and other fossil fuels. The tax is linked to the estimated emissions associated with the production, transportation, and consumption of these products.
- 3. Cap-and-Trade System: A market-based approach where a government sets a limit (cap) on total emissions. Companies are allowed to buy, sell, or trade **emission permits** within that cap, creating an economic incentive for lower emissions.
- 4. Carbon Tariff (CBAM): Also known as the Carbon Border Adjustment Mechanism (CBAM), this tax targets carbon leakage by imposing an eco-tariff on products imported from countries without a carbon pricing system. It ensures that international trade does not undermine domestic climate policies.

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#### The International Maritime Organization (IMO):

The **IMO**, a **specialized agency of the United Nations**, plays a key role in regulating the **global shipping industry** and its environmental impact. The IMO's new carbon tax will apply to ships operating internationally, aiming to reduce their contribution to global emissions.

## Role of the IMO in Global Climate Goals:

- The IMO is crucial in supporting **UN Sustainable Development Goal 14**: **Conserve and sustainably use the oceans, seas, and marine resources** for sustainable development.
- The IMO's work will be critical in reducing the **carbon footprint** of the **maritime sector**, which accounts for a significant portion of global emissions.

#### IMO's Structure:

- **Members**: The IMO has **176 member states** and three associate members: **Hong Kong, Macao**, and the **Faroe Islands**.
- **Headquarters**: Located in **London**, UK, the IMO consists of an **assembly** of member states and a **council**, which appoints the **Secretary-General**.

### Important IMO Treaties:

- International Convention for the Safety of Life at Sea (SOLAS): Ensures the safety of life at sea through regulations on ship design, operation, and management.
- International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW): Sets global standards for the training and certification of seafarers.
- **International Convention for the Prevention of Pollution from Ships (MARPOL)**: Aims to reduce pollution from ships, including **oil spills** and **emissions**.

# The Global Shipping Industry and Its Environmental Impact:

• The shipping industry is responsible for a substantial share of global carbon emissions. As international trade continues to grow, **shipping accounts for approximately 2-3%** of global **GHG emissions**, making it one of the largest sources of pollution worldwide.

The **carbon tax** imposed by the IMO aims to create a **financial incentive** for the industry to adopt **cleaner fuels**, **energy-efficient technologies**, and **sustainable practices**.

### **Conclusion: A New Era for Global Climate Action**

• The **global carbon tax on shipping** represents a **historic move** towards addressing climate change at a global scale. By targeting one of the most polluting industries, this initiative not only sets a precedent for future environmental taxation but also aligns with global efforts to reduce **greenhouse gas emissions** and limit global warming.

As countries like **India** continue to take **climate leadership**, this policy could serve as a model for tackling emissions in other sectors, contributing to the **global fight against climate change**.

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## New Frog Species Discovered in Assam: Leptobrachium aryatium

**Context:** In an exciting **scientific development**, researchers in **Assam** have identified a **new species of frog**, named *Leptobrachium aryatium*, as a tribute to **Arya Vidyapeeth College**, Guwahati. This discovery adds a fresh chapter to the region's **rich biodiversity**.

#### Found in the Heart of Nature: Garbhanga Reserve Forest

The newly identified frog was found in the **Garbhanga Reserve Forest**, located on the **southwestern edge of Guwahati**, near the

**Assam-Meghalaya border**. This forest is a **biodiversity hotspot**, playing a key role in maintaining the **climate stability** and **water systems** of the city.

Garbhanga is home to a stunning variety of **wildlife**, including:

- Asian elephants
- Rare bird species
- Colorful butterflies
- Reptiles and amphibians

Unfortunately, this delicate ecosystem is under **constant threat** from **urban development** and **habitat degradation**.

#### What Makes Leptobrachium aryatium Unique?

This newly recognized species is noted for its **distinctive features**, including:

- Fiery orange-and-black eyes
- A **reticulated throat pattern** that sets it apart from related species
- A smooth, rhythmic call at dusk, likely used for attracting mates

Originally misidentified as *Leptobrachium smithi* in **2004**, the frog was recently confirmed as a **new species** through advanced **molecular** and **morphological analysis**.

#### About the Leptobrachium Genus:

The genus *Leptobrachium* includes **38 known species** of **robust frogs** with:

- Broad heads
- Short hind limbs
- Vividly colored eyes

These frogs are distributed across **Southern China**, **India**, the **Sunda Shelf**, and the **Philippines**, typically residing in **humid forests** and playing a vital role in the **food web**.

#### A Call for Conservation:

The discovery of *Leptobrachium aryatium* not only enriches our understanding of amphibian diversity but also underscores the **urgent need** to **protect natural habitats** like Garbhanga. Every new species found is a reminder of the **unseen wonders of the wild** and the importance of preserving them for future generations.

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# **Particulate Matter Trading Scheme in Gujarat**

**Context:** A recent study has revealed that the **Surat Emission** Trading Scheme (ETS) in Gujarat has delivered significant environmental and economic gains, marking a milestone in India's fight against air pollution.

#### **Overview of the Scheme:**

Launched in **2019**, the **Surat ETS** is:

- The world's first market-based system targeting particulate matter (PM) emissions.
- India's first pollution trading scheme of any kind.
- Based on a **cap-and-trade** model, where total emissions are **capped**, and **permits are traded** among industries.

#### **Implemented by:**

Gujarat Pollution Control Board (GPCB) in collaboration with the Energy Policy Institute at the University of Chicago.

#### How Does the ETS Work?

### **Monitoring Through Technology:**

- 318 coal-using industrial units were mandated to install Continuous Emissions Monitoring Systems (CEMS).
- Real-time emissions tracking replaced outdated spot-check methods.

### Cap Setting and Trading:

- GPCB set a cap of 170 tonnes/month based on actual CEMS data.
- **Permit Allocation:** 
  - **80% of permits**: Issued for **free**, based on a unit's emissions capacity. 0
  - **20% of permits**: Auctioned weekly to promote market efficiency.
- Penalties: Industries that exceed their permits face proportional fines.

#### **Key Achievements of Surat ETS:**

Parameter	Impact
<b>Pollution Reduction</b>	20-30% decrease in PM emissions
Cost Efficiency	Over 10% reduction in abatement costs
Compliance	99% adherence to environmental regulations

### **Significance of the Programme:**



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- **Environmental Innovation**: First-ever **cap-and-trade for PM**, demonstrating **India's global leadership** in innovative environmental governance.
- **Data-Driven Governance**: Use of **real-time CEMS** ensures **evidence-based policymaking** and regulatory transparency.
- **Replicability**: Proven success opens the door to **scaling** this model to other cities and pollutants like **NOx and SO<sub>2</sub>**.

# **Understanding Particulate Matter (PM):**

**Particulate matter** refers to tiny solid or liquid particles suspended in the air. These particles are classified by size:

- **PM10**: Coarse particles (≤10 µm)
- **PM2.5**: Fine particles (≤2.5 µm)
- **PM0.3**: Quasi-ultrafine particles (<0.3 µm)
- **PM0.1**: Ultrafine particles (≤0.1 μm)

#### **Sources of PM:**

#### Natural Sources:

- Dust storms
- Forest fires
- Volcanic eruptions

# Anthropoge<mark>nic (Hum</mark>an-Made) Sources:

- Vehicle emissions
- Industrial pollution
- Construction dust
- Biomass & fossil fuel burning

### Health Impacts of PM Exposure:

- Respiratory Illnesses: Asthma, bronchitis, COPD
- Heart Conditions: Heart attacks, hypertension
- Neurological Effects: Cognitive decline, developmental issues
- **Premature Mortality**: Long-term exposure leads to **early deaths** from lung and cardiovascular diseases

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### **Conclusion:**

The **Surat PM Trading Scheme** is a **path-breaking initiative** that blends **technology, economics, and regulation** to tackle pollution. Its success is a **blueprint for other Indian cities** and a **testament to India's innovation** in environmental policy.

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#### **Balancing Ethanol Production with Sustainability in India**

**Context:** India's **ethanol production** is seeing a major uptick, with 35 lakh tonnes of sugar expected to be diverted toward ethanol manufacturing in **2024-25**, a significant increase from 21.5 lakh tonnes in 2023-24. This reflects India's continued focus on **biofuel adoption** and **energy diversification**.

#### What is Ethanol?

Ethanol (C<sub>2</sub>H<sub>5</sub>OH) is a **renewable biofuel** derived primarily from agricultural feedstocks, such as sugarcane, maize, rice, wheat, and other forms of **biomass**. In India, **molasses**, a byproduct of sugar production, is a key feedstock for ethanol.

#### **Properties of Ethanol:**

- Appearance: Clear, colorless liquid. •
- **Boiling Point:** 78.5°C
- Melting Point: -114°C
- **Octane Rating:** Higher than petrol, preventing engine knocking. •
- **Flammability:** Highly flammable, 99.9% pure alcohol. •

#### **Common Ethanol Blends**:

- **E10**: 10% ethanol, 90% gasoline (most widely used).
- E85: Up to 83% ethanol (used for flexible fuel vehicles).

#### Health & Environmental Impact:

- Exposure Risks: Skin irritation, nausea, or more severe effects at high concentrations. •
- **Environmental Decomposition:** Ethanol breaks down into **CO<sub>2</sub>** and **water**, but may contribute to photochemical smog and methane formation in oxygen-deprived environments.

#### India's Ethanol Blending Journey:

India's Ethanol Blending Programme (EBP) started in 2003, and over time, blending targets have expanded:

- 5% ethanol blending in 2003.
- Target for **20% ethanol blending by 2024-25**.
- **30% ethanol blending** targeted by **2030**.

#### **Ethanol Production and Economic Impact:**

- **Production Capacity:** 1,600 crore liters by **2024**.
- Foreign Exchange Savings: Rs. 1.06 lakh crore by reducing crude oil imports. •
- **CO<sub>2</sub> Emissions Cut:** 544 lakh metric tons.
- Crude Oil Substitution: 181 lakh metric tons.

# **Concerns Regarding Ethanol Production in India:**

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While ethanol production offers environmental benefits, there are significant challenges:

# **Food Security Risks:**

- Increased demand for **maize**, **rice**, and **broken rice** for ethanol may divert **food crops** from consumption, leading to **higher food prices**.
- **Retail rice prices** rose by **14.51%** in 2023, affecting food affordability.

## Land Use Pressure:

- Meeting the **E20 target** requires **7.1 million hectares** of land, which may lead to increased pressure on **land**, water, and **fertilizers**.
- **Inefficiency of Maize**: It takes **187 hectares of maize** to produce the same energy as **one hectare of solar energy**, raising concerns about land use efficiency.

### Water Scarcity:

• Ethanol production uses **8-12 liters of water per liter of ethanol**, leading to depletion of groundwater, especially in water-stressed regions.

# Limited Emission Reductions:

- While ethanol helps reduce CO<sub>2</sub> emissions, it may only offer **modest reductions**, which may not significantly contribute to India's **Net Zero 2070** goals.
- Ethanol plants, categorized as **"red industries"**, contribute to **pollution** (acetaldehyde, formaldehyde) in air, water, and soil.

# Technological and Infrastructure Gaps:

- India's ethanol production is **largely reliant on first-generation ethanol**, which is **less efficient** than **advanced technologies** like **cellulosic ethanol**.
- **Underdeveloped infrastructure** for fuel blending, especially in rural areas, hampers scalability.

How Can India Balance Ethanol Production with Sustainable Resource Management?

India can adopt several strategies to **balance ethanol production** with sustainability:

### Promote 3G Ethanol Production:

 Scaling up microalgae-based (3G) ethanol production under schemes like Pradhan Mantri JI-VAN Yojana offers an alternative to first-generation and second-generation ethanol. It requires fewer land and water resources.

### **Strengthen Environmental Regulations:**

- Implement Life Cycle Assessments (LCA) to evaluate the full environmental impact of ethanol production.
- Promote **carbon capture and storage (CCS)** technologies at ethanol plants to offset emissions and align with **Net Zero** goals.
- **Carbon credits** should be integrated into the supply chain to incentivize low-emission feedstock usage.

### **Enhance Water Management:**

• Encourage **drip irrigation** and **rainwater harvesting** for biofuel crops, as seen in **Maharashtra**, where water use was reduced by **40%** using drip irrigation.

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• Mandate **Zero-Liquid Discharge (ZLD)** systems to recycle water in ethanol plants, similar to the model adopted by **Balrampur Chini Mills**.

## **Agroforestry and Land Efficiency:**

• Promote **agroforestry** where biofuel crops are grown alongside forestry to optimize land-use and boost productivity without additional land use.

# **Circular Economy in Ethanol Production:**

• Under the **National Bio-Energy Programme**, adopt circular economy models by repurposing ethanol byproducts for **animal feed**, **fertilizers**, or **biogas**. Reusing treated wastewater for **irrigation** and **cooling** in industries can also improve efficiency.

### **Conclusion:**

India's ethanol blending initiative is a key step towards reducing **fossil fuel dependency**, curbing **emissions**, and fostering **rural economic growth**. As the country targets **30% ethanol blending by 2030**, adopting **sustainable practices** and advanced technologies will ensure that this ambitious program does not compromise food security, water resources, or long-term environmental goals.

# Earth Day 2025: "Our Power, Our Planet"

**Context: Earth Day** is celebrated **every year on April 22**, marking one of the **largest environmental protest movements** in the world. It's a global reminder of our **shared responsibility** to protect and preserve our **planet for** future generations.

### Theme of Ea<mark>rth Day</mark> 2025:

This year's official theme is:

"OUR POWER, OUR PLANET"

The message is clear: we must act now. Earth Day 2025 emphasizes the urgent need to **transition to renewable energy** sources. It calls on **individuals, corporations, and governments** to take bold action by **tripling clean energy production by 2030**. The campaign is a powerful rallying cry for a **just and sustainable energy future**.

# A Brief History of Earth Day:

- **First observed on April 22, 1970**, Earth Day began as a **national teach-in on environmental issues** in the United States.
- It was initiated by **U.S. Senator Gaylord Nelson**, bringing together **over 20 million Americans** about **10% of the U.S. population**—to demand cleaner air, water, and land.
- By **1990**, Earth Day had gone **global**, with more than **200 million people in 141 countries** participating.
- Since then, it has evolved into a **worldwide movement**, inspiring action on **climate change**, **biodiversity loss**, **plastic pollution**, and more.

### Why Earth Day Still Matters:

- Climate change continues to threaten ecosystems and communities worldwide.
- Environmental issues such as **deforestation**, **ocean acidification**, and **species extinction** are intensifying.











• Earth Day is a moment to **reflect**, **educate**, **and act**—pushing for **policies**, **innovations**, **and behaviors** that lead to a greener world.

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#### **Did You Know?**

- **Over 1 billion people** now participate in Earth Day activities annually.
- Earth Day inspired the creation of the **U.S. Environmental Protection Agency (EPA)** and landmark laws such as the **Clean Air Act, Clean Water Act**, and **Endangered Species Act**.
- The **Paris Agreement**, a global treaty to fight climate change, is often promoted through Earth Day advocacy.

#### What You Can Do:

- **Reduce your carbon footprint** by using public transport or cycling.
- Switch to renewable energy or support clean energy policies.
- Plant trees, reduce plastic use, and conserve water.
- Educate others and participate in **local clean-up events**.

#### Our Future is in Our Hands:

As we honor **Earth Day 2025**, let's remember: **we are not powerless**. Together, **our power can protect our planet**. Join the movement. Be part of the change.

### Kerala's IPR Policy to Be Revamped After 17 Years

**Context:** After a gap of **17 years**, **Kerala** is set to comprehensively revise its **Intellectual Property Rights (IPR) Policy**, aligning with the evolving national and global IP ecosystem.

#### About the Initiative:

- The revision is spearheaded by the Kerala State Council for Science, Technology and Environment (KSCSTE).
- A **six-member committee**, led by the **Chairman of the Kerala State Biodiversity Board**, is drafting the new policy.
- The existing policy was first introduced in **2008** and will now be modernized in line with the **National IPR Policy 2016** and **2024 directives** from the **Department of Science and Technology**.

### Key Highlights of the Draft Policy:

- Mandatory IPR education in school and university curricula.
- Establishment of:
  - o Kerala IPR Academy
  - o Kerala Traditional Knowledge Authority
  - Traditional Knowledge Docketing System
  - 'Mission IPR' for centralized IP governance

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• Aimed at promoting **innovation**, **protecting traditional knowledge**, and strengthening **IP infrastructure** in the state.

# Understanding Intellectual Property Rights (IPRs):

# What is Intellectual Property?:

**Intellectual Property (IP)** refers to creations of the **mind** in fields such as **science**, **art**, **industry**, and **literature**.

#### What are IPRs?

**Intellectual Property Rights** are **legal rights** granted to creators and innovators to protect their work and benefit from its use.

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#### Forms of IPR:

- Patents
- Copyrights
- Trademarks
- Industrial Designs
- Geographical Indications (GIs)
- Plant Varieties & Farmers' Rights
- Layout Designs of Integrated Circuits
- Trade Secrets

### Global vs. National IPRs:

# Patent Cooperation Treaty (PCT):

- Offers an international filing system (not a global patent).
- Allows inventors to seek protection in **multiple countries** with a single application.
- India joined the PCT in 1998.
- Managed by the World Intellectual Property Organization (WIPO).

# About WIPO (World Intellectual Property Organization):

- A **UN agency** promoting global IP protection.
- Established in **1967** under the **WIPO Convention**.
- Has **193 member countries**, including **India** (joined in **1975**).
- Headquarters: Geneva, Switzerland.

### Challenges in India's IP Regime:

- 1. Patent Backlog: Slow patent examination and approvals.
- 2. **IP Infringement**: Weak enforcement leading to counterfeiting and piracy.
- 3. Low Commercialization: Poor industry-academia collaboration.
- 4. **Global Innovation Lag**: Foreign firms dominate filings due to low domestic R&D.

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India's IP Ecosystem: Reforms and Initiatives:

# National IPR Policy 2016:

- Unifies all IPRs under one vision document.
- Emphasizes IP awareness, protection, enforcement, and commercialization.
- **Cell for IPR Promotion and Management (CIPAM):** Coordinates the implementation of the **National IPR Policy**.
- National Intellectual Property Awareness Mission (NIPAM): Aims to create IP awareness in schools and colleges across India.
- **Startup-Focused Initiatives: SIPP Scheme**: Supports startups in protecting their IP assets.

# Atal Innovation Mission (AIM) by NITI Aayog:

Encourages a culture of innovation through:

- Atal Tinkering Labs
- Atal Incubation Centers
- Atal New India Challenges
- Mentor India Network

# Conclusion: A Vision for an Innovation-Led Economy

India's dynamic progress in the IP domain reflects its growing intellectual capital and global ambition. The revision of Kerala's IPR policy adds momentum to India's broader mission to build an innovationdriven, economically resilient, and IP-empowered future.

# Hindu Kush Himalaya Snow Update 2025: Alarming Decline in Snow Persistence

**Context:** According to a recent report by the **International Centre for Integrated Mountain Development (ICIMOD)**, the **Hindu Kush Himalaya (HKH)** region has recorded its **third consecutive below-normal snow year** in 2025. This trend raises serious concerns for water security and ecosystem health across the region.



### Key Findings of the Report:

- Snow Persistence Time Series: Data was analyzed over a 23-year period (2003–2025), focusing on snow persistence from November to March.
- Drastic Reductions in Major River Basins:
  - **Ganga Basin**: **24.1% below normal lowest** snow persistence in 23 years.
  - Indus Basin: 24.5% below normal, a sharp drop from +19.5% above normal in 2020.
  - Brahmaputra Basin: Also showed significant decline in snow cover.
- HKH Region-wide Snow Persistence: Reached a two-decade low of 23.6%.
- Wider Impact in Southeast Asia:
  - Mekong Basin: 51.9% decline
  - Salween Basin: 48.3% decline

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#### o Tibetan Plateau: 29.1% decline

#### **Implications of Snow Deficit:**

- Reduced Meltwater: Snowmelt is a primary water source for rivers in the HKH, contributing up to 23% of annual runoff. Persistent snow deficit leads to lower river flows and early-summer water stress, especially downstream.
- Threat to Water Security: Almost one-fourth of the world's population relies on HKH-fed river systems.

#### About the Hindu Kush Himalaya (HKH):

- Geographic Spread: Stretches 3,500 km across 8 countries: Afghanistan, Bangladesh, Bhutan, China, India, Nepal, Myanmar, and Pakistan.
- **"Water Towers of Asia"**: Birthplace of **10 major river systems**: Amu Darya, Indus, Ganga, Brahmaputra, Irrawaddy, Salween, Mekong, Yangtze, Yellow River, and Tarim.

#### About ICIMOD:

- Established: 1983
- Headquarters: Kathmandu, Nepal
- **Type**: Intergovernmental knowledge and learning centre
- **Coverage**: Works for 8 regional member countries in the HKH
- Role: Conducts research, pilots solutions, supports policy, and advocates on global platforms.

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#### Way Ahead: Recommendations

Policy and Infrastructure:

- Improved water infrastructure
- Stronger drought preparedness
- Investment in water storage systems

Technology and Forecasting:

- Advanced early warning systems
- Better seasonal forecasting models

**Environmental Measures:** 

- Reforestation with native species
- Snowfall zone protection policies

**Community and Cooperation:** 

- Local involvement in decision-making
- Stronger regional cooperation
- Integrated water management strategies

# **Conclusion:**

The declining trend in snow persistence across the Hindu Kush Himalaya is a **wake-up call** for the region. It calls for **science-led**, **community-driven**, and **cooperative** strategies to secure water resources, protect ecosystems, and ensure **climate resilience** for future generations.

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# Forecasting Extreme Weather Events with Artificial Intelligence (AI)

**Context:** As **extreme weather events** become more frequent and intense due to **climate change**, **Artificial Intelligence (AI)** is emerging as a **game-changing tool** for enhancing the **accuracy and speed** of weather predictions—offering new capabilities beyond traditional models.

#### **Traditional Weather Prediction Models:**

- Relies on Numerical Weather Prediction (NWP) models.
- Simulates atmospheric dynamics using **fluid dynamics** and **thermodynamic equations**.
- Inputs data from satellites, radars, and weather stations.
- Requires high-performance supercomputers to perform calculations.
- Governed by the **laws of physics**, offering detailed but computationally intensive forecasts.

#### AI-Based Weather Prediction Models:

- Driven by **data**, not physics.
- Employ **machine learning (ML)** algorithms to find patterns and correlations between variables (temperature, humidity, wind speed) and weather events (rainfall, cyclones).
- Capable of learning directly from historical and real-time data—without explicit programming of atmospheric science.

#### Advantages of AI in Weather Forecasting:

- **1. Big Data Integration:** AI can process vast datasets from multiple sources including **satellites, ground stations, radars,** and even **social media**, identifying subtle trends traditional models might miss.
- **2. Uncovering Nonlinear Relationships:** Capable of detecting **complex, nonlinear patterns** in atmospheric systems that traditional models may overlook.
- **3. Region-Specific Adaptability:** Enables **localized forecasting**, accounting for **topographical** and **climatic variations** across different regions.
- **4. Real-Time "Nowcasting":** Offers **short-term forecasts** (minutes to hours) crucial for **disaster response**, **aviation**, **urban planning**, and **agriculture**.

### **Challenges in AI-Based Weather Forecasting:**

- **1. Complexity of Weather Systems:** The atmosphere is inherently **chaotic** and dynamic, requiring extremely **sophisticated models** to predict accurately.
- 2. Skills Gap: Shortage of experts who are trained in both **meteorology** and **AI/ML**, slowing innovation and deployment.
- **3. Inadequate Sensor Infrastructure: Sparse meteorological data**, especially in **remote or mountainous areas**, hinders the development of robust AI models tailored to Indian geography.
- **4. Climate Change Uncertainty:** Models trained on **present climate data** may underperform in future scenarios due to **shifting baselines** caused by global warming.

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- 5. Data Quality Issues: AI requires large, clean, and consistent datasets. Current data sources suffer from sensor errors, format inconsistencies, and gaps in spatial and temporal coverage.
- 6. Lack of Transparency: Many AI models, especially deep learning ones, operate as "black boxes", making them difficult to interpret or trust, especially for operational meteorologists and policy-makers.

# Weather Forecasting Infrastructure in India:

- The India Meteorological Department (IMD) utilizes satellite data and supercomputers.
- Key satellites for meteorological observations include INSAT-3D, INSAT-3DR, and INSAT-3DS.
- These satellites provide data on **cloud motion**, **cloud top temperature**, and **water vapor** content, aiding in **rainfall estimation**, **cyclone tracking**, and **short-term forecasts**.

# **Recent Indian Initiatives to Enhance Forecasting:**

### 1. Mission Mausam:

- Aims to modernize India's weather forecasting capabilities.
- Focuses on:
  - Cutting-edge surveillance technologies
  - Next-gen radars and satellites
  - AI/ML-driven forecasting methods

# 2. National Monsoon Mission (2012):

• Shifted focus towards real-time, ground-level data to improve monsoon predictability.

# 3. Doppler R<mark>adar Exp</mark>ansion:

- IMD has expanded its Doppler radar network from **15 (2013)** to **37 (2023)**.
- Doppler radars enhance short-term, localised rainfall prediction, improving timeliness and accuracy.

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### 4. WINDS Initiative:

- Launched by the Ministry of Agriculture & Farmers Welfare.
- Will install over **200,000 ground stations** for **hyper-local weather data**, supporting **precision farming** and **climate-resilient agriculture**.

# **Conclusion:**

AI is set to **redefine the landscape** of weather forecasting—offering faster, more accurate, and localized predictions. However, its success in India hinges on **overcoming infrastructure gaps**, **training interdisciplinary talent**, and **enhancing data quality**. If integrated strategically, AI could be a critical tool in **climate adaptation**, **disaster mitigation**, and **agricultural resilience**.

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#### New Discoveries in Indian Rivers: Labeo Uru & Labeo Chekida

**Context:** Two **new species of freshwater fish**, **Labeo uru** and **Labeo chekida**, have been recently discovered by scientists from **ICAR-National Bureau of Fish Genetic Resources (NBFGR)** in the **biodiversity-rich Western Ghats** — reaffirming the region's status as a **global ecological hotspot**.

#### About the Species:

#### Labeo Uru:

- Found in the **Chandragiri River**.
- Notable for its **sail-like dorsal fin**, which gives it a unique and striking appearance.
- Named **'uru'**, inspired by the traditional boat of the region, symbolizing its graceful dorsal profile.

#### Labeo Chekida:

- Discovered in the **Chalakkudy River**.
- Locally called **'kaka chekida'**, this species is **small and dark-bodied**.
- Known for its subtle beauty and distinct ecological niche.

#### Scientific Significance:

- Both species belong to the **genus Labeo**, which includes the well-known **Rohu group of freshwater fish**.
- Their discovery clears up a long-standing taxonomic mystery around Labeo nigrescens, originally described in 1870.
- Morphological and genetic studies have now confirmed that Labeo uru, Labeo chekida, and Labeo nigrescens are distinct species.

#### Why It Matters:

- The Western Ghats is home to more than 250 species of freshwater fish, many of which are endemic.
- This discovery sheds light on **undocumented biodiversity** and highlights the need for **conservation of riverine ecosystems**.
- It also strengthens the case for **further scientific exploration** of India's rich inland aquatic life.

#### **Did You Know?**

- The **genus Labeo** includes many species that are economically important for **aquaculture and inland fisheries** in India.
- The Western Ghats is listed as a UNESCO World Heritage Site and is one of the eight "hottest hotspots" of biological diversity in the world.
- Several rivers in this region are **monsoon-fed and ecologically fragile**, making them highly sensitive to climate and human interference.

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#### Mahuadanr Wolf Sanctuary: India's Exclusive Wolf Haven

**Context:** Nestled in the **Latehar district** of **Jharkhand**, the **Mahuadanr Wolf Sanctuary** proudly stands as **India's first and only wolf sanctuary**. It plays a pivotal role in safeguarding the **Indian grey wolf**, an iconic yet vulnerable species of the Indian subcontinent.

#### **Discovering Mahuadanr Wolf Sanctuary**

**Overview:** 

yet

The **Mahuadanr Wolf Sanctuary** spans an area of approximately **63 square kilometers** and was officially **declared a sanctuary in 1976**. It was established specifically to ensure the **survival and protection** of the **Indian grey wolf (Canis lupus pallipes)**.

This sanctuary is also an important component of the larger **Palamau Tiger Reserve**, blending wolf conservation with broader efforts to protect India's forest ecosystems.

#### Wildlife Diversity:

While the sanctuary's primary focus is the **Indian grey wolf**, it is also home to a variety of other wildlife species, including:

- Spotted deer
- Wild boars
- Hyena<mark>s</mark>
- Sloth bears
- Numerous species of birds and reptiles

The coexistence of different species highlights the **rich biodiversity** and **ecological importance** of this region.

#### The Indian Grey Wolf: A Silent Hunter:

#### **Species Profile:**

The **Indian grey wolf** is a **distinct subspecies** of the grey wolf, adapted to the **warm climates** of **Southwest Asia** and the **Indian subcontinent**.

It prefers scrublands, grasslands, and semi-arid regions, often avoiding dense forests.

#### **Behavior and Adaptations:**

- **Pack Size**: Generally smaller compared to other wolf species.
- **Vocalization**: Less vocal and more stealthy than its northern cousins.
- Activity: Primarily nocturnal, it hunts during the cooler hours from dusk till dawn.

This behavior helps the Indian wolf adapt to **harsher**, **warmer environments**, where conserving energy and water is crucial.

#### **Conservation Status:**

• **IUCN Red List**: Classified as **Endangered**, with an estimated population of just **2,000–3,000 individuals** in India.

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- **CITES**: Listed under **Appendix I**, indicating **maximum international protection** against trade and exploitation.
- Wildlife Protection Act, 1972: Included in Schedule I, granting it the highest level of legal protection within India.

# **Interesting Facts: Going Beyond:**

- The **Mahuadanr wolves** are known for their **unique denning behavior**, digging deep burrows for raising pups—a rare trait among wolf populations worldwide.
- **Cultural ties**: In many local tribal traditions of Jharkhand, the wolf is revered and featured in folklore, highlighting its deep-rooted significance to the region's heritage.
- **Challenges**: Habitat loss, human-wildlife conflict, and declining prey base are the major threats these wolves face today, making sanctuaries like Mahuadanr even more critical.

### **Conclusion:**

The **Mahuadanr Wolf Sanctuary** is more than a protected land—it is a **symbol of hope** for one of India's most elusive and endangered carnivores. Strengthening conservation efforts here ensures that the **Indian grey wolf** continues to roam the wild landscapes of Jharkhand for generations to come.

# Climate Crisis and Gender-Based Violence: Urgent Call to Action

# **Context:** A **report** released by the **UN Spotlight Initiative** highlights a growing crisis: **climate change is worsening gender-based violence (GBV)**, particularly in **vulnerable communities**.

The **report predicts** that by **2100**, climate change could be responsible for **1 in 10 cases of intimate partner violence (IPV)** if urgent action is not taken.



# Understanding the UN Spotlight Initiative:

The **Spotlight Initiative** is a **global partnership** between the **European Union (EU)** and the **United Nations (UN)**, dedicated to **eliminating violence against women and girls (VAWG)** worldwide.

### Key Findings from the UN Report on Climate and Gender-Based Violence:

### **Climate Change Intensifies GBV:**

- A 1°C rise in temperature results in a 4.7% increase in intimate partner violence (IPV).
- With **2°C of warming**, **40 million more women and girls** could face IPV annually by **2090**. This number more than doubles with **3.5°C of warming**.
- Limiting the temperature increase to **1.5°C** could reduce IPV rates from **24%** to **14%** by **2060**.

# **Disaster-Induced Violence & Underreporting:**

- In **2023**, **93.1 million people** faced climate disasters, and **423 million women** suffered IPV.
- Heatwaves caused a **28% rise** in **femicide**. Post-disaster situations often lead to an increase in **child marriage**, **human trafficking**, and **sexual exploitation**.
- Gender-based violence is described as a "shadow pandemic", with one in three women globally experiencing physical, sexual, or psychological abuse, and only 7% of survivors reporting the incidents.

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#### Vulnerable Groups at Highest Risk:

 Women in poverty, informal settlements, agriculture, Indigenous communities, those with disabilities, the elderly, and LGBTQ+ individuals are at higher risk of GBV due to limited support systems.

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• Women advocating for environmental rights face harassment, violence, abduction, and even murder.

#### Huge Gap in Gender-Climate Funding:

• Only **0.04%** of **climate-related development assistance** focuses on **gender equality**, signaling a massive gap in addressing GBV within climate action.

#### Key Recommendations from the UN Report:

#### **Integrating GBV in Climate Policy:**

• It is crucial to **mainstream GBV prevention** into all climate policies and programs at the **local**, **national**, and **global** levels, with an increase in **gender-focused climate funding**.

#### Prioritize Women's Safety and Leadership:

- Ensure women are central to climate solutions as both leaders and beneficiaries.
- Acknowledge and address GBV as a barrier to climate resilience, making it a core part of sustainable development efforts.

#### Supporting Women's Movements:

 Strengthen the capacity of civil society organizations and women's movements, such as the Pacific Feminist Community of Practice, to ensure gender justice is central to global climate platforms like COP27.

#### Adopting International Best Practices:

- Implement gender-responsive programs as seen in Vanuatu, Liberia, and Mozambique, linking gender justice with climate resilience.
- Key measures include:
  - Retraining former FGM practitioners in climate-smart agriculture.
  - Embedding GBV services in disaster response.
  - Deploying **mobile health clinics** in **climate-affected areas**.

### New Vision for Indian Cities: River and Urban Planning in Harmony

**Context:** In a forward-thinking move, the **National Mission for Clean Ganga (NMCG)** has approved an **Annual Master Plan** under the **River Cities Alliance (RCA)** to mainstream **riversensitive urban planning** across India. This bold initiative marks a critical step in ensuring that urban growth aligns with the **ecological and cultural vitality of rivers**.

The plan includes a robust framework for **capacity-building programs**, **technical guidance**, **knowledge-sharing platforms**,



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and **thematic research**, with a vision of making rivers a **central element of urban development**.

# Urban River Management Plans (URMPs): A Sustainable Blueprint

Launched in **2020** by the **National Institute of Urban Affairs (NIUA)** and **NMCG**, the **Urban River Management Plans (URMPs)** provide a first-of-its-kind approach to manage rivers through an integrated **environmental, economic, and social lens**.

## Key Highlights:

- Five cities—Kanpur, Ayodhya, Chhatrapati Sambhaji Nagar, Moradabad, and Bareilly—have already developed URMPs.
- An additional **25 cities** will develop their URMPs in the coming year, as part of a broader goal to prepare **60 such plans** across India.
- Steering Committees have been established in key states like Uttarakhand, Uttar Pradesh, Bihar, and West Bengal to support and guide this process.
- The initiative is **supported by the World Bank**, emphasizing its global alignment and importance.

**Fun Fact:** Rivers in cities like London (Thames), Seoul (Cheonggyecheon), and Paris (Seine) have undergone successful rejuvenation, serving as global models for integrating waterways into urban life.

# River Cities Alliance (RCA): A Platform for Urban-River Synergy

The **River Cities Alliance**, launched in **2021** by **NMCG and NIUA**, functions as a **national-level collaborative platform** for Indian cities to share **best practices and technical support** for river management.

### **Core Pillars:**

- Networking among cities to promote peer learning
- TOGÉCHIER WE SCALE HEIGHES
- Capacity Building through training and knowledge dissemination
- Technical Assistance for river-centric urban planning

Since its inception with **30 cities**, the RCA has grown to over **145 members**, including cities from **both Ganga and non-Ganga river basins**. In a notable milestone, **Aarhus (Denmark)** joined the alliance, adding an international perspective.

**Insight:** River-sensitive urban planning promotes not just ecological balance, but also **flood resilience**, **air quality improvement**, and **urban beautification**.

# Global River Cities Alliance (GRCA): Taking India's Model Worldwide

India's success with RCA paved the way for the **Global River Cities Alliance (GRCA)**, launched at **COP28 in 2024**. This platform brings together **over 275 river cities** from **11 countries**, including **Japan**, **Australia**, **the Netherlands**, **Egypt**, **Ghana**, **and Bhutan**, creating a global dialogue for **river conservation and urban water resilience**.

Supported by institutions like the **World Bank**, **Asian Development Bank** (ADB), and **Asian Infrastructure Investment Bank** (AIIB), the GRCA aims to promote integrated water resource management and **international collaboration**.

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# National Mission for Clean Ganga (NMCG): The Force Behind the Mission

The NMCG, established as a **registered society** under the **Societies Registration Act, 1860**, is the nodal agency for implementing the **Namami Gange Programme**—the government's flagship mission for **Ganga rejuvenation**.

#### **Key Functions of NMCG:**

- Pollution abatement and ecological rejuvenation of River Ganga.
- Maintain minimum ecological flows while ensuring sustainable development.
- Managed through a two-tier structure: **Governing Council** and **Executive Committee**, both headed by the **Director General**.
- The Executive Committee can sanction projects up to 21000 crore.

#### **Conclusion: Towards Resilient, River-Friendly Cities**

The approval of the **Annual Master Plan** under RCA reflects India's commitment to **sustainable urbanization** by placing rivers at the heart of city planning. With an ambitious roadmap for **URMPs**, **international collaborations**, and a **robust policy framework**, India is setting a benchmark for **river-centric urban development**—a model that other nations are beginning to follow.

### **Tax Exemption Granted to NMCG: A Boost to Ganga Rejuvenation Efforts**

**Context:** The **Central Board of Direct Taxes (CBDT)** has officially notified the **National Mission for Clean Ganga (NMCG)** as an **authority under the Income Tax Act, 1961**. This major decision grants **income tax exemption** to NMCG, strengthening its financial and operational capacity under the ambitious **Namami Gange Programme**.



#### Namami Gange Programme: India's Flagship River Rejuvenation Mission

Launched in **2014**, the **Namami Gange Programme** is an **integrated conservation mission** to clean and rejuvenate the **Ganga River**. With a massive budget outlay of **20,000 crore**, it is one of India's most comprehensive river revitalization efforts.

#### **Key Objectives:**

- Pollution abatement
- Conservation and rejuvenation of the National River Ganga

### Administrative Setup:

- Implemented by NMCG and State counterparts called State Program Management Groups (SPMGs)
- Overseen by the National Ganga Council (NGC), chaired by the Prime Minister
- Three-tier monitoring mechanism:
  - National Level: High-level task force chaired by Cabinet Secretary
  - State Level: Committee chaired by Chief Secretary
  - District Level: Chaired by District Magistrate

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#### **Implementation Phases:**

- 1. Entry-Level Activities Quick, visible impact
- 2. Medium-Term Activities Within 5 years
- 3. Long-Term Activities Within 10 years

## **Recent Developments: Tax Relief for NMCG**

## Legal Foundation of Exemption:

- Section 10, Clause 46A of the Income Tax Act, 1961
- Applicable to authorities formed under a Central/State Act for public benefit
- NMCG qualifies under the Environment (Protection) Act, 1986
- Effective from Assessment Year 2024–25

## Significance of the Tax Exemption:

- Enhances financial autonomy
- Improves operational efficiency
- Crucial for the execution of Namami Gange projects
- Reduces fiscal strain from past tax liabilities

## Background & Legal Transition of NMCG:

- 2011: Established as a society under the Societies Registration Act, 1860
- 2016: Upgraded to an authority under the Environment (Protection) Act, 1986
- Despite the upgrade, its **PAN status** remained as an **Association of Persons (AOP)**, causing taxrelated confusion and scrutiny

## Income Tax Disputes and Resolution:

- Faced tax demands totaling **243.74 crore**
- CBDT intervention: Permitted delayed revised returns for three assessment years
- Retrospective exemption allowed
- Action facilitated by the Ministry of Jal Shakti in coordination with the Ministry of Finance

# Additional Insights & Facts:

- NMCG is critical not just for cleaning the Ganga but also for building climate-resilient cities and reviving aquatic biodiversity
- **Tax-exempt status** ensures smoother **foreign and multilateral funding**, especially from partners like the **World Bank**, **Japan International Cooperation Agency (JICA)**, and others
- The Ganga River Basin covers **26% of India's landmass** and supports **over 40% of the population** making its rejuvenation **nationally vital**

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Draft GEI Target Rules 2025: Paving the Way for a Low-Carbon Industrial Future

Context: The Ministry of Environment, Forest and Climate Change (MoEFCC) has introduced the Draft Greenhouse Gases Emissions Intensity (GEI) Target Rules, 2025.

These rules set sector-specific emission reduction targets for "obligated entities" and establish a robust compliance framework under the Carbon **Credit Trading Scheme (CCTS)**, 2023—a significant step toward achieving India's Paris Agreement climate commitments.



## What are Greenhouse Gases (GHGs)?

**GHGs** are atmospheric gases that **trap heat**, contributing to **global warming** through the **greenhouse effect**.

**Maior GHGs:** 

- Carbon dioxide (CO<sub>2</sub>) •
- Methane (CH<sub>4</sub>) •
- Nitrous oxide (N<sub>2</sub>O) ٠
- Ozone  $(0_3)$
- Water vapour
- Synthetic gases like CFCs and HCFCs

## **Understanding GEI:** Greenhouse Gas Emissions Intensity

GHG Emissions Intensity (GEI) measures emissions per unit of output, e.g., tonnes of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e) per tonne of cement or aluminium produced.

#### As defined by the Draft Rules:

# "Greenhouse gases emission intensity in tCO2e / equivalent output or product."

This provides a **standardized benchmark** for industries to track, reduce, and report emissions.

## Key Highlights of Draft GEI Target Rules, 2025:

#### **Baseline and Targets:**

- Baseline Year: 2023-24
- Target Years: 2025–26 and 2026–27 •
- Tied to **CCTS 2023** and India's long-term emission strategy •

#### **Industries Covered:**

- Aluminium (13 plants)
- Cement (186 plants)
- Pulp & Paper (53 plants)
- Chlor-Alkali (30 plants)

**Total Units Covered: 282** 

**Major Corporations Assigned Targets:** 

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• Vedanta, Hindalco, Ultratech, JK Cement, Grasim, Shree Cement, Dalmia Cement, NALCO, and others.

#### **Compliance & Penalties:**

- Defined compliance mechanisms
- **Penalties** for failure to meet reduction targets
- Performance-linked incentives via carbon credits

## From PAT to CCTS: A Greener Evolution

## Foundation: PAT Scheme (2012)

- **Perform, Achieve, Trade (PAT)** encouraged energy efficiency.
- Earned Energy Saving Certificates (ESCerts) for overachievers.

## **Evolution to Carbon Credit Trading Scheme (CCTS), 2023:**

- Expands focus to **GHG reduction** across sectors.
- Establishes **GEI targets** and promotes **carbon market participation**.

## How CCTS Works: India's Carbon Market Explained

## Framework:

- **Carbon Credit Certificates** generated when targets are exceeded.
- Traded on the Indian Carbon Market.
- Overseen by **Bureau of Energy Efficiency (BEE)** and **Ministry of Power**.

## Industries Must:

- Submit Action Plans to achieve GEI targets.
- Buy credits or face penalties (enforced by CPCB) if underperforming.

## Incentives & Market Dynamics:

- Surplus achievers: Sell credits for profit
- Lagging sectors: Buy credits and invest in clean technologies

## **Global Comparisons & Context:**

- European Union ETS (2005): First large-scale carbon market
- China's ETS (2021): Now world's largest by emissions covered
- India's CCTS aligns with global best practices under Article 17 of the Kyoto Protocol

## Alignment with India's Climate Goals:

## Key Target under the Paris Agreement:

Reduce emissions intensity of GDP by 45% by 2030 compared to 2005 levels.

- GEI targets drive climate-smart industrial growth
- Encourages adoption of advanced, low-carbon technologies
- Ensures India's development pathway remains sustainable

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**Government Increases Stake in Vodafone Idea: Equity Conversion and AGR Dues** 

**Context:** The Indian government is set to increase its stake in **Vodafone Idea (Vi)** to nearly **49%** by converting an additional **36,950 crore** of the company's dues into equity. This move significantly boosts the government's stake, up from its previous holding of about **23%**, making it the largest shareholder. However, the **promoters** will retain **operational control** of the company. Vi will issue **3,695 crore shares** at **10** per share—**47% above its market price** of **6.8**. These dues primarily cover **spectrum auction payments** and **deferred liabilities** after the moratorium period.



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#### Background: Vodafone Idea and AGR Issue

#### AGR Dues and Legal Struggles :

Vodafone Idea (Vi) has faced significant financial burdens due to a ruling by the **Supreme Court** on **Adjusted Gross Revenue (AGR)** dues. **AGR** determines the portion of revenue telecom operators must share with the government, including charges for **spectrum usage** and **licensing**.

- AGR Controversy: The Department of Telecom (DoT) mandates that AGR includes all revenues, including non-telecom sources like **deposit interest** and **asset sales**. Telecom companies have contested this, arguing AGR should only encompass telecom service revenues.
- **Supreme Court Ruling**: In **October 2019**, the **Supreme Court** ruled in favor of the government, expanding AGR to include **all revenues** except termination fees and roaming charges. This decision placed a massive financial strain on telecom operators.
- **Final Ruling (2020)**: On **September 1, 2020**, the Court upheld the government's definition of AGR and directed companies to clear their dues, including interest and penalties. The payment schedule was set from **April 2021** to **March 2031**. Defaults would lead to **penalties** and **contempt of court**.

#### Government Reli<mark>ef Measures</mark> and the Lifeline for Vodafone Idea:

#### Telecom Reform Package (2021) :

In **September 2021**, the **Union Cabinet** approved a **telecom reforms package** designed to ease the burden on telecom operators and improve liquidity. Key measures included:

- A four-year moratorium on spectrum and AGR dues (set to end in October 2025).
- A one-time option to **convert interest on deferred payments** into **equity** after the moratorium period.

#### Second Lifeline for Vodafone Idea:

To further aid Vodafone Idea, the government converted **16,000 crore** of **interest liabilities** into equity in **February 2023**, increasing its stake to **33.1%**. With this latest conversion, the government's stake in Vi will rise to **49%**, helping the company manage its massive debt burden.

#### Vodafone Idea's Debt Burden:

As of **December 2024**, Vi's total debt is approximately **2.3 lakh crore**, comprising:

• 77,000 crore in AGR liabilities.









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• 1.4 lakh crore in spectrum liabilities.

Despite the **equity conversion**, the company still faces immense debt, with no new capital infusion from this move.

#### Impact of Equity Conversion on Vodafone Idea:

- 1. **Debt Relief and Financial Runway** : The conversion of debt into equity helps **Vi** reduce its **spectrum dues**, preventing an immediate financial crisis. Without this intervention, the company would have faced an annual installment of **40,000 crore** post-**September 2025**. This relief is expected to provide Vi with a financial runway for **two more years**.
- 2. Limited Debt Reduction: While this move reduces the debt by **37,000 crore**, Vi's total debt remains high at **2.1 lakh crore**. However, there is **no fresh capital infusion**, meaning existing shareholders face further dilution of their holdings.
- 3. **Government Ownership Limit** : The government's equity stake cannot exceed **50%**. Beyond this threshold, Vi would be classified as a **Public Sector Undertaking (PSU)**. This ownership limit prevents the government from converting more debt into equity without fundamentally changing the company's structure.
- 4. **Potential for Raising New Debt**: With increased government ownership, **Vi** may gain increased confidence from **investors** and **banks**, making it easier for the company to raise the **25,000 crore** in new debt it seeks to secure.

## Conclusion: A Mixed Outlook for Vodafone Idea

The government's **equity conversion** has provided **Vodafone Idea** with some much-needed financial breathing room, though its future remains uncertain. The company's ability to raise new debt and manage its overwhelming liabilities will determine whether this lifeline proves sustainable or if further support will be required. For now, the government's increased stake has provided a temporary **reprieve**, but **long-term financial stability** will depend on **Vi's operational performance** and ability to navigate its substantial debt load.

#### Domestically Manufactured Iron & Steel Products Policy (DMISP) – 2025

**Context:** The **Central Government** has introduced the **Domestically Manufactured Iron & Steel Products (DMISP) Policy – 2025**, focusing on selfreliance and enhanced domestic value addition in the Indian steel sector. This policy is a key component of the "Atmanirbhar Bharat" (Self-Reliant India) vision.



#### **Objectives & Significance:**

#### **Promote Self-Reliance:**

The policy aims to encourage **domestic production and consumption** of iron and steel, reducing dependency on imports.

#### **Curb Imports:**











Addressing the rising trend of steel imports, the policy seeks to safeguard the Indian steel sector from foreign competition.

#### **Protect Domestic Industry:**

By providing preference to **domestic manufacturers**, the policy aims to **shield local steel producers** from **unfair foreign competition**, especially in **government contracts and infrastructure projects**.

#### **Enhance Domestic Value Addition:**

The policy emphasizes **increasing local sourcing** of capital goods used in steel manufacturing, thereby strengthening the domestic manufacturing ecosystem.

#### Key Highlights of the DMISP Policy - 2025:

**1. Preference for Domestic Steel:** 

- All government ministries, departments, PSUs, trusts, and statutory bodies are required to procure locally manufactured iron and steel products.
- Applies to all **procurement contracts exceeding 25 lakh**.
- Includes infrastructure projects under centrally sponsored and central sector schemes.

#### 2. "Melt & Pour" Requirement:

- To ensure core production occurs within India, all products must be **melted and poured into solid** form domestically.
- Applicable to a wide range of products, including **flat-rolled products**, bars, rods, and railway steel.

#### 3. No Global Tenders Under 200 Crore:

- Global Tender Enquiries (GTE) are banned for contracts below 2200 crore unless explicitly • approved by the **Department of Expenditure**.
- Promotes **domestic participation** in government projects by reducing competition from foreign players.

#### 4. Reciprocal Clause:

- Suppliers from countries that restrict Indian firms from participating in their public procurement will be barred from bidding in Indian government steel tenders, unless permitted by the Ministry of Steel.
- This clause aims to ensure **fairness and reciprocity** in **international trade**, with **China** believed to be a primary target.

#### 5. Emphasis on Domestic Value Addition:

- For capital goods used in steel production (e.g., furnaces, rolling mills), a minimum of 50% ٠ domestic value addition is mandatory.
- Bidders must **self-certify**, with false claims risking **blacklisting and forfeiture of earnest money** deposits.
- Auditor certification is required for capital goods to verify value thresholds.

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#### Significance of the DMISP Policy – 2025:

1. Boosts Self-Reliance: Aligns with the "Atmanirbhar Bharat" vision, promoting indigenous manufacturing and consumption of steel.

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- 2. Strengthens Domestic Industry: Provides a level playing field for Indian manufacturers by restricting foreign competition in government projects.
- 3. Encourages Technological Upgradation: The policy emphasizes domestic value addition, encouraging technological advancements within the country.
- 4. Improves Trade Fairness: The reciprocal clause ensures that international trade practices remain equitable.

#### **Conclusion:**

The **DMISP Policy – 2025** marks a bold step towards fostering **self-reliance in the Indian steel sector**. By prioritizing **domestic production**, **curbing imports**, and **enhancing local value addition**, the policy aims to secure India's strategic interests and strengthen the indigenous steel industry.

Bolstering India's Undersea Cable Infrastructure: Importance, Risks, and Growth Measures

**Context:** India's rapidly expanding internet economy demands robust and resilient **undersea cable infrastructure**. As the country enhances its connectivity with new cable systems, addressing risks and ensuring streamlined growth is essential for national security and economic prosperity.

India's Subsea Cable Infrastructure: Latest Developments:

India is expanding its international internet bandwidth with **new** cable landing systems:

- Airtel's 2Africa Pearls System (backed by Meta) Adds a massive 100 terabits per second of capacity.
- **SEA-ME-WE-6 Cable System** Landed in **Chennai and Mumbai** earlier this year, further enhancing connectivity.

**Understanding Undersea Cables:** 

What Are Undersea Cables?

Undersea cables are the backbone of global internet connectivity, linking internet service providers (ISPs) and telecom operators across continents. They provide the foundation for fast and reliable data transmission worldwide.

**Structure and Functionality:** 

- These cables, though only a few inches thick, are heavily protected to withstand harsh underwater environments.
- Inside, they contain **fiber optic strands** that transmit data at lightning-fast speeds.

#### Landing Points and Stations:



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- Landing Points: Coastal entry points where cables reach land, typically protected in manholes buried under sand.
- Landing Stations: Inland facilities where undersea cables integrate with terrestrial networks, ensuring seamless internet connectivity.

## Critical Role in the Modern World:

According to experts, undersea cables are responsible for:

- 90% of Global Data Transmission
- 80% of World Trade
- \$10 Trillion in Financial Transactions
- Secure Government Communications

## Data Capacity:

Modern cables offer several **hundred gigabits per second** of capacity, serving **millions of users globally**.

#### **Connection to Terrestrial Networks:**

After reaching land, undersea cables connect to **terrestrial networks**, comprising **towers, buried cables, and data centers** that deliver internet services to homes and businesses.

## India's Underse<mark>a Cable Hubs:</mark>

#### **Major Hubs:**

India's unders<mark>ea cable in</mark>frastructure revolves around two main landing hubs:

- 1. **Mumbai:** Handles **95% of subsea cable traffic**, with a significant portion concentrated along a **six-kilometre stretch in Versova**.
- 2. **Chennai:** Serves as a critical connectivity point, especially for cables connecting to **Southeast Asia and the Middle East**.

#### Current Infrastructure:

- TOGETHER WE SCALE HEIGHT:
- **17 International Cable Systems** currently land in India.
- Two Domestic Projects:
  - CANI (Chennai-Andaman and Nicobar Islands)
  - Kochi-Lakshadweep Islands Project

## **Planning and Cost:**

Undersea cable projects are **capital-intensive**, involving:

- Months or years of planning and execution.
- Costs ranging from **millions to billions of dollars**.

## India's Capacity:

- India accounts for 1% of global cable landing stations and 3% of subsea cable systems.
- While current infrastructure meets existing demand, experts warn of future shortfalls due to **rapidly increasing data usage**.

## Risks Surrounding Undersea Cable Deployment in India:

## Vulnerability to Cable Cuts at Sea:

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- India's internet infrastructure is heavily dependent on **undersea cables**, with **more cables landing in Singapore than in India**.
- Disruption in areas like the **Red Sea** could result in a loss of **25% of India's internet connectivity**.

## Impact of Cable Cuts in the Red Sea:

- In 2024, cable cuts in the **Bab-el-Mandeb Strait** (caused by Houthi rebel strikes) led to temporary issues.
- While alternative networks provided stability, a larger-scale disruption could have **catastrophic impacts** on connectivity.

## **Historical Dependence on Shipping Routes:**

- Subsea cables traditionally follow **shipping trade routes** for easier deployment.
- This alignment exposes them to **risks from maritime activities and geopolitical conflicts**.

## Measures to Strengthen India's Subsea Cable Infrastructure:

#### 1. Streamlining Regulatory Processes:

- Companies currently face delays due to the need for **51 different approvals** from agencies like:
  - Department of Telecom
  - Home Ministry
  - Environment Ministry
  - Local Municipalities
- **Simplifying these processes** would reduce project timelines and costs, promoting faster deployment.

## 2. Enhancing Cable Security:

- Physical damage from fishing trawlers and ships poses a significant threat.
- Implementing monitoring systems and surveillance technologies could prevent accidental damage and enhance protection.

#### 3. Building Domestic Repair Capabilities:

- India relies on **foreign repair vessels**, causing delays due to **lengthy approval processes**.
- Investing in **domestic repair vessels and cable storage depots** would:
  - Speed up repair work.
  - Reduce dependency on external resources.
  - Strengthen national security and economic resilience.

#### **Interesting Fact:**

The **world's longest undersea cable**, **SEA-ME-WE 3**, spans over **39,000 km** and connects **Europe**, **Asia**, **and Australia**. It plays a vital role in ensuring global connectivity, just as India's expanding infrastructure aims to do for the subcontinent.



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India's Remittance Landscape is Shifting: A Surge from Advanced Economies

Context: The Reserve Bank of India's (RBI) latest Remittances Survey reveals a striking transformation in India's remittance ecosystem. Over the last decade, India has not only retained its position as the world's top recipient of remittances, but also witnessed a major shift in remittance sources—from the Gulf to the West.



April.

#### Growth in Remittance Inflows:

- India's remittances more than doubled from \$55.6 billion in 2010–11 to \$118.7 billion in 2023– 24.
- This remarkable surge marks a shift from a **trickle to a flood**, reflecting both **migration trends** and changing global economic dynamics.

#### Who's Sending the Money?

- **Key Trends in Remittance Sources:**
- 1. Rise of Advanced Economies (AEs):
  - Advanced Economies now account for over 50% of India's total remittance inflows.
  - **Top contributors:** 
    - United States (27.7%)
    - **United Kingdom** 0
    - **Singapore** (6.6% in FY24 its highest share to date) muatej 0
    - Canada 0
    - Australia  $\circ$
  - The U.S. alone contributed nearly 28% of all remittances in FY24, up from 23.4% in FY21 and 22.9% in FY17.

#### 2. Decline of GCC Countries:

- Historically dominant **Gulf Cooperation Council (GCC)** countries are **seeing a decline**:
  - UAE's share fell from 26.9% (2016-17) to 19.2% (2023-24)
  - Saudi Arabia and Kuwait's shares also dropped 0
- **Reasons for the decline:** 
  - Covid-19 pandemic impacts: job losses, salary cuts 0
  - "Saudisation" policies: Nationalisation programs like Nitagat aimed at reducing foreign  $\circ$ workers
  - Reduced wage growth and slower economic recovery in oil-dependent nations

#### **Demographic & Geographic Insights:**

#### **State-Wise Distribution:**

- 50% of remittances go to Maharashtra, Kerala, and Tamil Nadu
- Other states like Punjab, Haryana, and Gujarat receive below 5%
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#### Size of Remittances:

- 28.6% of total remittances are above 5 lakh
- 40.6% are 16,500 or less, indicating a broad range of earners

## Why the Shift Toward Advanced Economies?

## Reasons for Rise in AE Remittances:

- Higher Wages & Purchasing Power: Especially in the U.S., Canada, UK
- Skilled Migration: Surge of Indian professionals in STEM, finance, and healthcare
- Growing Student Population Abroad: Contributing via loan repayments and family support
- Stable Job Markets in developed economies with more opportunities for high-skilled workers

## **Reasons for Decline in GCC Remittances:**

- Economic Downturns post-Covid
- Job Losses, especially among blue-collar workers
- Nationalisation Policies prioritising locals over expatriates
- Shrinking wage premiums for Indian workers in construction, hospitality, and health sectors

## What the Future <mark>Holds:</mark>

**Emerging Trends:** 

- Rising right-wing politics may tighten immigration policies in AEs
- Migrants may remit more money home to diversify financial risks, rather than invest in uncertain host economies
- India's demographic advantage will likely continue, with the country remaining the world's largest labor supplier until 2048

Policy Recommendations for India:

To **maximize remittance inflows** and **safeguard migrant welfare**, India should:

- 1. Skill Harmonization: Align domestic training with international job market requirements
- 2. Protect Low-Skilled Workers: Prevent exploitation and forced deskilling
- 3. Bilateral & Multilateral Agreements: For safe, legal, and regulated migration pathways
- 4. **Engage with Destination Countries**: Establish **long-term frameworks** to ensure fair treatment and integration of Indian workers abroad

New Pamban Rail Bridge Inaugurated: A Leap Forward in Coastal Connectivity

**Context:** In a significant stride toward enhancing southern India's transportation infrastructure, **Prime Minister Narendra Modi** inaugurated the **New Pamban Rail Bridge**, connecting **Rameswaram Island** to **Ramanathapuram** in **Tamil Nadu**. Built at a cost of 2531 crore by Rail Vikas Nigam Limited (RVNL), the bridge introduces **state-of-the-art engineering** to one of India's most spiritually significant locations.



# Old Pamban Bridge: An Engineering Icon:





Constructed in **1913**, the **Old Pamban Bridge** was a **2.05-kilometre marvel**, linking the mainland to Rameswaram for over **70 years**. It featured a **Scherzer Rolling Lift Span**, patented by **American engineer William Donald Scherzer**, allowing ships to pass underneath. Despite being severely damaged in the **1964 cyclone**, the bridge was **quickly restored**, standing as a symbol of resilience and innovation.

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#### **Upgrades Over Time**:

- Converted to **broad-gauge** in **2007**.
- Fitted with **structural reinforcements** and **sensor monitoring** by 2020.
- Declared **beyond repair** in **2022**, leading to the suspension of rail services.

## A Glimpse into the Past: Indo-Ceylon Rail Link Dreams

The idea of connecting **India and Sri Lanka** via **Adam's Bridge** was explored as early as **1876**, with detailed proposals emerging in **1894–95**. However, due to **high costs** and **low expected traffic**, the plans were shelved. By **1906**, the focus shifted to building the Pamban Bridge to **boost the tobacco trade**, especially between **India and Ceylon (now Sri Lanka)**.

#### The Scherzer Lift Mechanism: Genius in Motion

The **Scherzer Rolling Lift Span** was one of the world's early marvels in moveable bridge engineering. It combined the principles of a rolling lift and bascule bridge, allowing smooth and quick elevation for **ship navigation**. This design has since been replicated in **over 150 bridges globally**.

## New Pamban Bridge: Engineering Excellence Reimagined

With the deterioration of the old bridge, the need for a **modern structure** became pressing. Launched in **2019**, the construction of the **New Pamban Rail Bridge** faced setbacks due to **COVID-19** and **harsh marine conditions**, but was successfully completed in **November 2024**.

Key Features:

- Length: 2.08 km
- Vertical Lift Span: 72.5 meters, can be raised by **17 meters** for ship passage
- **Speed Limit**: Trains can run at **80 km/h** (capable of supporting up to 160 km/h)
- Design Life: Built to operate safely for 100 years

#### Built for the Future: Modern Materials & Design

The new bridge incorporates **cutting-edge construction materials**:

- Stainless steel reinforcements
- Polysiloxane paint to resist corrosion from salty sea winds
- Fully welded joints to minimize maintenance
- 101 piers and 333 deep piles provide structural integrity
- Designed for **dual rail tracks**, ensuring future scalability

## Rameswaram: A Spiritual and Strategic Hub

The bridge not only improves **rail connectivity** but also enhances access to **Rameswaram**, one of the **Char Dham pilgrimage sites**, attracting millions of visitors annually. Improved transport infrastructure is expected to **boost tourism**, **promote trade**, and open up the region to **faster economic development**.

## What Lies Ahead for the Old Pamban Bridge?







As the **old bridge is set for dismantling**, plans are underway to **preserve parts of the structure** as a **tribute to its historical and engineering legacy**. It will remain a symbol of India's **colonial-era ingenuity** and a reminder of **William Scherzer's timeless design**.

#### **Did You Know?**

- The **Old Pamban Bridge** was **India's first sea bridge** and remained the **longest until the Bandra-Worli Sea Link** opened in 2009.
- The **Rameswaram–Sri Lanka ferry service**, once operational from the nearby **Dhanushkodi port**, was discontinued post-1964 cyclone damage.

#### **Conclusion: A New Chapter in Coastal Connectivity**

The **New Pamban Rail Bridge** isn't just a replacement—it's a powerful symbol of **India's engineering advancement**, combining **heritage and innovation**. With this upgrade, the region is set to witness **enhanced mobility, spiritual tourism**, and **strategic growth**, reinforcing Rameswaram's place on the national map.

## **Tensions Rise Over MSME Reclassification in Budget 2025**

**Context:** The **Union Budget 2025** has introduced **major revisions** to the classification criteria for **Micro, Small, and Medium Enterprises (MSMEs)**. While the government positions the move as a growth enabler, it has **sparked backlash** from micro and small business groups.



#### **Overview of the Classification Changes:**

**Effective April 1, 2025**, the **investment** and **turnover limits** for all MSME categories have been **substantially increased**:

Category	Old Investment Limit	New Investment Limit	Old Turnover Limit	New Turnover Limit
Micro	1 cro <mark>re</mark>	2.5 crore	5 crore	10 crore
Small	10 crore	25 crore	50 crore	100 crore
Medium	50 crore	125 crore	250 crore	500 crore

Government's View: These changes aim to

- Facilitate scaling up of operations
- Improve capital access
- Boost employment generation

#### Support for the Revised Norms:

**Industry associations** such as **FISME (Federation of Indian Micro and Small & Medium Enterprises)** have endorsed the reclassification.

Key Arguments in Favor:

- Adjusts for inflation and rising input costs
- Encourages **vertical growth** over inefficient horizontal expansion
- Reduces fear of losing government incentives when growing beyond a category

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• May attract foreign investment by increasing eligibility under the MSME umbrella

"This move incentivizes formal growth and encourages innovation-led expansion," said FISME's Secretary General.

## Concerns Raised by Micro and Small Enterprise Bodies:

However, **representatives of micro and small units** have expressed **strong opposition**.

## **Major Objections:**

- Medium enterprises (0.01% of total MSMEs) may dominate benefits intended for micro and small units (99.99%)
- Public procurement quotas (25% reserved) could now disproportionately benefit larger players
- Access to credit might become harder for micro firms, as banks prefer larger, low-risk clients
- Calls for **restoring old norms** or establishing a **separate department** for micro and small enterprises

A formal letter was sent to the **Ministry of MSME**, warning of **"systemic marginalization"** of the smallest businesses.

## Broader Implications for the MSME Sector:

## Public Procurement Competition:

• Quotas meant for small players could be **captured by medium-sized firms**, leaving micro units at a disadvantage.

## Credit Distribution Challenges:

- Formal allocation: 8% of priority sector lending for micro units
- **Reality**: Banks prefer larger ticket sizes  $\rightarrow$  micro firms face **practical exclusion**

## Post-Pandemic Recovery Not Uniform:

Critics argue the revision comes at a time when recovery is uneven, and the policy may be premature.

## Outdated Data Concerns:

• The last **National Sample Survey on MSMEs** was conducted in **2015–16**, raising alarms about policymaking **without updated evidence**.

## The "Missing Middle" Problem:

- Many firms deliberately remain small to retain benefits
- The new norms aim to **encourage scaling**, bridging the gap between micro units and large enterprises

## **Future Considerations:**

As India aims to develop a **globally competitive MSME sector**, **periodic policy updates** are necessary.

However, it is **critical** that the interests of **micro and small enterprises—the backbone of India's industrial base—are protected**.

The success of this reclassification hinges on:

- Equitable distribution of benefits
- Improved grassroots access to finance, markets, and digital infrastructure
- **Consultative policymaking** with genuine microenterprise representation

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#### National Critical Mineral Mission (NCMM) – 2025

**Context:** Launched in **2025**, the **National Critical Mineral Mission (NCMM)** aims to build a **robust, self-reliant ecosystem** for the exploration, processing, and utilization of **critical minerals**—a foundational step toward **India's clean energy transition** and **economic security**.

#### What Are Critical Minerals?

**Critical minerals** are elements that are **economically vital** and have **high supply chain risk** due to:

- Limited global availability
- Geopolitical vulnerabilities
- Lack of domestic substitutes

They are essential for:

- Renewable energy systems
- Electric vehicles (EVs)
- Advanced electronics
- Defense technologies

#### About the NCMM Mission:

The National Critical Mineral Mission is designed to:

- Ensure long-term availability of essential minerals.
- Reduce import dependence.
- Build capacity for exploration, mining, refining, and recycling.

**Key Features:** 

- The Geological Survey of India (GSI) has been tasked with conducting 1,200 exploration projects from 2024–25 to 2030–31.
- A 2022 expert committee identified 30 critical minerals, with 24 included in Part D of Schedule I of the Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act).
- The **Union Government now holds exclusive rights** to auction mining leases and licenses for these minerals.

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#### **Uses of Critical Minerals:**

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**Energy Security & Clean Transition:** 

- Minerals like lithium, cobalt, nickel, and rare earth elements (REEs) are vital for:
  - o Solar panels, wind turbines, green hydrogen tech
  - Energy storage systems (e.g., lithium-ion batteries)
  - Supporting India's targets:
    - **50% electric power** from non-fossil sources by **2030**
    - Net-zero emissions by 2070
- Wind capacity expansion from 42 GW to 140 GW
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## **Electric Mobility:**

- Supports the National Electric Mobility Mission Plan (NEMMP) and FAME scheme
- Critical for boosting EV battery production •
- Reduces India's crude oil dependency

## **Economic Development:**

- Drives **investment** in mining and **clean-tech startups**
- Generates jobs in:
  - Exploration and mining
  - Engineering
  - Technology and R&D
- Strengthens **MSMEs** across the **clean energy value chain**

## **National Security:**

- Minerals like **titanium**, **tungsten**, and **REEs** are used in:
  - Missile systems
  - **Radar and satellites** 0
  - Stealth aircraft and defense electronics 0

# **Digital Economy Backbone:**

- Key minerals like silicon, gallium, and indium power:
  - Semiconductors

  - 5G/6G technology
    Smart cities and grids
  - **Digital India initiatives**

# IREL (India) Limited: Strategic Backbone:

## **IREL (India) Limited**, under the **Department of Atomic Energy**, is a **key public sector player** in the critical minerals value chain.

- **Processing capacity**: 6 lakh tonnes/year
- Produces **beach sand minerals**: *ilmenite*, *rutile*, *zircon*, *sillimanite*, *garnet*
- Runs:
  - Rare Earth Extraction Plant in Chatrapur, Odisha
  - Rare Earth Refining Unit in Aluva, Kerala 0

# **India's Global Engagements:**

- KABIL-CAMYEN Agreement (Argentina, 2024): Lithium exploration on 15,703 hectares
- MoU with Australia's Critical Minerals Office (2022) •
- Ongoing discussions with the **Democratic Republic of Congo (DRC)** for **cobalt and copper**
- Building **strategic mineral partnerships** across:
  - Africa
  - Latin America

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#### **Challenges Ahead:**

Challenge	Details
Geopolitical Risks	Overdependence on China, DRC, and South America
Low Domestic Processing Capacity	Lack of advanced <b>REE separation technology</b>
Private Sector Barriers	Regulatory hurdles and <b>low private investment</b>
Environmental Concerns	Mining and refining may impact <b>local ecosystems</b>
Weak Recycling Ecosystem	India's <b>e-waste recycling infrastructure</b> is still underdeveloped

#### Way Forward: A Strategic Roadmap

- **Boost Domestic Exploration**: Leverage **PPP models** to attract private participation.
- Forge Global Alliances: Secure long-term sourcing deals with mineral-rich nations.
- Scale R&D and Recycling: Focus on urban mining and circular economy strategies.
- Capacity Building & Skilling: Train workforce in critical mineral processing and clean-tech • applications.

## **Conclusion: Paving the Way to Mineral Sovereignty**

The National Critical Mineral Mission marks a bold shift in India's mineral strategy—from a resourcedependent nation to a resource-secure one.

With the right investments, policies, and global collaborations, India can build a sustainable, resilient, and self-reliant critical minerals ecosystem, powering its green economy, digital transformation, and strategic defense future.

## Adenium Obesum: The Exotic Charm of the Desert Rose

**Context: Tiruvallur district** in **Tamil Nadu** is emerging as a promising hub for cultivating **Adenium obesum**, commonly known as the **Desert Rose**. With its striking floral beauty and **low-maintenance appeal**, this plant is gaining popularity as a premium ornamental houseplant and bonsai centerpiece.

#### About Adenium Obesum:

- Common Name: Desert Rose
- **Botanical Family**: *Apocynaceae* (Dogbane family) ٠
- Type: Succulent shrub
- Native Regions: Africa and the Arabian Peninsula

Originally found in arid deserts and dry shrublands, this plant thrives in sun-drenched regions, making it ideal for hot climates and indoor sunlit spaces.

Feature	Description
Flowers	Trumpet-shaped, vibrant blooms in shades of white, pink, red, and deep crimson
Trunk	Thick, <b>swollen base</b> (caudex) used to <b>store water</b> — an adaptation for survival in dry
	climates
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#### **Kev Features & Aesthetic Appeal:**

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Pollination	Attracts bees, butterflies, and other pollinators due to its fragrant flowers
Growth Habit	Slow-growing, typically 12 inches per year; ideal for shaping into bonsai
Drought- Tolerant	Stores water in its caudex, enabling survival during long dry periods

#### **Uses and Cultivation:**

- **Ornamental Houseplant**: Valued for its **compact**, **tree-like form** and **colorful blossoms**.
- **Bonsai Art**: Widely used in **bonsai cultivation** due to its sculptural trunk and manageable growth.
- Low-Maintenance Landscaping: Perfect for xeriscaping (landscaping with minimal water use).

#### Tiruvallur's Growing Success:

- Farmers and nursery owners in **Tiruvallur**, Tamil Nadu, are tapping into the **commercial potential** of Desert Rose.
- The region's **dry climate** and **well-drained soil** conditions make it ideal for this exotic plant.
- Increased demand in **urban markets**, particularly among **gardeners and interior designers**, is fueling local production.

## Did You Know?

- Medicinal Uses: In traditional African medicine, parts of the plant are used for pain relief and antimicrobial purposes, though the plant is toxic if ingested in large quantities.
- **Caution**: All parts of Adenium are **poisonous** if consumed especially for **pets and small children**. Handle with care.
- **Climate Adaptability**: Though native to deserts, the Desert Rose can be grown in tropical and subtropical climates with proper care.

#### Care Tips for Adenium Obesum:

- Light: Needs full sun (at least 6 hours daily).
- Soil: Prefers well-draining, sandy soil avoid waterlogging.
- **Watering**: Water sparingly; allow the soil to dry between watering.
- **Temperature**: Thrives in temperatures above **20°C**; protect from frost.
- **Pruning**: Prune to maintain shape and encourage bushier growth.

## **Conclusion: The Desert Rose in Bloom**

The **Adenium obesum** is more than just a plant — it's a symbol of **resilience**, **beauty**, and **botanical artistry**. With its growing popularity in regions like **Tamil Nadu**, India is poised to become a niche exporter of this exotic gem in the global ornamental plant market.

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RBI Slashes Repo Rate to 6%, Trims GDP Forecast to 6.5% Amid Trade Turmoil

**Context:** In a decisive move to bolster economic momentum, the Reserve Bank of India (RBI) has reduced the repo rate by 25 basis points, bringing it down to 6%. Simultaneously, the GDP growth forecast for FY2026 has been revised downward to 6.5% from the earlier projection of 6.7%, amidst escalating global trade tensions and uncertain macroeconomic conditions.



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**Key Takeaways from the MPC Meeting:** 

**Repo Rate Cut to Stimulate Growth:** 

- The Monetary Policy Committee (MPC) announced a 25 bps rate cut, the second consecutive reduction, lowering the **repo rate to 6%**.
- The **repo rate** is the interest charged by the **RBI** when lending to commercial banks a key tool to manage liquidity and economic activity.
- This move is aimed at **stimulating demand and supporting economic recovery**, especially in the wake of **rising global trade tensions**.

#### Shift in Monetary Policy Stance:

- The MPC shifted its stance from 'neutral' to 'accommodative', indicating a readiness to cut rates further if necessary.
- A neutral stance allows flexibility based on inflation and growth, whereas an accommodative stance is focused on **boosting growth** through **lower interest rates**.
- The **RBI Governor** emphasized that the stance now points only toward a status quo or further easing, ruling out rate hikes in the near term.

#### Growth Forecast Revised Downward:

- The RBI lowered its FY2026 GDP forecast to 6.5%, down from 6.7%, citing the negative effects of trade disputes and policy uncertainty on both global and domestic growth.
- Concerns over **investment**, **consumption**, and **net exports** led to this revision.

#### **Inflation Under Control:**

- Despite concerns over imported inflation and currency fluctuations, falling crude oil and **commodity prices** have helped ease inflationary pressures.
- The **Consumer Price Index (CPI)** inflation forecast for FY2026 has been revised down from **4.2% to** 4%.
- The RBI noted that growth concerns currently outweigh inflation risks.

#### **RBI Unveils Additional Measures:**

To complement the rate cut, the RBI also announced several strategic initiatives:

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- Forward contracts to be introduced in the Government Securities (G-Sec) market.
- SEBI-registered non-bank brokers to gain access to the NDS-OM platform.
- A review of trading and settlement timings across multiple market segments.
- Launch of exclusive internet domains: 'bank.in' for banks and 'fin.in' for non-bank financial entities.
- Implementation of Additional Factor Authentication (AFA) in cross-border 'Card Not Present' transactions for enhanced security.

#### Why Did the RBI Cut the Repo Rate?

#### **Global Trade Tensions Trigger Proactive Action:**

- The recent announcement of a 26% reciprocal tariff by the US on Indian exports has raised significant concerns about global economic stability.
- These tensions have led the RBI to act swiftly to **protect domestic growth** and cushion the impact on the economy.

#### Growth Risks Take Center Stage:

- The **MPC** acknowledged the fragile nature of the recovery, particularly after a weak H1 in FY2024-25.
- With the global slowdown looming, the RBI is prioritizing domestic growth support, taking advantage of the favorable inflation environment.

## Improved Inflation Outlook Provides Policy Leeway:

A sharp decline in food inflation and a stable price outlook gave the MPC room to support • sustainable, non-inflationary growth.

## **India Needs an Ecosystem That Enables Deep-Tech Innovation**

**Context:** At the **Startup Mahakumbh**, Commerce Minister **Piyush Goyal** criticized Indian startups for being too focused on **consumer-centric models** like food delivery and influencer-driven apps. He emphasized that India must shift toward deep-tech innovation to stay competitive globally.



## **Did You Know?**

- **Startup Mahakumbh** is a flagship event promoting **entrepreneurship and innovation** in India.
- Theme: 'Startup India @ 2047: Unfolding the Bharat Story'
- The event aims to propel India as a global startup hub by the time it reaches 100 years of independence.

## **Comparison with China: The Innovation Gap:**

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India	China
Focuses on <b>food delivery</b> , <b>betting platforms</b> , and	Invests in <b>electric vehicles (EVs)</b> , <b>AI</b> , <b>robotics</b> , and
short-form content	battery tech
Lacks significant intellectual property (IP) in	Over 6,000 deep-tech startups; nearly \$100B in
deep-tech	funding
Still evaluating AI model proposals	Leads with <b>DeepSeek</b> , an efficient AI model
Dependent on Chinese components for	Strong domestic hardware ecosystem
manufacturing	
Ranks <b>39th</b> in Global Innovation Index (2024)	Ranks <b>11th</b>

China's strategic focus on foundational technologies is what gives it a dominant edge in the global tech race.

## **Challenges Facing Indian Startups:**

## **Innovation Deficit:**

- Global Indian talent, like Satya Nadella (Microsoft) and Sundar Pichai (Google), thrive abroad while local innovation lags.
- India hasn't produced a globally competitive **AI model** yet.

## Funding Gap:

- India invested **\$160B in tech (2014–2024)** vs China's **\$845B**. •
- Only **10% of Indians** can afford discretionary spending—limiting consumer tech scalability.

# Weak Education and Research:

- Many graduates are **unemployable**.
- Indian universities lack global research credibility. ٠
- **Brain Drain: Top talent emigrates** for better research and entrepreneurial environments. ٠
- **Risk-Averse VC Culture:** VCs favor **quick-return apps** over **long-gestation deep-tech ventures**.
- Limited Global Presence: Startups like Zomato, Swiggy, and Flipkart are India-centric, with little global reach.

# **Opportunities and Strengths**

# **Startup Ecosystem Growth:**

- India is the **3rd-largest startup ecosystem**, with **1.57 lakh+ recognized startups** (as of Dec 2024).
- Over **100 unicorns** span across SaaS, fintech, healthtech, and more.

# **Geographic Spread**:

Major hubs: Bengaluru, Hyderabad, Delhi-NCR, Mumbai.

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Tier II & III cities now account for over 51% of recognized startups—showing grassroots innovation.

#### **Tech Contributions:**

- India has become a global leader in **SaaS** with companies like **Zoho**, **Freshworks**, **TCS**, and **Infosys**.
- Pioneered **digital public infrastructure** with **UPI**, revolutionizing digital payments via **Paytm** and PhonePe.

## **Space and Deep-Tech Potential:**

- Startups like **Skyroot**, **Agnikul**, and **Digantara** are emerging in **space tech**. ٠
- **Cybersecurity** startups are rising but often face **early exits via acquisition**.
- Deep-tech investments grew 78% in 2024, reaching \$1.6B.

## **Key Areas to Focus On:**

To truly transition into a **deep-tech powerhouse**, India must focus on:

- Artificial Intelligence (AI)
- Smart manufacturing and Industry 4.0
- Medical technology (MedTech) •
- Climate tech & green energy
- Defence tech and aerospace •
- Quantum and advanced computing

## **Conclusion: A Call for Bold Reforms**

India has made **tremendous strides** in **SaaS**, **fintech**, and **digital payments**, but it still lags behind global powers like China in **deep-tech innovation and global competitiveness**.

To bridge the gap, India needs:

- Bold, long-term investment in R&D
- A culture of risk-taking among VCs
- Stronger academic-industry collaboration
  - Policies that incentivize deep-tech development
  - A national mission to retain and empower Indian tech talent

**India Ends Transshipment Facility for Bangladesh Exports** 

Context: India has officially withdrawn the transshipment facility that previously allowed **Bangladesh to export goods** to third countries via **Indian** ports, airports, and land customs stations (LCSs). This move is poised to have considerable implications for Bangladesh's export logistics and regional trade dynamics.



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## What Was the Transshipment Agreement?

Introduced in **2020** by India's **Central Board of Indirect Taxes and Customs (CBIC)**, the **transshipment agreement** was designed to:

- Strengthen regional trade connectivity
- Allow Bangladeshi cargo to move through Indian LCSs to international ports and airports
- Facilitate seamless exports from Bangladesh to destinations like Europe, West Asia, and beyond

## Why Was It Revoked?

India cited **logistical bottlenecks** as the main reason behind this decision. Key concerns included:

- Severe congestion at Indian ports and airports
- Resulting delays and increased operational costs
- Negative impact on India's own export timelines and efficiency

The suspension of this facility is likely to **raise costs** and **complicate trade logistics** for Bangladesh, especially for shipments to **Western markets**.

## India-Bangladesh Relations: A Snapshot

## **Historical Ties:**

1971 Liberation War: India played a pivotal role in Bangladesh's independence from Pakistan, cementing a foundation of strong bilateral ties.

## Land Bound<mark>ary Agre</mark>ement (LBA):

- Signed in **2015**, this historic agreement:
  - Resolved decades-old border disputes
  - Enabled the exchange of enclaves
  - Simplified the international boundary

#### Connectivity and Infrastructure:

- Five pre-1965 rail links have been restored.
- Operational trains include:
  - Maitri Express
  - Bandhan Express
  - Mitali Express
- The **Akhaura-Agartala rail link** has significantly improved connectivity between **northeastern India** and Bangladesh.

#### **Economic Ties:**

- Bangladesh is India's largest trading partner in South Asia.
- In FY24, bilateral trade reached US\$ 12.90 billion.
  - **India's exports**: US\$ 11.06 billion
- Both countries participate in multiple trade agreements:
- Asia Pacific Trade Agreement (APTA)









- o SAARC Preferential Trade Agreement (SAPTA)
- South Asian Free Trade Area (SAFTA)

## Strategic and Regional Cooperation:

- Active membership in **SAARC** and **BIMSTEC**.
- Regular joint military exercises:
  - Sampriti (Army)
  - Milan (Navy)
- Bangladesh imports approximately **2,000 MW of electricity** from India, highlighting energy interdependence.

## **Challenges in the Bilateral Relationship:**

- **1. Border Issues**: Despite the LBA, sporadic **border security incidents** and **illegal crossings** continue to pose challenges.
- 2. Water Sharing Disputes: Teesta River sharing remains unresolved, causing diplomatic strain.
- **3. Trade Imbalance:** A persistent **trade surplus in India's favor** has triggered calls for a more balanced trade structure.
- **4. Cross-Border Migration: Undocumented migration** into Indian states like **Assam and West Bengal** remains a politically sensitive topic.
- **5.** Security Concerns: Issues like smuggling, extremist activities, and border vulnerabilities demand constant vigilance.
- **6.** China's Influence: China's growing footprint in Bangladesh, especially in infrastructure and defense, is viewed by India as a strategic challenge.

#### The Way Forward:

India and Bangladesh share not just a **border**, but a deep-rooted bond forged by **history**, **culture**, and **geographical proximity**. With the **longest land boundary** between any of India's neighbors, Bangladesh remains a **key partner** in regional stability and growth.

Moving forward, both nations should focus on:

- Strengthening dialogue
- Enhancing inclusivity in trade
- Balancing strategic partnerships
- Promoting a resilient and forward-looking relationship

Indian Agriculture to 2047: Pathways to a Sustainable and Resilient Future

**Context:** The policy paper titled **"Indian Agriculture to 2047"**, released by the **ICAR–National Institute of Agricultural Economics and Policy Research (ICAR-NIAP)**, presents a long-term vision for transforming India's **agri-food system**. This comprehensive analysis reflects on the **six-decade evolution** of Indian agriculture while offering a roadmap to address future challenges and opportunities.



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## A Green Revolution Legacy:

Over the past 60 years, India has shifted from a **food-insecure nation** to a **food-surplus economy**, thanks to innovations such as the Green Revolution, along with input subsidies and minimum support price (MSP) mechanisms.

#### **Economic Transformation:**

- The contribution of agriculture to national income has reduced from 43% in the 1960s to 18% today.
- However, the **agricultural workforce** has declined at a much slower pace, from **74% to 46%**, indicating a need for **rural employment diversification**.

#### Land Fragmentation:

- Marginal holdings (≤1 hectare) have grown from 51% to 68% of total landholdings. •
- The average farm size has shrunk from 2.28 hectares to 1.08 hectares, making economies of scale harder to achieve.

#### **Diversification of Agriculture:**

- The contribution of **animal husbandry** to agricultural **Gross Value Added (GVA)** rose to **31%** in 2022-23.
- **Fisheries** now account for **7%**, reflecting a trend toward **multi-sector** agri-based livelihoods.

#### Key Challenges to Agri-Food System Transformation:

Despite notable progress, India's agri-food system faces critical structural and environmental constraints:

- 1. Shrinking Agricultural Land: Rapid urbanization, industrialization, and population growth are steadily eroding **arable land**, leading to competition between food production and urban infrastructure.
- 2. Imbalanced Fertilizer Usage:
  - Excessive use of urea due to subsidy distortions has led to soil nutrient depletion.
  - Low nutrient-use efficiency and regional disparities in fertilizer use affect both yields and environmental health.
- 3. Water Stress
  - **Groundwater over-extraction**, especially in the northwestern states, is unsustainable.
  - Inefficient irrigation systems and poor water governance have made agriculture highly vulnerable to water scarcity.
- 4. Climate Change Impacts:
  - **Extreme weather events** such as droughts, floods, and heatwaves have caused a **25% decline in** productivity growth.
  - Rainfed areas, which constitute over 50% of cultivated land, are most at risk.
- 5. Market and Policy Bottlenecks:
  - A **cereal-centric policy approach** has skewed production patterns.
  - Poor market access, weak value chains, and limited rural credit remain major barriers for farmers.

#### **Recommendations for a Sustainable Agri-Food System:**

To future-proof Indian agriculture by 2047, the report offers a suite of forward-looking reforms:

1. Water Resource Management:



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• Promote **rainwater harvesting**, **groundwater recharge**, and **micro-irrigation** (e.g., **drip and sprinkler systems**) for efficient water use.

April

• Encourage **crop diversification** towards **less water-intensive crops** like **millets** and **pulses**.

## 2. Energy and Input Reforms:

- Gradually phase out electricity subsidies to reduce over-pumping of water.
- Promote **nano fertilizers**, which increase nutrient efficiency and reduce environmental impact.
- Encourage **integrated nutrient and pest management**, **intercropping**, and **crop rotation**.

## 3. Research and Innovation:

- Increase investments in **agricultural R&D**, particularly in **climate-resilient crops**, **precision farming**, and **digital agriculture**.
- Scale up the use of **AI**, **drones**, **and IoT-based solutions** to improve farm productivity and decisionmaking.
- 4. Market and Price Policy Reforms:
  - Strengthen **agricultural market infrastructure**, including **cold chains**, **warehousing**, and **logistics**.
  - Reform **MSP policy** to make it **crop-neutral** and **region-sensitive**.
  - Support Farmer Producer Organizations (FPOs) to improve bargaining power and value addition.

## Additional Insights: Global Best Practices for India:

## India can dra<mark>w lessons</mark> from:

- **Israel's water management**, where over **80% of wastewater** is treated and reused for agriculture.
- The Netherlands, a leader in agri-tech innovation, despite having limited land.
- Brazil's integrated agro-industrial model, which connects smallholder farmers to global value chains.

## Conclusion: Vis<mark>ion 2047 – Towards Resilience and Prosperity</mark>

As India approaches its **centenary of independence**, the transformation of agriculture must move beyond production to focus on **sustainability, inclusivity, and resilience**. The policy roadmap offered by ICAR-NIAP envisions a **farmer-centric, market-oriented**, and **climate-smart** agricultural system.

**Empowering smallholders**, investing in **technology**, and making **policies more adaptive and responsive** will be critical to ensuring that **Indian agriculture thrives** in the face of 21st-century challenges.

India-Middle East-Europe Economic Corridor (IMEC) — A Game-Changer in Global Trade

**Context:** Describing the **India-Middle East-Europe Economic Corridor (IMEC)** as much more than a trade pathway, the **Union Minister of Commerce and Industry** called it a **"modern-day Silk Route"** that will reshape international commerce and connectivity. This visionary project is poised to transform how goods, energy, and data move across continents.



#### What is IMEC?











The IMEC is a multinational, multimodal connectivity initiative, formalized through a Memorandum of Understanding (MoU) signed at the G20 Summit 2023 in New Delhi. Signatory nations include India, European Union, France, Germany, Italy, Saudi Arabia, United Arab Emirates, and the United States.

#### Core Objective:

To build a comprehensive infrastructure network encompassing **ports, railways, highways, sea routes, and pipelines**, linking **India with the Arabian Peninsula, the Mediterranean region, and Europe**.

## **Economic and Strategic Benefits of IMEC:**

## 1. Reduced Logistics Costs and Transit Time:

- IMEC is projected to **cut logistics costs by up to 30%**.
- It is expected to **reduce transportation time by around 40%**, significantly accelerating supply chains.

#### 2. Enhanced Geostrategic Positioning:

- The corridor **bypasses critical maritime chokepoints** like the **Suez Canal**, offering a **secure and resilient trade alternative**.
- It strengthens **India's strategic ties** with the Middle East and Europe, enhancing regional influence.

## 3. Boost to Geoeconomic Integration:

- IMEC enables deeper economic cooperation across three major regions, fostering cross-border investments, technology exchange, and energy connectivity.
- 4. Counterbalance to China's Belt and Road Initiative (BRI):
  - IMEC provides a transparent and democratic infrastructure alternative, reinforcing rules-based international trade and reducing dependency on China-centric trade routes.

#### Drawing Parallels: IMEC and the Historic Silk Route:

The Minister likened IMEC to the **ancient Silk Route**, which connected Asia with Europe from the **2nd century B.C. to the 15th century A.D.** Just like its predecessor, IMEC is expected to be a **catalyst for economic prosperity, cultural exchange**, and **geopolitical influence**.

#### Roadmap for Implementation: Minister's Key Suggestions:

To ensure the success of IMEC, the Minister proposed a **multi-pronged strategy**:

#### 1. Multi-Stakeholder Collaboration:

• Active engagement of **industry players**, **academia**, **think tanks**, and **governments** to align on execution plans and shared benefits.

#### 2. Innovative Financing Models:

• Introduction of **long-term IMEC Bonds** and **public-private partnerships (PPPs)** to mobilize funding at scale and ensure project viability.

#### 3. Sustainable and Smart Infrastructure:

• Use of **green technologies**, **digital logistics platforms**, and **AI-driven route optimization** for enhanced efficiency and sustainability.

#### A Step Toward a New Trade Order:

IMEC marks a significant milestone in shaping a **new world trade order** that is **inclusive, diversified, and strategically secure**. With **India playing a central role**, the corridor is set to drive **economic** 









#### Did You Know? - IMEC in Numbers

- **Over 8,000 km** of planned infrastructure spanning multiple regions.
- Potential to impact over 2 billion people across participating countries.
- Projected to mobilize **hundreds of billions of dollars** in investment over the next decade.

**15th BRICS Agriculture Ministers' Meeting: A Milestone for Sustainable and Inclusive Farming** 

**Context:** At the **15th meeting of BRICS Agriculture Ministers**, member countries – **Brazil, Russia, India, China, and South Africa** – came together to strengthen collaboration in transforming the global agricultural landscape. **India** played a pivotal role by reiterating its commitment to **inclusive, equitable**, and **sustainable agriculture**.



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#### Key Outcome: BRICS Land Restoration Partnership:

A major highlight of the meeting was the launch of the **BRICS Land Restoration Partnership**, an initiative aimed at:

- Combating land degradation
- Tackling desertification
- Restoring **soil fertility**

This partnership aligns with the **UN's Decade on Ecosystem Restoration (2021–2030)** and promotes landbased solutions to global food insecurity and climate change.

#### Joint Declaration: Vision for a Sustainable Agri-Food System:

The ministers signed a **Joint Declaration** committing to the creation of a **fair**, **innovative**, **inclusive**, and **resilient** agri-food system. The declaration emphasizes:

- Investment in climate-resilient farming
- Strengthening global agricultural trade
- Enhancing technology transfer between member countries

#### India's Stand: Empowering the Backbone of Agriculture:

India emphasized the need to **empower small and marginal farmers**, particularly **women**, who are often the most **vulnerable** to:

- Climate change
- Price volatility
- Resource scarcity

**Fact Check:** Globally, **over 510 million smallholder farmers** produce more than **one-third** of the world's food supply.

India stressed that empowering these farmers **socially**, **economically**, and **politically** is essential for ensuring **food security** and **rural development**.

#### Understanding Sustainable Agriculture:

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## **Definition:**

Sustainable agriculture refers to farming practices that:

- Meet current food needs
- **Conserve** natural resources
- Protect the environment
- Ensure economic viability and social equity

#### **Key Practices:**

- Efficient water management
- Use of **bio-fertilizers** and **organic inputs** ٠
- Reduction of **chemical dependency** ٠
- Adoption of agroecological methods

## Why Sustainable Agriculture Is the Need of the Hour:

- **Over-Dependence on Monsoons:** Around **60% of India's farmland** is rain-fed, making it highly vulnerable to climate variability.
- **Price Fluctuations:** Farmers often sell crops at a loss due to market volatility and lack of storage infrastructure.
- Low Mechanization & Processing: Post-harvest losses and lack of value addition reduce farmer income.
- **Limited Access to Credit:** Smallholders face barriers in accessing **institutional finance**.

# India's Initiatives for Agricultural Sustainability:

## **Farmer Producer Organizations (FPOs):**

FPOs help aggregate produce, improve market access, and provide shared infrastructure.

## Warehouse Receipt Financing:

Enables farmers to store their produce and **delay sales** until they get **better prices**.

## National Mission for Sustainable Agriculture (NMSA):

Focuses on:

- **Climate-resilient crops** •
- Soil health management
- Efficient irrigation practices like drip and sprinkler systems

# National Innovations on Climate Resilient Agriculture (NICRA):

Supports climate-based research, technology demonstration, and farmer capacity building. ٠

# **Promotion of Bio-fertilizers:**

Reduces **chemical inputs** and enhances **soil microbial health**, supporting long-term productivity.

# **Conclusion: Toward a Just and Resilient Global Food System**

The 15th BRICS Agriculture Ministers' Meeting marked a significant step toward redefining the future of agriculture—placing farmers first, prioritizing sustainability, and driving innovation across borders.

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For India, this summit reinforced a long-term vision of agriculture-led inclusive growth, placing smallholder farmers, climate resilience, and global cooperation at the center of policy planning.

#### Ride-Hailing in India: BluSmart Exit, Subscription Models, and Legal Challenges Reshape Market

Context: India's \$1-billion ride-hailing market is undergoing major disruption.

- **BluSmart**, a leading **electric vehicle (EV)** cab operator, has **paused** services amid financial distress and regulatory probes.
- In parallel, **subscription-based pricing models** by startups like Rapido and Namma Yatri are challenging traditional commissionheavy models from Uber and Ola.
- Adding to the volatility, the **Karnataka High Court** has ordered a **ban on bike taxis**, impacting gig workers and raising broader questions about regulation.

#### **BluSmart's Uncertain Future: Key Developments**

#### Service Suspension:

BluSmart has halted operations in **Delhi-NCR**, Bengaluru, and Mumbai. Refunds for users' in-app wallet balances may take **up to 90 days**, worrying customers and regulators alike.

#### Liquidity Crisis Deepens:

- **ICRA** has flagged delays in debt servicing and highlighted BluSmart's loss-making status.
- The service suspension further worsens its cash crunch.

#### Vehicle Financing in Trouble:

- Gensol Engineering, BluSmart's associate, is in default on loans from IREDA and PFC used to finance EVs.
- These vehicles were pledged as collateral and may now be **repossessed and auctioned**.

#### **Ownership Tangles:**

While some EVs are under BluSmart's "Assured" leasing program, most are leased from Gensol, complicating potential takeovers or partnerships (e.g., with Uber).

#### Failed Exit Deal;

- A proposed deal to sell **3,000 EVs to Refex Green Mobility** has collapsed.
- Meanwhile, **SEBI is probing Gensol** for financial misconduct, further clouding future asset deals.

Bottom Line: BluSmart's exit appears more permanent than temporary, with deep financial, legal, and operational hurdles blocking a revival.

#### Who Gains from BluSmart's Fall?

- Uber and Ola May Regain Share: BluSmart's absence could drive users back to Uber and Ola, but the landscape is no longer theirs alone.
- Rise of New Players: Startups like Shoffr in Delhi are gaining traction—especially for airport transfers—with better reliability and service.

#### **Subscription Models on the Rise:**













- Rapido and Namma Yatri now offer driver-friendly daily/weekly subscription fees, instead of steep commissions.
- These models are increasingly popular among **auto** and **cab drivers**.

## **Pressure on Incumbents:**

Uber and Ola have adopted subscriptions for autos and may soon extend them to cabs. However, moving away from commission models challenges their existing revenue structures.

Legal Hurdles Facing India's Ride-Hailing Sector

## **GST Confusion Over Subscription Models:**

Subscription platforms avoid collecting 5% GST from passengers, since payments go directly to drivers. But legality is unclear:

- Nov 2024 (Karnataka AAR): Held that Uber must collect GST under the subscription model. •
- Sep 2023 Ruling: Exempted Namma Yatri, saying it only connects drivers and passengers.

The industry is now seeking **clear policy guidance** from the **GST Council** and tax authorities.

## Crackdown on Bike Taxis:

- Karnataka High Court ordered a shutdown of bike taxi services by mid-May, citing lack of regulation.
- This affects **thousands of drivers**, including **many women riders**.

## **Drivers have petitioned for:**

- Temporary permits
- A regulatory framework
  Stakeholder consultations reedom PS(

## Call for Reform:

The Internet and Mobile Association of India (IAMAI) has urged the formation of a joint governmentindustry committee to frame comprehensive bike taxi regulations.

#### Growth Potential Amid Legal Uncertainty:

Despite ongoing disruption, India's ride-hailing market is **poised for rapid expansion**:

- Valued at \$951 million in FY 2023-24
- Expected to reach \$3.9-4 billion by FY 2031-32
- Implies a CAGR of over 18% ٠

However, **policy clarity**—on **subscription pricing**, **GST**, and **bike taxis**—will be critical to sustaining this momentum.

#### **ISRO Satellites Forecast Wheat Production**

Context: In a remarkable blend of space science and agriculture, ISRO has forecasted India's wheat production for the 2024-25 Rabi season at an estimated 122.724 million tonnes. This estimate comes from eight major wheat-growing states, showcasing how space-based tools are revolutionizing farm monitoring.



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## About the Study:

ISRO utilized the Comprehensive Remote Sensing Observation on Crop Progress (CROP) framework for this assessment. Key technologies included:

- **Optical & Synthetic Aperture Radar (SAR)** datasets from satellites:
  - **EOS-04**  $\circ$
  - **EOS-06** 0
  - **Resourcesat-2A**
- **Near real-time monitoring** of wheat sowing and crop conditions

## What is CROP?

- A semi-automated, scalable framework developed by NRSC/ISRO
- Tracks **crop sowing**, **harvesting**, and **growth stages** in real-time
- As of March 31, 2025, wheat was sown over 330.8 lakh hectares, aligning closely with the Ministry of Agriculture's data

## Why Space Technology in Agriculture Matters:

## **Challenges in Indian Agriculture:**

- Heavy reliance on **natural resources**
- Rising population pressure
- Need for **sustainable** and **data-driven** agriculture

#### How Space Tech Helps:

- Enables smart planning and resource optimization
- Provides real-time insights to farmers, scientists, and policymakers •
- Improves yields, reduces input waste, and supports climate resilience
- Key Applications of Space Technology in Agriculture:

## 1. Precision Agriculture:

- Uses GNSS (Global Navigation Satellite Systems) for accurate field mapping
- Facilitates:
  - Precision irrigation
  - **Nutrient optimization**
  - **Targeted crop planning**  $\circ$
- Results in higher yields and better resource efficiency
- 2. Enhanced Connectivity: Satellite-based networks provide farmers with:
  - Weather forecasts
  - Market prices 0
  - Expert agronomic advice 0

## 3. Remote Sensing & Satellite Imaging:

- Monitors:
  - **Crop health**
- Vegetation indices 0 Download Our Application \_



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- Land use patterns
- Detects disease and stress early, reducing pesticide use

## 4. Hyperspectral Imaging:

- Tracks subtle physiological changes in plants
- More precise than traditional sensors for:
  - Plant health monitoring
  - Nutrient deficiency detection

## 5. Water & Soil Management:

- Tracks:
  - Soil moisture
  - Groundwater levels
  - Irrigation efficiency
- Aids in:
  - Combating erosion
  - Conserving resources
  - Sustainable land management

# Government Initiatives Supporting Agri-Space Integration:

- Since the 1980s, India has harnessed satellite data for agricultural planning.
- Mahalanobis National Crop Forecast Centre (MNCFC) established in 2012 to operationalize crop forecasting using ISRO data.
- Soil and Land Use Survey of India (SLUSI) employs satellite mapping for soil resources.
- Krishi-DSS: A groundbreaking geospatial digital platform offering:
  - Satellite imagery
  - Weather and soil data
  - Reservoir storage and groundwater levels

Accessible **anytime, anywhere**, Krishi-DSS empowers data-driven decisions.

# **Conclusion & The Road Ahead:**

**Space technology** is fast becoming a cornerstone of **smart agriculture** in India. By leveraging **satellite data** and **geospatial intelligence**, the sector can achieve:

- Enhanced **productivity**
- Improved sustainability
- Strengthened food security

As **climate change**, **population growth**, and **resource scarcity** continue to challenge traditional agriculture, integrating **space-based solutions** will be vital for ensuring **resilient and informed farming systems**.

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#### Cruise Tourism in India: Setting Sail Towards a Global Horizon

**Context:** India is capitalizing on its **extensive coastline** and **vast inland waterways** to harness the economic, cultural, and recreational potential of **cruise tourism**. With visionary government initiatives and infrastructural development, the country is poised to emerge as a major **cruise tourism hub**.

#### What is Cruise Tourism?:

**Cruise Tourism** involves leisure travel on **cruise ships**, where both the **journey and the destination** create a unique, enriching experience.

- Includes **onboard activities** (entertainment, dining, wellness, etc.)
- Offers offboard excursions to explore local attractions and cultures
- Blends luxury travel with experiential tourism

#### Segments under Cruise Tourism:

- 1. Ocean Cruise Tourism Coastal and sea-based leisure voyages
- 2. River Cruise Tourism Travel through inland waterways and rivers
- 3. Expedition Cruises Remote and adventure-based voyages
- 4. Luxury & Theme Cruises Special interest cruises focused on wellness, cuisine, heritage, etc.

#### India's Potential in Cruise Tourism:

India's natural and infrastructural advantages place it in a strong position:

- 12 Major and 200 Minor Ports
- Over **20,000 km of navigable waterways** connecting ~**400 rivers**
- 1300+ Islands and several coastal & riverine states and UTs
- Rich cultural heritage, historic ports, and diverse ecosystems

#### River Cruise Tourism in India:

River cruise tourism is gaining momentum due to its **cultural depth** and **regional connectivity**.

#### **Key Features:**

- Short-distance travel and calm waters
- Access to interior villages, towns, and heritage sites
- Offers local cultural immersion festivals, cuisine, architecture

## Notable Examples:

- MV Ganga Vilas (2023):
  - ► World's **longest river cruise**
  - ► Covered **3,200 km** across **5 Indian states** and **Bangladesh**
  - ► Navigated through **27 river systems**

Kerala Houseboats: Popular in Alappuzha backwaters, offering unique regional experiences
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## **Steps Taken by the Indian Government:**

## **Cruise Bharat Mission (2024):**

- Launched from Mumbai Port
- Aims to double cruise passenger traffic by 2029
- 4.71 lakh cruise passengers recorded in FY 2023-24 •

## **Maritime India Vision 2030:**

- Blueprint to make India a global cruise tourism player •
- Emphasis on ocean and river cruise development

## **River Cruise Tourism Roadmap 2047:**

- Released during IWDC (Inland Waterways Development Council)
- Focus on **4 strategic pillars**: ٠
  - 1. Infrastructure
  - 2. Integration
  - 3. Accessibility
  - 4. Policy Reforms

## **Concluding Remarks:**

India's cruise tourism industry is navigating new waters with strategic planning, rich natural assets, and strong policy backing.

With a blend of **modern maritime vision** and **age-old cultural richness**, India is all set to anchor itself as a vibrant global cruise destination — both along its coasts and rivers.

## Monsoon 2025 & Food Inflation in India: What's the Link?

**Context:** The **India Meteorological Department (IMD)** has projected an above-normal monsoon for 2025, forecasting rainfall at 105% of the Long Period Average (LPA). This is expected to boost agricultural production and support the government's efforts to control food inflation, which is closely tied to rainfall variability in India.



# IMD's Monsoon Forecast 2025: Key Highlights

- **Rainfall Prediction**: Rainfall expected to be **105% of the LPA (87 cm)** with a ±5% margin
- Classification of rainfall:
  - **Deficient**: <90%  $\cap$
  - **Below Normal**: 90–95% 0
  - Normal: 96–104% 0
  - **Above Normal**: 105–110%
  - **Excess:** >110% 0

## **Climatic Support:**

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- Neutral El Niño-Southern Oscillation (ENSO)
- Positive Indian Ocean Dipole (IOD)
- Below-normal Eurasian snow cover, indicating stronger monsoon winds

## Improved Forecast Accuracy:

Average deviation has dropped from 7.5% (2017-20) to 2.27% (2021-25)

## Geographical Distribution:

- Below Normal: Jammu & Kashmir, Ladakh, Tamil Nadu, Bihar, Northeast
- Normal to Above Normal: Madhya Pradesh, Rajasthan, Maharashtra, Odisha, Chhattisgarh, Uttar Pradesh, West Bengal (key rain-fed agriculture zones)

## Monsoon's Impact on Food Inflation:

## Agricultural Yield & Crop Prices:

- Good rainfall usually improves **crop yields** and reduces prices.
- However, **individual crop prices** may still spike due to **localized production issues**.

## Stats Snapshot (2015-24):

- 6 out of 10 years had normal or above-average rainfall.
- Years like FY16 & FY19 saw low rainfall, leading to weak agricultural growth: 0.65% in FY18, 2.7% in FY24 (Decade average: 4.45%)

## Supply Chain & Transportation Costs:

- Heavy rainfall/floods disrupt transport and storage, causing logistics delays.
- Example: 2023 floods in Assam and Bihar delayed staple movement, leading to temporary price hikes.

## Monsoon De<mark>ficit & Im</mark>port Costs:

- Poor monsoons increase **import dependency**, especially for **pulses and edible oils**.
- **2023 Example**: Low rainfall = spike in edible oil imports from **Indonesia & Malaysia**.
- In 2022–23, India imported 16.5 million tonnes of edible oils, with domestic production meeting just 40–45% of demand.

## **Beyond Rainfall: What Else Drives Food Inflation?**

Despite high rainfall in **FY20, FY21, FY23, and FY25**, food inflation **remained high** (6–7%). In contrast, **below-normal rainfall years** like FY18 and FY19 saw **low food inflation** (2.2% and 0.7%).

## **Recent Trend**:

- Food inflation fell from 8% (Dec 2024) to below 6% (Jan 2025)
- For the first time since July 2023, it dropped below headline inflation by March 2025

## **Other Contributing Factors:**

- Supply Shocks: Hoarding, market disruptions, and black marketing affect prices
- **Global Commodity Prices**: Rise in **edible oil & pulse prices** directly impacts India due to high import reliance
- Monetary Policy: RBI's interest rate hikes raise input costs, especially for processed and packaged food

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• Government Policies: MSP hikes support farmers but can raise inflation

Export bans (e.g., on onions or rice) protect local supply but may destabilize markets

• **Infrastructure Gaps**: Poor **storage and transportation** result in wastage and higher consumer prices

### Conclusion: Rainfall Helps, But It's Not Everything

While a **strong monsoon** is a **positive sign for agriculture**, it is **not a silver bullet** for food inflation. **Structural reforms**, **efficient logistics**, **supply chain resilience**, and **global price monitoring** are just as crucial.

CSR Spending in India Jumps 16% in FY24: Key Highlights and Insights

**Context:** India's **Corporate Social Responsibility (CSR)** landscape witnessed robust growth in **FY24**, with **listed companies** increasing their CSR spending by **16%** to a total of **17,967 crore**, compared to the previous year.

### What is Corporate Social Responsibility (CSR)?

**Corporate Social Responsibility (CSR)** refers to a company's commitment to operate in an economically, socially, and environmentally sustainable manner.

Under the **Companies Act**, 2013, effective from April

2014, Indian companies meeting specific financial

thresholds must allocate **at least 2%** of their average net profits from the last three years towards CSR initiatives.

### Who Must Comply?

### TOGETHER WE SCALE HEIGHTS

- Companies with net worth ≥ 500 crore
- Or **turnover** ≥ **1,000 crore**
- Or **net profit ≥ 5 crore**

The objective is to ensure businesses contribute **meaningfully to societal development** while aligning corporate growth with **national priorities** such as **education**, **healthcare**, **rural development**, **environmental protection**, **and cultural preservation**.

### **Important Figures:**

- Mandated CSR spend: 18,309 crore
- Actual CSR spend: 17,967 crore
- Unspent CSR (to be utilized later): 2,329 crore

This marks a return to **strong growth** after **three years of muted expansion**, showing companies' renewed commitment to social causes alongside increasing profitability.

### Top 10 CSR Contributors in FY24:

The largest corporate houses continued to **lead the CSR efforts**:

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Company	CSR Spend (Crore)
HDFC Bank	945.31
Reliance Industries	900
Tata Consultancy Services (TCS)	827
Oil and Natural Gas Corporation (ONGC)	634.57
Tata Steel	580.02
ICICI Bank	518.87
Indian Oil Corporation (IOC)	457.71
Infosys Ltd	455.67
ITC Ltd	404.05
Power Grid Corporation of India	330.48

Together, these companies accounted for a **significant share** of India's total CSR expenditure, underlining how large corporations continue to drive the nation's social investment ecosystem.

### Where Did CSR Funds Go? Sector-Wise Breakdown

CSR spending was primarily directed towards **priority sectors**:

- Education: 1,104 crore (Top sector)
- Healthcare: 720 crore
- **Environmental Sustainability:** Notable **54% increase** over the previous year! ٠

### However, certain sectors saw sharp declines:

- **Slum development:** -72%
- **Rural development:** -59% ٠
- Armed forces veterans' welfare: -52%

This shift indicates an evolving focus towards sustainability, climate action, and urban-centric development.

### **Compliance and Governance: A Positive Trend**

India's corporate sector showed **strong compliance** with CSR rules:

- 98% of 1,394 eligible companies met their CSR obligations.
- **49%** of companies **exceeded** their mandated spending.
- Only **259** companies underperformed, mainly due to multi-year project planning.

### **Public Sector Undertakings (PSUs):**

66 PSUs contributed 3,717 crore, a 19% increase compared to the previous year.

### **Corporate Governance in CSR:**

Companies with CSR budgets exceeding 50 lakh must form a CSR Committee. Of the 1,028 companies required to establish committees, **990** were fully compliant, ensuring **better oversight** and **transparency**.

Future Outlook: CSR as a Strategic Asset:











Looking ahead, CSR in India is set to transform from a **compliance checklist** to a **core strategic pillar** for corporate success.

**Emerging Focus Areas:** 

- **Climate change mitigation and resilience** •
- Digital inclusion and access to technology
- Skill development for the future workforce
- Healthcare innovations (telemedicine, biotechnology)
- Integration with ESG (Environmental, Social, Governance) standards

Fact: Many global investors now evaluate a company's CSR and ESG performance before investing, linking social responsibility directly with financial success.

**Conclusion:** India's **CSR landscape** in **FY24** reflects a **mature**, evolving corporate consciousness, blending profit with purpose. With rising corporate profits, strong governance structures, and new focus areas, CSR is poised to play a **transformative role** in building a **sustainable**, **inclusive India**.

### **Overseas Remittances by Indians under LRS Drop by 29%**

Context: Overseas remittances by Indian residents under the Liberalised **Remittance Scheme (LRS)** of the **Reserve Bank of India (RBI)** declined by 29% to \$1,964.21 million in February 2025, compared to \$2,768.89 million in January 2025.



What is the Liberalised Remittance Scheme (LRS)?

- LRS is part of the Foreign Exchange Management Act (FEMA), 1999, which governs outward remittances from India.
- Under LRS, resident individuals, including minors, can freely remit up to \$250,000 per financial year for permissible **current or capital account transactions**.
- Permitted purposes include:
  - **Education abroad** 0
  - Medical treatment overseas 0
  - **Purchase of property** 0
  - **Investment in foreign stocks**  $\circ$

### **Recent Update:**

The Union Budget 2025 raised the threshold for collecting Tax Collected at Source (TCS) on LRS transactions from 7 lakh to 10 lakh.

This move is expected to **boost outbound tourism**, foreign education, and airline sectors by reducing upfront tax burdens.

### **Reasons Behind the Decline:**

**1.** Drop in Indian Students Abroa: A sharp decline of at least 25% was recorded in the number of Indian students receiving study permits in Canada, the United States, and the United Kingdom during 2024.

#### 2. Volatile Global Economy: Download Our Application 🗕











• Economic and market volatility led many individuals to **postpone or cancel** their **travel** and **investment plans**.

### **Understanding Remittances:**

### What are Remittances?

- **Remittances** refer to the **electronic transfer of money** to individuals, often **family members**, residing in another country.
- Typically sent by those employed in **blue-collar** or **skilled jobs** overseas.

### Why are Remittances Important?

- They provide a **significant source of income** for many countries.
- Help **stabilize economies**, support **local consumption**, and even **finance national trade deficits**.

### Modes of Remittance Transfer:

- Banks
- Money Transfer Operators
- Digital Platforms

### Types of Remittances:

Туре	Description		
Inward Remittance	Funds transferred <b>into India</b> from abroad.		
Outward Remittance	Funds transferred <b>from India</b> to another country.		

### India's Remi<mark>ttance L</mark>andscape:

### **Overall Growth:**

India's remittances more than doubled, rising from \$55.6 billion in 2010-11 to \$118.7 billion in 2023-24 — a trickle turning into a flood.

### **Contribution by Countries:**

- United States and United Kingdom: Together accounted for 40% of India's inward remittances in FY24, up from 26% in FY17.
- United States: Emerged as the top source, contributing nearly 28% in FY24.
- **United Arab Emirates (UAE)**: Still the **second-largest** contributor with **19.2%**, driven mainly by Indian migrants in **construction**, **healthcare**, **hospitality**, and **tourism** sectors.
- **Singapore**: Saw an **increase** in its share to **6.6%** in **FY24**, the **highest** since **FY17**.

### State-wise Distribution:

- Maharashtra, Kerala, and Tamil Nadu received half of all remittances.
- Other states like **Haryana**, **Gujarat**, and **Punjab** had **smaller shares** (below 5%).

### Size of Remittances:

- 28.6% of remittances were above 5 lakh.
- 40.6% of remittances were 16,500 or less.

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#### **Rafale-M Fighter Jets: Powering India's Naval Air Dominance**

**Context:** In a significant boost to India's naval firepower, the **Cabinet Committee on Security (CCS)**, led by the Prime Minister, has approved a **63,000-crore deal** for the procurement of **26 Rafale-M fighter jets** from **France**. These aircraft are specially built for **carrier-based operations**, enhancing India's maritime strike capabilities.



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#### **Background: From MMRCA to Maritime Supremacy**

- Originally, under the MMRCA (Medium Multi-Role Combat Aircraft) tender floated in 2007, India aimed to procure 126 jets with full technology transfer.
- The MMRCA deal was eventually scrapped in 2015, and replaced by a government-to-government deal.
- In 2016, India signed a direct agreement for 36 Rafale jets for the Indian Air Force (IAF), which were delivered between 2019–2022.

#### Deal Details: Naval Rafales for the Indian Navy

- Total Aircraft: 26 Rafale-M jets
  - ► 22 single-seater fighters for aircraft carrier operations
  - ► 4 twin-seater trainer variants (non-carrier compatible)
- These jets will operate from:
  - INS Vikramaditya
  - INS Vikrant India's first indigenously built aircraft carrier
- The formal agreement is expected to be **signed during the upcoming visit** of the **French Defence Minister**.

### What is the Rafale Jet?

The **Dassault Rafale** is a **4.5-generation**, **twin-engine**, **delta-wing multirole fighter aircraft**, manufactured by **Dassault Aviation** of France. It is capable of executing a **wide spectrum of missions**, including:

- Air dominance
- Ground and maritime strike
- Reconnaissance
- Nuclear deterrence

Key Capabilities of Rafale-M:

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Specification
Mach 1.8 (~2,222 km/h)
Over 1,000 km
Up to <b>9,500 kg</b> on <b>14 hardpoints</b>
<b>RBE2 AESA radar</b> for enhanced target tracking and range
<b>SPECTRA</b> (electronic warfare system) for self-protection
Twin <b>SNECMA M88 turbofans</b> with <b>supercruise</b> capability
Tailhook and reinforced undercarriage for carrier landings

### Rafale Variants:

Variant	Role
Rafale C	Single-seat variant for the Air Force
Rafale B	Twin-seat trainer with full combat capabilities
Rafale M	Naval carrier-based variant, specially modified for short-deck landings
Rafale N	Nuclear delivery-capable variant (not exported)
Rafale R	Research and experimental configurations

#### Why Rafale-M Matters for India:

- Strengthens Naval Air Power: Operates seamlessly from aircraft carriers, enhancing India's maritime strike reach.
- **Complements India's Blue-Water Navy Vision**: Fits into India's strategy of maintaining dominance in the **Indian Ocean Region (IOR)**.
- Strengthens Indo-French Defence Ties: Builds on the successful Air Force deal, showcasing strategic trust.
- **Counter to Regional Threats**: Balances growing Chinese presence in the Indian Ocean and PLA Navy's carrier expansions.

### What's Next?

- Training of Indian Navy pilots and ground crew in France
- Customization of jets to meet Indian Navy's operational requirements
- Deployment alongside MiG-29K until the full Rafale-M squadron is integrated

### **Conclusion: A Strategic Leap**

The Rafale-M deal is not just a defense procurement—it's a **strategic transformation**. As India bolsters its naval aviation with one of the world's most capable carrier-based fighters, it signals a clear commitment to securing its **maritime interests**, **modernizing its forces**, and building enduring **international defense partnerships**.

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### Extradition of Tahawwur Rana: A Diplomatic & Legal Victory in the 26/11 Case

Context: After 16 years since the devastating 26/11 Mumbai terror attacks, Tahawwur Rana, a key conspirator, has finally been extradited to India from the United States.

This marks a **watershed moment** in India's anti-terrorism efforts and a remarkable success in India-US diplomatic and legal cooperation.

#### Flashback: The 26/11 Mumbai Terror Attacks

- **Dates:** November 26–29, 2008
- Casualties: 166 dead, 238+ injured
- Terror Outfit: Lashkar-e-Taiba (LeT), a Pakistan-based terrorist organization
- Key Locations Attacked:
  - Chhatrapati Shivaji Terminus (CST) 0
  - Taj Mahal Palace Hotel
  - **Oberoi Trident Hotel** 0
  - Nariman House (Jewish Centre)
- Tactic Used: Infiltration via sea route from Karachi, Pakistan

#### Did vou know?

This attack was broadcast live, creating a new era of **media-covered urban terrorism**. It changed how India approaches counter-terrorism and urban security.

#### Who is Tahawwur Rana?

- Nationality: Pakistani-born, naturalized Canadian citizen
- **Profession:** Former officer in **Pakistan Army's Medical Corps**
- Associations:
  - Close associate of **David Coleman Headley** (aka Daood Gilani), a LeT scout 0
  - Linked to banned groups like LeT and Harkat-ul-Jihadi Islami (HUJI)
- Arrested: In Chicago, October 2009

### His Role in the Attack:

- Provided logistical and strategic support to Headley
- Helped in **reconnaissance operations** and **coordinated planning** of attacks •

### Legal Proceedings & Extradition Journey:

### **Key Milestones:**

- US Magistrate Court approves extradition after rejecting the "double jeopardy" defense
- US Supreme Court declines review plea, finalizing Rana's extradition
- Special aircraft deployed to fly him to India under tight security

### **Legal & Security Coordination:**

Lead Counsel (India): Senior Advocate Dayan Krishnan



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- Supported by: Narender Mann, Sanjeevi Sheshadri, Sridhar Kale, and NIA legal team.
- Security Escorts: National Security Guard (NSG) & NIA officials

### **Current Status:**

- Arrested at IGI Airport, New Delhi
- Produced before NIA Special Court at Patiala House
- Remanded to 18 days of NIA custody for interrogation

### Political & Diplomatic Significance:

### India-US Cooperation:

- Based on India-US Extradition Treaty (1997)
- Key players:
  - US Department of Justice
  - Indian Ministry of External Affairs (MEA)
  - Ministry of Home Affairs (MHA)
  - Indian Embassy in Washington D.C.

### Political Acknowledgement:

- Prime Minister Narendra Modi thanked the US for its support to India's justice system
- Demonstrates strong India-US strategic partnership in counterterrorism cooperation

### What is Extra<mark>dition?</mark>

**Extradition** is a formal legal process through which one country **transfers a fugitive or accused** to another country where they face **criminal charges** or **sentencing**.

### Core Princip<mark>les:</mark>

- Treaty-based process
- **Dual criminality:** Offence must be punishable in both countries
- **Exemptions:** Political offences, persecution risks, or weak evidence

### India's Extradition Framework:

- Extradition treaties: With 48 countries
- Extradition arrangements (non-binding): With 12 nations
- Nodal Agency: MEA's Consular, Passport & Visa (CPV) Division

### **Challenges in the Extradition Process:**

- Legal complexities: Rana's case spanned over a decade
- Double jeopardy claims: Rejected but caused delays
- Diplomatic roadblocks: Depends on bilateral goodwill
- Contrast with Headley:
  - David Headley received a plea bargain in the US
  - Avoided extradition, serving a **35-year sentence** in the US

**Interesting Fact:** In 2013, Headley was declared a **prosecution witness**, further complicating extradition efforts but helping build a stronger case against Rana.

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**Conclusion: A Strategic Win for India** -The extradition of Tahawwur Rana represents more than just justice—it's a **symbol of resilience**, **strategic diplomacy**, and a **testament to India's growing international influence**. It also sets a precedent for future cross-border **counterterrorism collaboration**.

#### Naxalmukt Bharat Abhiyan: From Red Zones to Growth Corridors

**Context:** India has made **remarkable progress** in countering **Left Wing Extremism (LWE)**, with a **significant decline in violence**, **reduction in affected districts**, and a visible **shrinking of Naxalite influence** across the country.

#### What is the Naxalite Movement?

#### **Origins:**

- Began in **1967** in **Naxalbari**, West Bengal.
- Initiated as a **radical leftist uprising**, advocating for the rights of **tribals and landless farmers**.

#### Geographical Spread:

- Expanded across the so-called **Red Corridor**, including:
  - Chhattisgarh, Jharkhand, Odisha, Maharashtra, West Bengal, Andhra Pradesh, Telangana, Madhya Pradesh, and Kerala.

#### Tactics Used:

- Operate through guerrilla warfare, targeting state institutions.
- Engage in extortion, child recruitment, and violence in the name of justice for the marginalized.

#### **Consequences of Naxalism:**

**Political Impact:** 

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- Undermines state authority and disrupts democratic processes.
- Creates administrative vacuums and weakens law enforcement.

#### **Economic Impact:**

- Disrupts agriculture, mining, and infrastructure projects.
- Leads to higher security spending, reducing focus on development.
- Deters **private investment** in affected regions.

#### **Social Impact:**

- Spreads fear and alienation among local communities.
- Interrupts education and healthcare, causing long-term human development setbacks.

India's Progress in Combating Naxalism:

- Reduction in Affected Districts: From 126 in 2010 to just 38 in 2024.
- Violence Down by 81%: From 1,936 incidents in 2010 to 374 in 2024.
- **Over 8,000 Naxalites Surrendered**: In the last **10 years**.











• **Mainstream Integration**: Improvements in **infrastructure**, education, healthcare, and governance in previously LWE-dominated areas.

Key Government Initiatives:

- 1. Security Related Expenditure (SRE) Scheme:
  - Part of the 'Modernization of Police Forces' umbrella.
  - Central government **reimburses security expenses** in LWE-affected districts.
- 2. SAMADHAN Strategy:

### A comprehensive 8-point approach:

- Smart Leadership
- Aggressive Strategy
- Motivation and Training
- Actionable Intelligence
- Dashboard-based KPIs & KRAs
- Harnessing Technology
- Action Plans for Each Theatre
- No Access to Financing
- **3.** Fortified Police Stations: 612 police stations constructed in vulnerable districts over the past decade.
- 4. Aspirational Districts Programme: 35 LWE-affected districts included for focused development monitoring under Ministry of Home Affairs.
- 5. Special Central Assistance (SCA):
  - **30 crore** annually for the most affected districts.
  - 10 crore for Districts of Concern to bridge infrastructure and development gaps.

### The Way Ahead:

- 1. Community Participation
  - Implement confidence-building initiatives.
  - Strengthen tribal governance and grassroots institutions.
- **2. Education & Employment:** Offer **vocational training, job opportunities**, and **educational access** to youth in remote areas.
- **3. Tech-Driven Security:** Leverage **modern surveillance, communication**, and **intelligence tools** to monitor and counter threats efficiently.

### **Conclusion:**

The Government of India is committed to achieving a **Naxalism-free India** by **31st March 2026**, recognizing extremism as a **major obstacle to tribal and rural development**.

The success of **Naxalmukt Bharat Abhiyan** lies in a balanced approach that **combines strong security measures** with **inclusive development**. With **political determination**, **administrative efficiency**, and **community engagement**, a **peaceful and prosperous future** free from **Left-Wing Extremism** is not only possible—it is within reach.

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Tragedy in Paradise: Terror Strikes Pahalgam's Baisaran Valley

**Context:** In a **devastating terror strike**, **28 tourists** lost their lives in **Baisaran Valley**, a breathtaking destination near **Pahalgam**, in the **Anantnag district** of **Jammu and Kashmir**.

This **high-altitude area**, accessible only by **foot or horseback**, proved difficult for emergency response teams to reach promptly.

The **Resistance Front (TRF)**, an **ISI-backed proxy group of Lashkar-e-Taiba (LeT)**, has **claimed responsibility** for the deadly assault—making it the **worst attack on civilians since the abrogation of Article 370** in 2019.



#### Discovering Pahalgam: A Jewel in Kashmir's Crown:

Located around **90 km from Srinagar International Airport**, **Pahalgam** is a beloved hill station nestled in the southern Kashmir Valley.

Known as the **'Valley of Shepherds'**, this region offers a serene retreat with:

- Amarnath Cave Temple A sacred Hindu pilgrimage site
- Aru Wildlife Sanctuary Home to rare species like the Himalayan brown bear and musk deer
- Betaab Valley Named after the Bollywood classic Betaab
- **Tulian Lake** A pristine alpine lake adored by trekking enthusiasts
- Baisaran Valley Often called 'Mini Switzerland' for its scenic beauty

### Baisaran Valley: Kashmir's Hidden Treasure:

### The Mini Swi<mark>tzerland</mark> of India:

- Just 5 km from Pahalgam, Baisaran is known for its lush green meadows, dense pine forests, and snow-capped mountain backdrops.
- This breathtaking location, accessible **only via ponies or trekking**, became the tragic site of the recent **terrorist attack**.

### A Trekker's Dream Destination:

Baisaran serves as a key **camping point for trekkers** en route to **Tulian Lake**. Its **year-round appeal** draws nature lovers, adventurers, and families seeking peace in the valley.

### Inside The Resistance Front (TRF):

### **Origins and Affiliations;**

- Formed shortly after the **abrogation of Article 370**, the **Resistance Front (TRF)** is widely recognized as a **proxy of Lashkar-e-Taiba (LeT)**.
- The group has **consolidated militants from various organizations**, becoming a prominent **terror outfit** in the region.

### **Declared a Terror Group:**

- In January 2023, India's Ministry of Home Affairs designated TRF as a terrorist organization under the Unlawful Activities (Prevention) Act (UAPA).
- Authorities cited its use of **online psychological warfare** to **radicalize youth** and incite violence against the Indian state.

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Abril.

#### **Targets and Tactics:**

TRF has launched attacks aimed at tourists, Kashmiri Pandits, and migrant laborers, destabilizing the image of peace in the Kashmir Valley.

### Analysis: What the Pahalgam Attack Reveals

### A Security Wake-Up Call:

This gruesome attack is the deadliest civilian tragedy since the 2008 Mumbai attacks (26/11). It exposes not just internal security gaps but also **external provocations**—bringing global attention back to Kashmir.

#### **Tourism as a Target:**

Post-2019, increased tourism was seen as a symbol of stability in Jammu & Kashmir. This attack shatters that image, evoking the region's painful legacy of violence and threatening its economic recovery through tourism.

#### **Timing with Global Implications:**

The attack occurred during high-profile international engagements:

- US Vice-President JD Vance was on a visit to India
- PM Modi was engaged in diplomacy with Saudi Arabia

Such timing **mirrors past tactics** by terrorists aiming for maximum **global exposure**, including:

- March 2000: Massacre of 36 Sikhs in Anantnag before President Bill Clinton's India visit
- May 2002: Kaluchak Massacre, killing 23 civilians, during US envoy Christina Rocca's visit

### **Provocative Rhetoric from Across the Border:**

The attack came shortly after Pakistan's Army Chief, Gen. Asim Munir, described Kashmir as Pakistan's "jugular vein", echoing long-standing, inflammatory rhetoric.

### Hydrogen Bomb Innovation: A Game-Changer for Modern Warfare

**Context: Chinese researchers** have reportedly tested a **new hydrogen bomb** that uses **magnesium hydride** to sustain a **fireball** — achieving a thermonuclear reaction without using traditional nuclear materials.

#### What is a Hydrogen Bomb?

A Hydrogen Bomb, or Thermonuclear Bomb, traditionally operates through a **two-stage detonation process**:

Primary Stage (Fission Trigger): Uses fissile material such as uranium-235 or plutonium-239 to generate immense heat and pressure.



Secondary Stage (Fusion Reaction): Under extreme conditions, hydrogen isotopes (deuterium and **tritium**) undergo **fusion**, releasing an energy yield **many times greater** than a pure fission bomb.

#### What is a Fissile-Free Hydrogen Bomb?

China's breakthrough represents a fissile-free thermonuclear device. Instead of relying on fission, alternative ignition systems are used:

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- Inertial Confinement Fusion (ICF): High-powered lasers compress and heat a small pellet of hydrogen isotopes to initiate fusion.
- **Magnetic Compression (Z-pinch Systems): Magnetic fields** rapidly compress plasma to achieve the high pressure needed for fusion reactions.

Key Difference: No uranium or plutonium is required, making it technically non-nuclear under traditional definitions.

### **Key Concerns Arising from this Innovation:**

### **1. Legal Loopholes:**

- Nuclear treaties like the Nuclear Non-Proliferation Treaty (NPT) and Comprehensive Test Ban Treaty (CTBT) focus on fissile material.
- Fissile-free devices could bypass treaty restrictions, undermining global arms control efforts.

### 2. Ease of Development:

- Fusion fuels like deuterium and tritium are less regulated compared to fissile materials. •
- **Fusion technologies** are **embedded in civilian research** (e.g., energy programs), making **dual-use** activities harder to monitor.

### 3. Proliferation Risk:

- **Rogue states** or **terror groups** could exploit the **new pathway** to build powerful weapons **without** conventional nuclear infrastructure.
- 4. Asymmetric Warfare Implications:
  - Compact, **high-yield**, and **non-radioactive** bombs could be: •
    - Used in covert operations. 0
    - Deployed in gray-zone warfare tactics.  $\circ$
    - Smuggled across borders. 0
    - **Disguised** as industrial accidents. 0

### Way Ahead:

### **Redefining International Law:**

- **Update the CTBT** to explicitly ban **non-fissile thermonuclear tests**.
- **Rethink definitions** of nuclear weapons based on **energy yield**, not merely **material composition**.

### **Strengthening Verification Mechanisms:**

Establish a Fusion Weapons Verification Body (FWVB) under the International Atomic Energy Agency (IAEA), similar to the Organisation for the Prohibition of Chemical Weapons (OPCW).

### **India's Strategic Response:**

- India, guided by its credible minimum deterrence doctrine, must address the emerging strategic uncertainties.
- **Invest** in technologies that can **detect non-radiological fusion detonations** to safeguard national security.

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**Government Strengthens Cybercrime Fight with I4C-ED Collaboration** 

**Context:** In a significant move to **tighten the grip on cyber-enabled financial crimes**, the Government of India has empowered the **Indian Cyber Crime Coordination Centre (I4C)** to **share and receive information** with the **Enforcement Directorate (ED)** under the **Prevention of Money Laundering Act (PMLA), 2002.** This strategic inclusion under **Section 66 of PMLA** will significantly **enhance investigative capabilities** and **track illicit money trails**, especially in **transnational cyber frauds**.



#### What is I4C?

The Indian Cyber Crime Coordination Centre (I4C) is an initiative under the Ministry of Home Affairs, designed to provide a robust framework for law enforcement agencies to coordinate and tackle cybercrimes effectively. It works as a hub for data analytics, investigation support, and capacity building, facilitating a pan-India response to digital threats.

#### About the Enforcement Directorate (ED):

The **Enforcement Directorate**, established in **1956**, is a **multi-disciplinary law enforcement agency** under the **Department of Revenue**, Ministry of Finance. It enforces key financial laws, including:

- The Foreign Exchange Management Act (FEMA), 1999 a civil law that governs foreign exchange dealings in India.
- The Prevention of Money Laundering Act (PMLA), 2002 a criminal law that empowers the ED to investigate and prosecute money laundering.
- **The Fugitive Economic Offenders Act (FEOA), 2018** targets economic offenders trying to evade Indian laws by remaining overseas.

By joining forces with I4C, the ED can now **track digital footprints** of criminals and **intercept illicit fund flows** across borders more effectively.

#### Understanding Cybercrime:

**Cybercrime** refers to unlawful activities carried out through **computers, networks, or digital devices**. It targets both individuals and institutions, aiming to **steal, disrupt, or manipulate data** for profit or malicious intent.

#### **Common Types of Cybercrime:**

- Hacking Unauthorized access to systems or data
- **Phishing** Deceptive attempts to obtain sensitive information
- Malware Malicious software like viruses and ransomware
- Identity Theft Misuse of personal or financial data
- **Cyber Espionage** Unauthorized surveillance or information gathering
- Cyberbullying Online harassment and intimidation

#### Impact of Cybercrime on Society:

• **Threat to National Security** – Critical infrastructure such as defense, banking, and energy sectors are prime targets.

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- **Massive Data Breaches** Can lead to exposure of personal information and trade secrets.
- **Service Disruptions** Attacks on power grids or telecom networks cause public chaos. •
- **Reputational Damage** Organizations may lose public trust and investor confidence.

### **Government Measures to Combat Cyber Threats:**

### **Key Initiatives Include:**

- Indian Computer Emergency Response Team (CERT-In): National agency for responding to cybersecurity incidents and issuing threat advisories.
- National Critical Information Infrastructure Protection Centre (NCIIPC): Safeguards sectors critical to national survival like energy, finance, and healthcare.
- Cyber Crime Prevention against Women and Children (CCPWC): Financial assistance to states for setting up cyber forensic labs and specialized units.
- National Cyber Crime Reporting Portal: A platform for citizens to report cybercrime (https://cvbercrime.gov.in) and dial **1930** for real-time assistance.
- **Cyber Swachhta Kendra:** Offers free tools to detect and remove malware and botnets from infected devices.

**New Trend Alert:** Cybercriminals are increasingly using **AI-driven deepfakes** and **cryptocurrency** laundering to evade detection.

### **International Cybersecurity Frameworks:**

### India aligns with global best practices through international conventions:

- Budapest Convention on Cybercrime: The first international treaty addressing crimes like data • interference and content misuse.
- Malabo Convention (Africa): Focuses on cybersecurity and data protection in African nations.
- United Nations Internet Governance Forum (IGF): A global platform for policy discussions on digital governance and cyber laws.

### **Conclusion: A Smarter, Safer Digital India**

Bringing I4C under the ambit of PMLA is a landmark step toward building a safer digital ecosystem. This integration enables real-time intelligence sharing, boosts the ability to detect and prosecute complex cyber frauds, and strengthens financial and cyber governance.

As India moves forward in its digital transformation, this collaboration between I4C and ED will be crucial in safeguarding citizens, institutions, and the economy from rising cyber threats.

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Union Cabinet Approves Kosi Mechi Intra-State Link Project for Bihar under PMKSY-AIBP

**Context:** The **Union Cabinet** has approved the inclusion of the **Kosi Mechi** Intra-State Link Project under the Pradhan Mantri Krishi Sinchai Yojana - Accelerated Irrigation Benefits Programme (PMKSY-AIBP). This significant project is expected to enhance irrigation facilities and improve **flood management** in **Bihar**. The project is slated for completion by **2029**, ensuring long-term agricultural sustainability and better water management in the region.



### **Overview of the Kosi Mechi Intra-State Link Project:**

- **Project Goal**: The Kosi Mechi Intra-State Link Project aims to **divert surplus water** from the **Kosi** • **River** into the **Mahananda basin** by linking it to the **Mechi River**.
- Water Management Approach: This will be achieved through the remodelling and extension of the existing Eastern Kosi Main Canal (EKMC).

The **EKMC** is a part of the larger **Kosi Project** initiated in **1954** between **India** and **Nepal**, designed to address the issue of the shifting course of the Kosi River.

**Flood Control and Irrigation**: The project will **improve flood control** while also increasing irrigated agricultural land across Bihar, ensuring greater water availability for farming.

### About PMKSY (Pradhan Mantri Krishi Sinchai Yojana):

Launched in 2015-16, PMKSY is an umbrella scheme aimed at enhancing water access for agricultural use, thereby improving irrigation infrastructure across India. The scheme focuses on:

- Expanding irrigated areas to boost agricultural productivity.
- Improving water-use efficiency on farms. ٠
- Promoting sustainable water conservation practices.

### **Key Objectives of PMKSY:**

- Increase the **cultivable area** under irrigation.
- Ensure water conservation and enhance irrigation efficiency at the farm level.

### **Major Components of PMKSY:**

- 1. Accelerated Irrigation Benefit Programme (AIBP):
  - Launched in 1996-97, AIBP was merged into PMKSY in 2015-16 to provide central assistance to major and medium irrigation projects.
  - Under AIBP, the Long Term Irrigation Fund (LTIF) facilitates financial support for these projects with borrowings from NABARD.

### 2. Har Khet Ko Pani (HKKP):

This initiative ensures that every **farm** receives adequate water for irrigation, addressing the needs of small farmers and ensuring equitable water distribution.

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### 3. Watershed Development (WD):

• Implemented by the **Ministry of Rural Development**, this component focuses on **water conservation** and **rainwater harvesting** to ensure a sustainable water supply in drought-prone areas.

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### Significance of the Kosi Mechi Intra-State Link Project for Bihar:

- 1. **Improved Irrigation Facilities**: The project will directly benefit **agriculture** in Bihar by expanding **irrigated land**, improving crop yields, and reducing dependency on monsoon rains.
- 2. **Flood Management**: By controlling the flow of water and diverting surplus from the Kosi River, the project will help mitigate the **devastating flood effects** that frequently impact **northern Bihar**.

### Long-Term Agricultural Benefits:

With its projected completion by **2029**, the Kosi Mechi Link Project will support **sustainable farming** practices and secure water resources for future generations.

### Conclusion: A Step Toward a Resilient Agricultural Future

The inclusion of the **Kosi Mechi Intra-State Link Project** under **PMKSY-AIBP** represents a critical investment in Bihar's agricultural and environmental future. By enhancing **irrigation systems** and **flood management** mechanisms, the project will ensure that the state's agricultural sector thrives, even amidst unpredictable weather patterns and water scarcity issues. This initiative aligns with the **government's vision** of improving **water access** and **agricultural resilience** in India.

### Urban Transport in India: Moving Towards or Away from Inclusive Mobility?

**Context:** In **February 2025**, **Bengaluru's Namma Metro** became the **costliest metro service in India** after a sharp **fare hike**, sparking nationwide concerns over the **affordability of urban transport**. Without **fair and accessible pricing**, public transport systems risk **losing commuter trust** and driving users towards private, less sustainable options.



### Key Challenges Facing Urban Transport in India:

### 1. Rising Costs and Affordability Crisis:

- Fares like **90 for trips over 30 km** (Bengaluru) are increasingly **unaffordable for low- and middleincome commuters**.
- Surge pricing by ride-hailing apps during peak hours or rain adds further economic pressure.
- This contradicts the goals of the **National Urban Transport Policy (2006)** and the **Smart Cities Mission**, which prioritize **equitable mobility access**.

### 2. Neglected Non-Motorised Transport (NMT):

- Cities lack safe and continuous infrastructure for walking and cycling.
- Over **40% of road fatalities** in cities like Delhi, Kolkata, and Bengaluru involve **pedestrians**.
- Where NMT infrastructure exists, it is often **encroached**, **poorly designed**, or **dilapidated**.

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### 3. Traffic Congestion and Inefficient Road Use:

- **Private vehicles**, which serve <**20% of urban commuters**, consume **90% of road space**. •
- Infrastructure has **not kept pace** with rising urban population and vehicular load. ٠
- Results in **longer commutes**, **lost productivity**, and higher stress levels. ٠

### 4. Environmental Degradation:

- The transport sector accounts for 14% of India's energy-related CO<sub>2</sub> emissions (2020). •
- It is a leading contributor to PM2.5 and NOx, especially in metros like Delhi. •
- Lack of clean fuel adoption and slow EV integration hinder progress toward India's Net Zero target (2070).

### **5. Inadequate Public Transport:**

- Only **63 out of 458 cities** (with population >1 lakh) have **formal bus services**.
- India has just **1.2 buses per 1,000 people**, far behind the global ideal of **5–8**. ٠
- Poor last-mile connectivity in **peri-urban areas**, with reliance on **unregulated modes** like autos and e-rickshaws, raises security concerns.

### 6. Financial and Institutional Gaps:

- Urban Local Bodies (ULBs) lack financial power and depend heavily on higher government funding. •
- Limited capacity to raise revenue via tools like:
  - Land value capture 0
  - **Green bonds** 0
  - **Congestion** pricing 0
  - Parking charges

### The Way Forward: Building Sustainable and Inclusive Mobility:

### **1. Invest in Non-Motorised Transport:**

- Nearly **50% of urban trips** are under **5 km** ideal for **cycling and walking**. ٠
- Develop dedicated lanes, safe crossings, and NMT-friendly zones. •
- Promote awareness campaigns around active commuting. •

### 2. Learn from Best Practices:

- Kochi: Awarded for the Most Sustainable Urban Transport System.
- Bhubaneswar: Recognized for Best Public Transport. ٠
- Srinagar: Noted for its Non-Motorised Transport initiatives. ٠
- **Replication and scaling** of these models can accelerate progress. •

### 3. Ensure Affordable Access:

- Promote monthly passes and smart cards for affordability.
- Generate non-fare revenue from station advertisements, retail spaces, and leasing.

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### 4. Push for Clean Mobility:

- Support faster roll-out of EVs through schemes like:
  - **FAME II**
  - PM e-Bus Sewa  $\cap$
- Offer tax breaks and subsidies for electric buses and two-wheelers.
- Develop **charging infrastructure** in coordination with private sector players. ٠

### 5. Empower Urban Local Bodies (ULBs):

- Equip ULBs to use the Value Capture Finance (VCF) Policy 2017 tools:
  - **Congestion pricing** 0
  - Green bonds 0
  - Land monetization  $\circ$
- Build **institutional capacity** for **planning and execution** of urban mobility solutions.

### 6. Create Integrated and Multimodal Transit Systems:

- Promote seamless transfers between metro, buses, and other modes.
- Use smart ticketing, real-time tracking, and multi-modal hubs. •
- Implement Transit-Oriented Development (TOD) under MoHUA's 2017 policy. •
- Strengthen Unified Metropolitan Transport Authorities (UMTAs) for coordinated planning.

**Conclusion:** India stands at a critical juncture in urban mobility. Without bold reforms, investment in public and non-motorised transport, and affordable fare structures, the country risks locking itself into unsustainable, unequal, and inefficient urban systems. But with smart planning, policy support, and community participation, a green and inclusive urban transport future is well within reach.

### Silkvara Tunnel Breakthrough: A Leap Towards Seamless Himalayan Connectivity

Context: The Silkyara Tunnel, a crucial infrastructural marvel nestled in the rugged terrain of **Uttarakhand**, has recently achieved a **significant** breakthrough, marking a key moment in India's push for all-weather road connectivity in the Himalayan region.

### **Key Facts About the Silkyara Tunnel:**

- Location: Positioned on the Yamunotri National Highway, the tunnel is located in the Uttarkashi district of Uttarakhand.
- Length: Spanning 4.5 kilometers, it is the longest tunnel in the state under the Char Dham Highway Project.



- Connectivity Goal: The tunnel links Silkyara to Dandalgaon, both situated within Uttarkashi, drastically improving intra-district mobility.
- **Design:** Built as a **double-lane tunnel** with modern safety systems to withstand harsh Himalayan conditions.

### Part of the Iconic Char Dham All-Weather Road Project:



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#### **Project Overview:**

The **Char Dham Highway Project** is a **mega infrastructure initiative** launched in **2016** to upgrade and expand **889 km of mountain roads** across Uttarakhand.

- **Purpose:** Ensure **year-round connectivity** to the four sacred pilgrimage sites of the state:
  - Badrinath
  - Kedarnath
  - Gangotri
  - Yamunotri
- **Strategic Vision:** Enhance not just **religious tourism**, but also ensure **defense mobility** in the highaltitude border regions with **China**.

### Why the Silkyara Tunnel Matters:

#### Strategic and Socio-Economic Significance:

- **Reduced Travel Time:** Once operational, the tunnel will **cut down travel distance** between **Gangotri and Yamunotri** by **approximately 26 km**, saving **travel time and fuel**.
- Eco-Friendly Solution: By reducing road traffic through mountainous terrain, it minimizes environmental degradation and landslide risk.
- **Pilgrimage and Emergency Access:** Provides **faster access** to remote areas during **natural disasters**, crucial in a disaster-prone region like Uttarakhand.

#### Engineering Excellence Amid Himalayan Challenges:

#### **Construction and Challenges:**

- Terrain: Constructing in the fragile Himalayan geology presents challenges like landslides, water seepage, and seismic activity.
- **Technology:** Tunnel boring and reinforcement employ **advanced drilling and geotechnical solutions**, complying with **international tunneling standards**.

### Added Knowledge: The Global Context of Mountain Tunneling

- Similar high-altitude tunnel projects around the world include:
  - **Gotthard Base Tunnel** (Switzerland) World's longest railway tunnel (57 km)
  - **Zojila Tunnel** (India) Another strategic Himalayan tunnel in J&K for all-weather access to Ladakh
- India is **rapidly expanding its mountain infrastructure** to bolster both **tourism and defense logistics**.

### In Summary: A Tunnel to Transformation

The **Silkyara Tunnel** is not just a passage through a mountain — it is a **gateway to progress, resilience, and regional upliftment**. It reflects India's growing capability in executing **large-scale infrastructure projects in extreme terrains**, combining **technology, tradition, and strategy**.

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### Shinkansen Trains & India's Bullet Train Dream

**Context:** In a landmark move to strengthen Indo-Japanese cooperation, **Japan will provide India with two Shinkansen train sets—E5 and E3 Series—free of cost** in **2026**. This gesture is a part of the ongoing collaboration in India's ambitious **Mumbai-Ahmedabad Bullet Train Project**.

Meet the Marvels: Shinkansen E5 & E3 Series:

E5 Series - The Pinnacle of Speed and Innovation

- **Operational since 2011**, the E5 Series is a symbol of modern engineering and comfort.
- Boasts a top speed of 320 km/h, making it one of the fastest trains in the world.
- Features include:
  - Aerodynamic design for reduced drag and noise
  - **State-of-the-art safety systems**, including earthquake detection and automatic braking
  - **Luxurious seating and smooth ride quality** ideal for long-distance, high-speed travel

**Fun Fact**: The E5 was selected as the base model for India's bullet train line due to its cutting-edge technology and efficiency.

### E3 Series – T<mark>he Relia</mark>ble Veteran:

- A slightly older model, used primarily for Mini-Shinkansen services in Japan.
- While not as fast as the E5, it includes similar **safety and control mechanisms**.
- Designed for routes with converted narrow-gauge tracks, making it versatile for semi-high-speed operations.

### India's Bullet Train Project: Mumbai to Ahmedabad

### India's First High-Speed Rail Corridor:

- Implemented by National High-Speed Rail Corporation Ltd. (NHSRCL)
- Incorporates Japanese Shinkansen technology to ensure top-tier infrastructure and efficiency
- Funded up to 80% by the Japan International Cooperation Agency (JICA) via a soft loan

### Timeline & Vision:

- Initial deadline: 2022
- Revised completion date: 2028
- Total project length: **508 kilometers**, with trains expected to run at **speeds up to 320 km/h**
- A key component of India's National Rail Plan (NRP) 2030, aimed at transforming India's rail infrastructure

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### Additional Insights & Future Scope:

• The Shinkansen system has had **zero passenger fatalities** since its inception in 1964—a testament to its safety standards.

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- The bullet train project is expected to **cut travel time** between Mumbai and Ahmedabad from **6-7 hours to just 2-3 hours**.
- The corridor will pass through **Maharashtra**, **Gujarat**, **and Dadra & Nagar Haveli**, integrating urban centers and promoting regional development.
- Once operational, it will boost:
  - Employment opportunities
  - o Make-in-India initiatives via local manufacturing of components
  - Green transportation, reducing dependency on fossil fuels and reducing emissions

### **Conclusion: Speeding into the Future:**

The collaboration between India and Japan on the bullet train marks not just an infrastructural milestone but a **technological and diplomatic triumph**. With the Shinkansen trains symbolizing speed, safety, and precision, India is set to take a bold leap into the era of **high-speed rail travel**.

### Arun-III Hydropower Project: Powering Regional Partnership

**Context:** During his recent official visit to **Nepal**, India's **Minister of Power and Housing Affairs** inspected the progress of the **Arun-III Hydropower Project**, a flagship initiative symbolizing the deepening energy and economic ties between the two nations.



### About the Arun-III Hydropower Project:

- Located on the Arun River in the Sankhuwasabha
   District of Eastern Nepal, this is a 900 MW run-of-the-river hydropower project.
- The infrastructure features:
  - A 70-meter high concrete gravity dam.
  - An **11.74 km Head Race Tunnel (HRT)**.
  - An **underground powerhouse** with **four generating units**, each with a capacity of **225 MW**.

### **Development & Investment:**

- The project is being implemented with **Indian assistance**, at an estimated cost of **2144 billion**.
- Developed on a Build-Own-Operate-Transfer (BOOT) model by SJVN Arun-III Power Development Company (SAPDC), a wholly owned subsidiary of India's SJVN.
- SJVN is a joint venture between the Government of India and the Government of Himachal Pradesh.

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### **Operational Timeline & Ownership:**

- SAPDC will **operate the project for 25 years**, excluding a **5-year construction period**, after which it will be transferred to the Government of Nepal.
- Nepal will receive 21.9% of the total power generated as free electricity during this 25-year period.

### **Strategic and Economic Significance:**

- Upon completion, Arun-III will be Nepal's largest hydropower facility, significantly enhancing the • country's energy generation capacity.
- Surplus electricity will be exported to India, specifically from Dhalkebar (Nepal) to Muzaffarpur (India), bolstering regional grid interconnection and energy trade.
- The project will help reduce Nepal's energy imports, improve local employment opportunities, and promote **infrastructure development** in the region.

### Why It Matters:

- The Arun-III project exemplifies **South-South** cooperation, where India plays a pivotal role in infrastructure-led development in neighboring countries.
- It supports regional energy security, a clean energy transition, and strengthens people-to-people ties through sustainable development.
- Hydropower, being renewable and low-carbon, aligns with the global climate goals under the Paris Agreement.

### Did You Know?

- Nepal has a hydropower potential of over **83,000 MW**, of which only a small fraction has been tapped.
- The **Arun River** is a major tributary of the **Koshi River**, known for its swift flow and high energy potential.
- The cross-border power transmission line **Muzaffarpur–Dhalkebar** is one of the first high-capacity grid links between India and Nepal.

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ISRO's Breakthrough in Semi-Cryogenic Engine Development for LVM3

**Context:** The Indian Space Research Organisation (ISRO) has made a significant breakthrough in developing a semi-cryogenic engine with a remarkable thrust of 2,000 kN (kilonewtons). The first successful hot test of the Engine Power Head Test Article (PHTA) was conducted at the ISRO Propulsion Complex, Mahendragiri, Tamil Nadu. This achievement is set to enhance India's space launch capabilities by integrating this engine into the Launch Vehicle Mark-3 (LVM3).



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What is Geostationary Transfer Orbit (GTO)?

### **Understanding Transfer Orbi:**

A **Transfer Orbit** is used to move a satellite from one circular orbit to another in a **fuel-efficient manner**. The most commonly used maneuver for such transfers is the Hohmann Transfer Orbit.

### **Geostationary Transfer Orbit (GTO):**

Geostationary Transfer Orbit (GTO) is a highly elliptical orbit designed to move satellites closer to their final geostationary orbit (GEO).

- **Perigee** (closest point to Earth): **180-200 km** above Earth's surface.
- **Apogee** (farthest point from Earth): Approximately **35,900 km** (near geostationary orbit).

### Why is GTO Important?

Satellites are first placed in GTO before they use their own propulsion systems to reach their final geostationary orbit (GEO). This approach:

- Reduces energy requirements from the launch vehicle.
- Enhances fuel efficiency.

### What is a Semi-Cryogenic Engine?

A **Semi-Cryogenic Engine** is a type of **liquid rocket engine** that uses:

- Liquid Oxygen (LOX) as an oxidiser (cryogenic component). ٠
- Refined Kerosene (RP-1) as fuel (stored at ambient temperature).

### Why It Matters?

The combination of LOX and RP-1 offers a high thrust-to-weight ratio and improved efficiency, making it ideal for heavy-lift launch vehicles.

Significance of ISRO's Semi-Cryogenic Engine Development 🛛

### **Engine Power Head Test Success:**

- The PHTA was tested successfully for 2.5 seconds to validate ignition and boost strap mode • operation.
- All engine parameters performed as expected.
- Developed by: Liquid Propulsion Systems Centre (LPSC) under ISRO.

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#### **Future Plans:**

ISRO plans to conduct **a series of further tests** on the **PHTA** before achieving a **fully integrated engine**.

**Replacing the Current LVM3 Core Stage**:

The SC120 stage (powered by the SE2000 engine) will replace the existing L110 stage in the LVM3.

### **Impact on Payload Capacity:**

• Payload capacity to Geosynchronous Transfer Orbit (GTO) will increase from 4 tonnes to 5 tonnes.

This achievement marks a **crucial milestone** for ISRO's **space exploration ambitions** and positions **India** to achieve **greater efficiency and payload capabilities** in future missions.

### Historic Polar Orbit Mission: SpaceX Achieves a Groundbreaking Feat

**Context:** SpaceX recently made history with the successful launch of **Fram2**, a **private astronaut crew mission** aboard a **Falcon 9 rocket** from NASA's **Kennedy Space Center** in Florida. This mission marks a pivotal milestone as the **first human spaceflight to utilize a polar orbit trajectory**—an achievement that expands the boundaries of human space exploration.



### What is a Polar Orbit?

A **Polar Orbit (PO)** is a specific type of **Low Earth Orbit (LEO)**, typically ranging between **200 km to 1,000 km** in altitude. Unlike equatorial orbits that circle the Earth from **west to east**, polar orbits travel **from pole to pole**, allowing satellites to **cross over every part of the Earth's surface** over time.

**Interesting Fact:** A deviation of up to **10 degrees** from the exact **North-South trajectory** is still classified as a polar orbit.

### Why Polar Orbits Matter:

Polar orbits are crucial for:

- **Global Earth Observation:** They provide **comprehensive**, **repeated coverage** of the entire Earth's surface as the planet rotates beneath the satellite's path.
- **Climate Monitoring:** Vital for **tracking changes in the atmosphere, oceans, and land surfaces**, polar orbits are essential for understanding **climate change**.
- **Reconnaissance Missions:** Governments and private entities use polar orbits for **high-resolution imaging and surveillance**.

**Did You Know?** Most **Earth observation satellites**, like those in the **Landsat program**, utilize polar orbits for detailed monitoring of environmental changes.

### Significance of the Fram2 Mission:

1. **First Human Spaceflight in Polar Orbit:** Unlike traditional missions that follow **equatorial orbits**, Fram2 travels from **pole to pole**. This trajectory enables **complete observation of Earth's surface over time**, making it invaluable for **climate studies**, **global surveillance**, and **research**.

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Fact: Prior to Fram2, polar orbits were almost exclusively used by Earth-observing satellites and reconnaissance missions—not human missions.

- 2. Expanding Commercial Spaceflight: Fram2 is SpaceX's sixth private astronaut mission, further solidifying its dominance in the commercial spaceflight sector. By demonstrating the feasibility of polar-orbiting human missions, SpaceX highlights the growing role of private companies in space exploration, reducing reliance on government agencies like NASA.
- 3. Reusable Spacecraft Innovation: The mission uses the Crew Dragon capsule, a reusable spacecraft developed by SpaceX with NASA funding. To date, SpaceX has successfully conducted 16 crewed missions with this capsule, proving the cost-efficiency and reliability of reusable technology.

Fact: Reusability reduces the cost of space missions by up to 70%, a game-changer for making space travel more accessible.

### **Future Implications:**

The success of the **Fram2 mission** signals a **new era of space exploration**, where **commercial entities** push the boundaries of technology and trajectory. With the ability to explore polar orbits, we can expect enhanced global monitoring, improved climate models, and expanded human missions to previously inaccessible orbits.

### Neuralink's Groundbreaking 'Blindsight' Chip: Human Trials Expected by 2025

**Context:** Elon Musk's brain-chip company, Neuralink, is gearing up to initiate human trials of its revolutionary visual prosthesis device, "Blindsight", by the end of **2025**. This **Brain**-Computer Interface (BCI) aims to restore vision in individuals who are **completely blind**.



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### What is Blindsight?

The **Blindsight** device is an **experimental artificial vision system** that offers a new approach to restoring sight.

- Microelectrode Array Implantation: Uses a microelectrode array implanted directly in the visual ٠ cortex of the brain.
- Bypasses Traditional Visual Pathways: Completely bypasses the eyes and optic nerves, providing an alternative route for visual data processing.
- **Camera Feed Processing:** Captures visual information from a **camera feed** and **stimulates neurons** in the brain's visual center.
- Artificial Perception of Images: Enables the brain to perceive visual information even without functional eyes.

### **Understanding Brain-Computer Interfaces (BCIs):**

Brain-Computer Interfaces (BCIs) are advanced systems designed to connect the brain directly to external devices.

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**Key Functions:** 

- Signal Acquisition: Capturing brain signals through electrodes or sensors.
- **Signal Analysis:** Processing the acquired data to **interpret neural activity**.
- **Command Translation:** Converting brain signals into actionable **commands**.
- **Device Control:** Sending commands to external devices to execute a desired action.

Types of BCIs: BCIs can be categorized into three main types based on their level of invasiveness:

### 1. Invasive BCIs:

- **Direct implantation of electrodes** into the brain tissue.
- Offers the **highest signal quality** and precision.
- Associated with **surgical risks** such as infection, inflammation, and damage to brain tissue.
- Applications: Restoring motor function in paralyzed individuals, artificial vision systems like
   Blindsight.

### 2. Non-Invasive BCIs:

- Uses **external sensors**, such as **EEG headsets**, placed on the scalp.
- **Safer and more accessible** but suffers from **lower signal quality** due to interference from the skull and scalp.
- **Applications:** Communication devices, gaming, neurofeedback, and some medical diagnostics.

## 3. Partially Invasive BCIs:

- Electrodes are placed inside the skull, but outside the brain tissue.
- Provides a compromise between safety and signal quality.
- **Applications:** Cochlear implants, visual prosthesis development, etc.

### Extra Insights: The Future of BCIs:

- **Rapid Advancements:** Companies like **Neuralink** and **Synchron** are pushing the boundaries of BCI technology.
- **Ethical Considerations:** Privacy, autonomy, and consent remain critical issues as these technologies advance.
- Security Concerns: BCIs are vulnerable to potential cybersecurity threats, emphasizing the need for robust safeguards.
- **Potential Beyond Medicine:** BCIs could enable **new forms of communication, education, and entertainment**, reshaping human-computer interaction.

### Why This Matters:

Neuralink's **Blindsight** technology is a bold step toward **merging biology and technology**, offering hope to millions worldwide with visual impairments. As we approach **2025**, the world watches eagerly to see if this ambitious vision becomes a reality.

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### Vibe Coding: Revolutionizing App Development Through AI

**Context: Vibe Coding** has become a hot topic in Silicon Valley, quickly gaining attention after being coined by **Andrej Karpathy**, co-founder of **OpenAI** and former head of AI at **Tesla**. This revolutionary concept is reshaping how apps are developed, making the process more accessible than ever before.



#### What is Vibe Coding?

**Vibe Coding** refers to using **Generative AI** not only to assist in coding but to **generate entire codebases for apps** through natural language interactions. The process involves **prompting Large Language Models (LLMs)** like **ChatGPT** to produce application code based purely on user instructions.

#### How It Works:

- 1. **Natural Language Interaction:** Users communicate their app ideas and requirements to AI using simple, natural language prompts.
- 2. **Automated Code Generation:** The AI generates complete codebases, handling everything from backend logic to frontend design.
- 3. **Instant Prototyping:** Rapid development without deep technical knowledge of programming languages or frameworks.

#### Why It Matters:

- Accessibility: Lowers the barrier to entry for non-coders, allowing innovators and entrepreneurs
   to bring their ideas to life without technical expertise.
- **Speed:** Drastically reduces development time, enabling faster prototyping and iteration.
- **Scalability:** Offers potential for rapid scaling of applications without expanding human developer teams.

#### Potential Risks & Challenges:

Despite its promise, **Vibe Coding** presents certain challenges:

- Security Risks: Generated code may have vulnerabilities due to lack of contextual understanding by AI systems.
- **Maintenance Issues:** The code produced could be **inefficient or costly** to maintain, especially when scaled.
- **Quality Control: AI-generated code** may lack optimization, thorough testing, or adherence to industry standards.

#### **Extra Insights:**

- **AI Dependence:** While **Vibe Coding** can accelerate development, it risks making developers overly reliant on AI tools without fully understanding the underlying codebases.
- Human-AI Collaboration: The ideal approach may be to combine AI-driven code generation with expert oversight, ensuring quality, efficiency, and security.

**The Future of Vibe Coding:** As AI continues to evolve, **Vibe Coding** could become a cornerstone of software development. However, ensuring that AI-generated code is **secure, efficient, and maintainable** will be crucial for its long-term success.

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#### Chandrayaan-3: Surface Thermophysical Experiment (ChaSTE)

**Context:** The **Surface Thermophysical Experiment (ChaSTE)**, part of **Chandrayaan-3's Vikram lander**, has become the **first instrument to measure in situ temperatures near the Moon's south pole**. This breakthrough is significant as it provides **unprecedented insights into the thermal properties of the lunar regolith**, especially in a region considered **crucial for future exploration and colonization**.



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**How ChaSTE Works:** 

- Deployment:
  - ChaSTE is integrated into the **Vikram lander**, which successfully touched down on the **lunar south pole on August 23, 2023**.
  - Utilizes a **rotation-based deployment mechanism** instead of traditional hammering devices, which has been a critical factor in its success.
- Temperature Sensors:
  - The thermal probe is equipped with **10 temperature sensors**, placed **1 cm apart** along its length.
  - These sensors are highly sensitive and capable of detecting minute temperature changes in the lunar regolith.
- Penetration Process:
  - The probe is gradually rotated downward by a motor, which ensures a **controlled and steady descent**.
  - **No hammering mechanism:** This prevents potential damage to the probe or alteration of the lunar surface during penetration.
  - Successfully reached a depth of 10 cm in the Moon's regolith.
- Data Collection Period:
  - Continuously monitored temperature variations from **August 23 to September 2, 2023**.
  - Provided critical data on **temperature gradients**, thermal conductivity, and heat capacity of lunar soil.

Comparisons	with	Prev	vious	Missions:

Mission	Year	Target Body	Instrument	Purpose	Outcome
Chandrayaan- 3	2023	Moon (South Pole)	ChaSTE	Measure thermal properties	Successfully penetrated and measured temperature.
ESA's Philae	2014	Comet 67P	MUPUS	Surface & subsurface temperature	Failed due to awkward landing; probe not deployed properly.
NASA's InSight	2018	Mars	HP3 ("The Mole")	Heat flow measurement	Encountered low friction; unable to burrow deep enough.

Why ChaSTE's Success is Groundbreaking:

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1. New Measurement Techniques: Unlike previous missions that relied on hammering mechanisms (which often failed due to unpredictable soil properties), ChaSTE uses a rotation-based method that minimizes disturbance to the regolith.

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- 2. Superior Sensor Arrangement: With 10 sensors placed 1 cm apart, ChaSTE provides highresolution temperature profiles. This setup allows researchers to understand thermal conductivity and heat capacity more accurately.
- 3. Crucial Data for Future Missions: The temperature readings gathered by ChaSTE are essential for determining the presence and stability of water ice deposits, a key resource for future lunar bases and exploration missions.
- 4. Significance of the Lunar South Pole:
  - The South Pole region is of special interest due to its permanently shadowed areas where 0 water ice may be preserved.
  - Understanding thermal properties is critical for resource extraction and habitat 0 construction.

### Additional Facts & Knowledge:

- 1. Lunar Soil Composition:
  - The **regolith** is composed of **fine dust and small fragments** from meteorite impacts.
  - Its thermal properties can vary dramatically with depth, grain size, composition, and 0 compaction.
- 2. Thermal Conductivity Challenges:
  - Due to the Moon's lack of atmosphere, heat transfer primarily occurs via conduction and  $\circ$ radiation, making accurate measurement challenging.
  - The extreme temperature variations between day and night (ranging from +127°C during 0 the day to -173°C at night) make thermal studies critical.
- 3. Importance of Water Ice Detection:
  - Water ice can provide drinking water, oxygen, and hydrogen for fuel, making it essential for sustainable lunar exploration.
  - It could also serve as a **natural shield against cosmic radiation** for future lunar habitats.
- 4. **Comparison with Artemis Program:** NASA's **Artemis missions** also aim to study the lunar South Pole, but **Chandrayaan-3's ChaSTE experiment provides a head-start** in gathering in situ thermal data.
- 5. Data Utilization: ChaSTE's findings will assist in designing thermal insulation and protective measures for future lunar bases, rovers, and human missions.

**Conclusion:** ChaSTE's success is a monumental achievement for **ISRO's Chandrayaan-3 mission** and global lunar research. By providing valuable data on **lunar soil's thermal properties**, it offers critical insights for future resource utilization and habitat design on the Moon.

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### Artificial Rain: Engineering Rainfall to Tackle Environmental Challenges

**Context: Artificial rain**, a cutting-edge weather modification technique, is gaining attention as a potential solution for mitigating **drought**, **air pollution**, **and climate change**. Governments worldwide, including **India's capital Delhi**, are exploring this technology to address pressing environmental concerns.



#### Latest Development:

Delhi's **Environment Minister** recently held discussions with key government

agencies to assess the feasibility of implementing **artificial rain through cloud seeding** as a measure to **reduce air pollution and combat extreme weather conditions**.

#### What is Artificial Rain?

**Artificial rain** refers to the **induced precipitation** process achieved through **cloud seeding**. It involves dispersing specific chemicals into clouds to enhance **rainfall** and influence **weather patterns**.

#### **How Does It Work?**

#### The process of cloud seeding involves:

- 1. **Chemical Dispersion:** Chemicals such as **silver iodide**, **potassium iodide**, **and dry ice** are released into clouds via **aircraft or helicopters**.
- 2. Nuclei Formation: These substances act as **condensation nuclei**, around which **water vapor condenses** to form larger droplets.
- 3. **Rainfall Production:** As droplets combine and grow, they eventually become heavy enough to fall as rain.

#### Success Factors:

- Presence of Moisture: Cloud seeding is only effective when adequate moisture is already present in the atmosphere.
- Suitable Atmospheric Conditions: Optimal temperature and humidity levels are crucial for inducing precipitation.

#### **Types of Cloud Seeding:**

#### 1. Hygroscopic Cloud Seeding:

- Involves the dispersion of **salt particles** to accelerate the **coalescence of droplets** within liquid clouds.
- Particularly effective in **tropical regions** where warm clouds dominate.
- 2. Glaciogenic Cloud Seeding:
  - Utilizes ice-forming agents like silver iodide to target supercooled clouds.
  - Converts **water vapor into ice crystals**, which later melt into rain.
  - More suitable for **cold or mixed-phase clouds** found in higher altitudes.

#### **Alternative Technologies:**

- 1. Static Artificial Rain-Inducing System:
  - Utilizes **natural ionization technology** to stimulate precipitation.

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This method enhances rainfall by generating charged particles that attract moisture-laden clouds.

### 2. Stratospheric Aerosol Injection (SAI):

- A form of **solar geoengineering** inspired by **volcanic eruptions**. 0
- Involves injecting sulphur dioxide or reflective particles into the atmosphere to cool the  $\circ$ planet and reduce smog.
- Highly controversial due to potential adverse effects on weather patterns and ecosystems.  $\circ$

### 3. Diamond Dust Experiment:

- A futuristic approach that proposes using **diamond dust** as a **non-toxic**, **long-lasting** alternative to traditional aerosols for climate cooling.
- Estimated cost: A staggering **\$175 trillion**, making it economically unfeasible.

### **Benefits of Artificial Rain:**

 $\circ$ 

- Drought Mitigation: Provides relief to agriculture and water-scarce regions.
- Air Pollution Reduction: Artificial rain can wash away pollutants and particulate matter, improving air quality.
- Climate Regulation: Can be part of broader strategies to combat global warming and mitigate extreme weather conditions.

### **Challenges and Concerns:**

- **Environmental Impact:** Prolonged use of chemicals like silver iodide may have adverse effects on soil and water bodies.
- Cost and Efficiency: High operational costs and variable success rates make cloud seeding an expensive proposition.
- **Ethical Considerations:** Concerns over **altering natural weather systems** and potential misuse for geo-political purposes.

### **Interesting Fact:**

The concept of artificial rain dates back to **1946**, when **Vincent Schaefer**, an American chemist, successfully conducted the first cloud seeding experiment using **dry ice** over **New York's Mount Grevlock**. Since then, over **50** countries have adopted cloud seeding technologies for various purposes.

### Audible Enclaves and Parametric Array Loudspeakers (PAL)

Context: In a world filled with ambient noise and auditory distractions, delivering sound precisely to a **targeted individual** without disturbing others has long been a challenge. Traditional sound waves, being longitudinal in nature, propagate through compression and rarefaction, but also **spread out due to diffraction**. This leads to **dispersion**, especially at higher frequencies, making **focused sound transmission** nearly impossible in noisy environments.



However, emerging technologies like Audible Enclaves (AE) and Parametric Array Loudspeakers (PAL) are revolutionizing sound delivery by creating highly directional and private auditorv zones.



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### What Are Audible Enclaves (AE)?

Audible Enclaves are localized sound pockets, formed through a clever use of nonlinear acoustics.

- How It Works: Two high-frequency ultrasonic waves, which are individually inaudible, intersect at a specific point. Due to nonlinear interaction in the air, they generate an audible signal only at that precise location.
- **Privacy & Focus**: This allows for **personalized sound delivery—only the intended listener** hears the message, while others remain **undisturbed**.
- **Benefit**: Enhances **privacy**, enables **customized experiences**, and avoids audio pollution in public or shared spaces.

### Parametric Array Loudspeakers (PAL): Sound in a Straight Line:

PAL technology takes a similar concept and pushes it further with ultrasound modulation.

- **Mechanism**: PAL devices emit **high-frequency ultrasonic waves** modulated with an **audio signal**. As the wave travels through the air, it **self-demodulates**, converting into an **audible beam** of sound.
- **Precision**: The sound beam is **highly directional**, behaving almost like a **laser for audio**, making it perfect for delivering messages to a specific individual or area.
- No Sound Leakage: The surrounding environment remains silent, making it ideal for crowded or quiet environments.

### Where Are PAL and AE Used?

• These futuristic audio technologies are finding real-world applications across diverse sectors:

**Museums & Exhibitions:** Offer **personal audio commentary** to individual visitors without disrupting others.

### **Retail Environments:**

• Play **targeted product ads or messages** to shoppers standing near specific shelves or displays.

### **Immersive Entertainment & Gaming:**

• Create **3D** soundscapes that follow players or viewers, enhancing augmented reality and virtual reality experiences.

### Public Announcements in Crowded Spaces:

• Use **discreet messages** for specific locations (e.g., airport gates) without disturbing the entire area.

### Assistive Technology for the Visually Impaired:

• Provide **navigational audio cues** or contextual instructions that are **non-intrusive and precise**.

### Security and Defense:

• Deliver **confidential instructions or alerts** in sensitive zones or during covert operations.

### The Future of Audio is Directional:

With technologies like **Audible Enclaves** and **Parametric Array Loudspeakers**, we're entering an era where **sound is no longer bound by traditional limitations**. These innovations promise a future where **audio** *Download Our Application* 









**becomes personal, focused, and intelligent**—empowering users with **clarity, privacy, and immersive experiences** like never before.

### Iron's Surprising Role in the Sun's Opacity: New Insights into Solar Structure

**Context: Opacity** refers to a material's ability to absorb and block light; in simple terms, the higher the opacity, the less light can pass through it. This property plays a pivotal role in determining how energy moves within a star like the Sun. In particular, opacity governs the transfer of energy from the Sun's **core** to its surface, influencing its overall temperature gradient.



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### New Findings: Iron's Opacity is Far Greater Than Previously Thought

Recent studies have revealed that the opacity of **iron** inside the Sun is significantly higher than previously predicted by solar models. In fact, a 2015 study suggested that iron's opacity could be as much as **30–400% greater** than theoretical predictions. This discovery challenges long-standing assumptions about how energy moves within the Sun, and it could reshape our understanding of stellar dynamics.

### Why Does Iron's Opacity Matter?

The opacity of elements like **iron** is crucial in determining several key characteristics of a star:

- **Temperature Gradient**: It affects how temperature varies across different layers of a star.
- **Energy Transport**: The ability of energy to travel from the core to the surface is directly influenced by opacity.
- **Seismic Properties**: The movement of sound waves within a star is also affected, which helps in studying stellar interiors.

The Sun serves as a **benchmark** for understanding other stars in the universe. Any inaccuracies in solar models can lead to cascading errors in our understanding of distant stars, galaxies, and the universe itself. As such, improving the accuracy of solar models could lead to breakthroughs in our knowledge of:

- **Solar Neutrinos**: These elusive particles are produced in the Sun's core during fusion reactions.
- **Sunspot Cycles and Flares**: More accurate models can help predict the Sun's magnetic activity, which affects space weather.
- **Stellar Aging**: Understanding the life cycle of stars, including the Sun's eventual transition into a red giant, depends on accurate opacity values.
- **Energy Balance in Other Stars**: Updated opacity data could improve our ability to understand the life cycles of other stars beyond our solar system.

### The Sun's Internal Structure: A Complex Machinery

To grasp why iron's opacity matters, it's important to understand the Sun's internal structure:

- **Core**: The heart of the Sun, where nuclear fusion occurs, fusing hydrogen into helium to release immense energy.
- **Radiative Zone**: Surrounding the core, energy is transferred outward by radiation, although this process can take millions of years.

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Convection Zone: In this outer layer, heated material rises, cools at the surface, and sinks back down, forming convection currents that help transport energy.

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- **Photosphere**: The Sun's visible surface, although it's not solid—it's a **dense gas layer** that blocks deeper layers from view.
- **Chromosphere**: A thin, less dense layer above the photosphere that can be seen during solar eclipses. •
- Corona: The outermost part of the Sun's atmosphere, a highly ionized, low-density plasma that extends far into space.

### The Bigger Picture: Implications for Astrophysics and Cosmology

This new understanding of iron's opacity doesn't just refine our model of the Sun-it could have far-reaching consequences for the entire field of astrophysics. Even small errors in solar models can cascade into largerscale ramifications, affecting everything from the formation of stars to the evolution of galaxies. By improving the precision of these models, scientists can gain deeper insights into the **fundamental workings** of the universe.

The discovery of iron's greater opacity invites us to rethink not just our understanding of the Sun but also the processes that govern the stars and galaxies across the cosmos. As our simulations and data collection techniques improve, we move closer to uncovering the true workings of our Sun—and perhaps, the universe itself.

### India's Genome Mapping Reveals 180 Million DNA Variants

**Context:** The **GenomeIndia Project**, a pioneering initiative led by the Government of India, has unveiled its preliminary findings after sequencing the genomes of 9,772 individuals from 85 diverse **population groups** across the country. This large-scale genetic mapping highlights **India's vast genetic heterogeneity** and lays the foundation for transformative healthcare applications.

### What is Genome Sequencing?

Genome sequencing is the process of decoding the entire DNA sequence of an organism — including all genes and non-coding regions.

It determines the exact order of the four **nucleotide bases**:

- Adenine (A)
- Cytosine (C)
- Guanine (G)
- Thymine (T)

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Understanding this sequence enables researchers to explore **genetic variations**, identify **disease markers**, and develop personalized treatment strategies.

### **Key Findings from the Study:**

### **180 Million Genetic Variants Identified:**

**130 million variants** in **autosomes** (non-sex chromosomes)

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Genome India Project





### • **50 million variants** in sex chromosomes (*X and Y*)

This enormous variant discovery provides unprecedented insight into the **genomic diversity of the Indian population**.

### **Population-Specific Genetic Markers:**

• Some variants are **unique to specific ethnic or regional communities**, highlighting **localized genetic adaptations** shaped by **culture, geography, and history**.

### Disease Susceptibility and Adaptation:

• Identified variants include those linked to **infectious disease resistance**, as well as **adaptations to extreme environments** (e.g., **high altitudes** with **low oxygen levels**, common in Himalayan communities).

### Why is This Study Important?

### **Personalized Medicine:**

• Enables **tailored treatment plans** based on an individual's **genetic profile**, improving effectiveness and reducing trial-and-error approaches.

### Disease Marker Identification:

- Helps in detecting **genetic predispositions** to complex diseases such as:
  - Diabetes
  - Cancer
  - o **Cardiova**scular Disorders

### Pharmacogenomics:

• Assists in predicting **drug responses** and minimizing **adverse effects**, revolutionizing how medications are prescribed and administered.

### Broader Impact and Future Prospects:

- Enhancing public health strategies with genome-informed decision-making
- Creating **genetic databases** that serve as references for researchers globally
- Supporting **ancestry and evolutionary studies** tracing the **origins and migration patterns** of Indian populations

### Did You Know?

Despite housing over **17% of the world's population**, **India contributes less than 1%** to the global genomic databases. This project aims to **correct that imbalance** and ensure **genetic equity** in research and healthcare.

### **Conclusion: A Genomic Leap Forward**

The findings from **India's genome sequencing effort** mark a **historic advancement** in biomedical research. By unlocking the code of human life at a national scale, the **GenomeIndia project** is set to transform **healthcare**, **research**, and **precision medicine**, with far-reaching impacts for future generations.

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**Ottawa Landmine Convention** 

**Context: NATO members** — **Poland, Finland**, and the **Baltic states (Estonia, Latvia, Lithuania)** — have announced their **withdrawal from the 1997 Ottawa Convention**.

Why in News?

- The move is in response to **heightened security threats from Russia** amid the **Russia-Ukraine war**.
- These countries fear that a ceasefire could allow **Russia to rearm**, jeopardizing their own security.

## About the Ottawa Convention (1997):

#### **Overview:**

- Also known as the Mine Ban Treaty.
- Prohibits:
  - o Use
  - Production
  - Stockpiling
  - Transfer of anti-personnel landmines
- Landmines are hidden explosive devices triggered by proximity or pressure.
- Anti-personnel mines are designed to injure or kill humans, including non-combatants.

#### **Objectives:**

- Reduce **civilian casualties** caused by landmines, which often remain active **long after conflicts** end.
- Promote humanitarian demining and victim assistance.

#### Adoption & Enforcement:

- Finalized: 18th September 1997, Oslo
- Entered into force: 1st March 1999

#### **Scope & Commitments:**

- Requires signatories to:
  - **Destroy stockpiles** within 4 years
  - Clear mined areas
  - Provide assistance to victims
- Applies only to **anti-personnel mines** (not **anti-vehicle mines**).

#### **Membership:**

- **164 countries** are parties.
- Notable **non-signatories** include:
  - United States
  - Russia

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# **Related Treaty: 2008 Convention on Cluster Munitions:**

## About:

- Prohibits:
  - o Use
  - Production
  - Transfer
  - Stockpiling of **cluster munitions**

# **Cluster Munitions**:

- Weapons that release **multiple smaller bomblets** over a wide area.
- Known for causing **indiscriminate damage** and **long-term risks** to civilians.

## Membership:

- 112 state parties, 12 signatories
- Lithuania recently withdrew from this treaty.
- India, US, Russia, China, Ukraine, and Israel have not signed the treaty due to military and strategic concerns.

Sunbird: Nuclear Fusion Rocket Aiming to Revolutionize Space Travel

**Context:** Sunbird, an ambitious nuclear fusion-powered rocket under development by the UK-based startup Pulsar Fusion, is making headlines for its potential to redefine interplanetary travel. With an orbital demonstration planned for 2027, this could be a historic breakthrough in propulsion technology.



# What is Sunbird?

- **Speed Potential:** Expected to reach up to **805,000 km/h**, surpassing NASA's **Parker Solar Probe** (currently the fastest human-made object at **692,000 km/h**).
- Travel Efficiency:
  - Could reduce Mars travel time by nearly half
  - Could reach **Pluto in just 4 years** a mission that currently takes around 9.5 years
- **Core Objective:** Dramatically **cut travel time** to planets beyond Earth, making long-distance **space missions more feasible and frequent**

# Did You Know?

If Sunbird's concept is successful, it could support **crewed missions** beyond Mars — a milestone in **deep space exploration**.

# **Understanding Nuclear Fusion Propulsion:**

#### What is Nuclear Fusion?

• **Fusion** is the process where **two atomic nuclei combine** to form a **heavier nucleus**, releasing a **huge amount of energy** — the same principle that powers the **Sun and stars**.

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- Unlike **nuclear fission**, fusion:
  - Generates **minimal radioactive waste**
  - Offers a higher energy yield
  - Is considered **cleaner and safer**

## Two Major Concepts in Nuclear Propulsion:

#### 1. Nuclear Thermal Propulsion (NTP):

- Uses a nuclear reactor to heat liquid hydrogen (LH<sub>2</sub>)
- Hydrogen expands into **plasma** and is ejected through a **nozzle** to create **thrust**
- Advantages:
  - Higher **exhaust velocity**
  - Can **double or triple payload capacity** compared to chemical rockets
- Historical Context: Ground tests started as early as 1955, making it a well-established concept with decades of R&D

# 2. Nuclear Electric Propulsion (NEP):

- Converts nuclear heat into electricity, which then powers ion thrusters
- Thrusters build speed gradually but efficiently, suitable for long-duration missions
- Key Components:
  - Compact nuclear reactor
  - Electric generator
  - **Heat rejection system** (e.g., heat pipes)
  - Electric propulsion system (like ion thrusters)
- **Bonus:** While **solar panels** can also power electric propulsion, a **nuclear source** ensures **consistent energy output**—especially useful **beyond Mars** where solar power weakens

#### Why Sunbird Matters:

- Fusion-based propulsion could become the next leap in aerospace engineering
- Faster interplanetary travel could open doors to:
  - Commercial space tourism
  - Rapid resupply missions
  - Deep space exploration including Jupiter's moons or even interstellar probes
- Pulsar Fusion's work is backed by growing interest in private space innovation and clean energy tech

#### What's Next?

- 2027: Planned orbital demonstration of the Sunbird fusion rocket
- Success could trigger **investments**, **international collaborations**, and possibly **future missions to Mars and beyond**

# **Conclusion:**

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**Sunbird** isn't just a rocket — it's a **glimpse into the future of spaceflight**. By combining the **limitless power of fusion** with cutting-edge propulsion engineering, Sunbird could drastically **shorten cosmic distances** and bring **deep space exploration** within humanity's reach.

# Saras Mk2: India's Indigenous Civil Aviation Leap

**Context:** The **Saras Mk2**, India's ambitious push into the civilian aviation sector, is gearing up for its **first test flight in December 2027**, as confirmed by the **Director of CSIR-National Aerospace Laboratories (CSIR-NAL)**. This marks a significant milestone for India's domestic aerospace capabilities.

## Overview: India's First Light Civil Transport Aircraft

- Saras Mk2 is a 19-seater, multi-purpose light transport aircraft designed for civilian use.
- It is being developed by National Aerospace Laboratories (NAL), Bengaluru, under the Council of Scientific and Industrial Research (CSIR).
- The aircraft is an **upgraded version of the earlier Saras Mk1**, which laid the foundation for this advanced model.
- Saras Mk2 is India's first indigenously developed civilian aircraft in its category.

#### Key Features & Capabilities:

- Weight Class: 7.5 tons
- Passenger Capacity: Up to 19 passengers
- Maximum Range:
  - **775 km** with full capacity (19 passengers)
  - 2450 km with reduced load (7 passengers)
  - **Endurance**: 6 hours of continuous flight
- Service Ceiling: 29,000 feet
- Cruise Speed: 500 kmph
- Stall Speed: 185 kmph
- Take-Off Distance: 790 meters
- Landing Distance: 740 meters
- **Engines**: Powered by **2 Pratt & Whitney Canada PT6A-67A turboprop engines**, known for reliability and performance

# **Versatile Applications:**

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Saras Mk2 isn't just a passenger aircraft. Its **multi-role design** allows it to be configured for:

- Medical evacuation (air ambulance)
- Disaster relief and emergency response
- Short-haul regional connectivity, especially between Tier-1 and Tier-2/Tier-3 cities

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• Cargo transport and logistics support in remote or underserved areas

# Why Saras Mk2 Matters for India:

• **Boosts Indigenous Manufacturing**: Aligns with the **Make in India** and **Atmanirbhar Bharat** initiatives.

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- **Improves Regional Air Connectivity**: Supports **UDAN (Ude Desh ka Aam Nagrik)** scheme to make air travel affordable and widespread.
- Strengthens Civil Aviation Sector: Reduces dependency on imported aircraft for regional operations.
- **Economic Growth Catalyst**: Facilitates trade, healthcare access, and disaster management in remote regions.

#### **Did You Know?**

- The **PT6A engine** used in Saras Mk2 powers more than **130 different aircraft types worldwide** and has logged over **400 million flight hours**, showcasing exceptional dependability.
- The original Saras Mk1 program faced challenges but was **revived with renewed vigor** post-2016 under a redesigned configuration and stricter safety protocols.

## Looking Ahead:

As India continues to assert its technological capabilities in aviation, the **Saras Mk2** stands as a **symbol of innovation, resilience, and engineering excellence**. If all goes according to plan, **by the end of the decade**, we could see this indigenous aircraft **serving remote corners of the country and beyond**.

#### BatEchoMon: India's First Smart Bat Detection System

**Context:** In a groundbreaking development, the **Indian Institute for Human Settlements (IIHS)**, Bengaluru, has introduced **India's first automated bat detection and monitoring system** — **BatEchoMon**. This innovative system is poised to transform the way scientists study **urban bat populations**, allowing for real-time monitoring that once required months of manual effort.



# What is BatEchoMon?

**BatEchoMon** stands for **"Bat Echolocation Monitoring"**, a pioneering initiative that combines **ecology**, **engineering**, **and artificial intelligence** to track and identify bat species through their echolocation calls.

This fully **automated**, **real-time system** was designed by **bat biologist Kadambari Deshpande** and **engineer Vedant Barje**, under the mentorship of **Jagdish Krishnaswamy**. It was developed as a part of the **Long-Term Urban Ecological Observatory** at the **School of Environment and Sustainability**, IIHS, Bengaluru.

# How Does BatEchoMon Work?

BatEchoMon uses an intelligent mix of **hardware**, **software**, **and machine learning** to autonomously detect and analyze bat activity. Here's what powers it:

# **Key Components**:

• Ultrasonic Microphone (modified AudioMoth): Captures high-frequency bat calls.



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- Raspberry Pi Microprocessor: Processes and classifies sound data on-site.
- Solar-Powered Battery: Ensures sustainable, off-grid energy supply.
- Wi-Fi Module: For remote data transmission and cloud syncing.

## **Operational Details**:

- Activates **automatically at sunset**
- Records continuously throughout the night
- Uses a **Convolutional Neural Network (CNN)** to:
  - **Detect bat calls** amid background noise
  - **Classify calls** based on frequency and structure

## **Outputs and Insights**:

- Spectrograms (time vs. frequency plots)
- Audio files of bat calls
- **Species-specific data** on call timing, density, and behavior patterns

## Why is BatEcho<mark>Mon Important?</mark>

#### **Revolutionizing Bat Research**:

• Traditionally, bat call analysis was **labor-intensive** and delayed — now, **real-time detection** means faster insights and more efficient conservation.

# Urban Biodiversity Monitoring:

With cities expanding rapidly, understanding **how bats adapt to urban environments** is crucial. Bats help control insect populations and pollinate plants, making them vital for **urban ecosystem health**.

# A Tech-Driven Conservation Model:

• BatEchoMon is among the few globally that **integrate AI in wildlife monitoring**. It offers a **scalable solution** for developing nations looking to modernize biodiversity tracking without heavy infrastructure.

#### Looking Ahead: The Future of Bioacoustic Monitoring

The success of BatEchoMon could inspire **similar systems for monitoring birds, frogs, or even marine life**, using acoustic signatures and machine learning.

In addition, data from BatEchoMon can:

- Support policy-making in urban planning
- Enhance **biodiversity indexes**
- Enable citizen science through open-access bat call libraries

# Quick Facts: BatEchoMon at a Glance

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Feature	Details
Developed by	IIHS, Bengaluru
Core Tech	AudioMoth, Raspberry Pi, CNN algorithm
Power Source	Solar-powered battery
Function	Autonomous bat call detection and classification
Outputs	Spectrograms, audio files, statistical reports
Significance	India's first real-time bat monitoring system

#### **Conclusion: A New Era for Indian Bat Science**

**BatEchoMon** is not just a scientific tool — it's a leap toward **modern**, **AI-integrated wildlife conservation**. With rising interest in **bioacoustics** and **urban ecology**, this system places India at the forefront of **smart environmental monitoring**.

It also sets the stage for **collaborative, tech-enabled conservation strategies** in an increasingly urbanized world.

# Lichens: A Key to Life on Mars

**Context:** A recent experiment has demonstrated that **lichens** can survive and thrive in **Martian-like conditions**, marking a **significant step** towards understanding life's potential on Mars. This exciting development opens new doors for **space exploration** and the possibility of life beyond Earth.

#### What Are Lichens?



Lichens are not just one organism but a **symbiotic partnership** between two distinct life forms: a **fungus** and an **alga**. This unique

combination creates a highly adaptable organism that can survive in extreme conditions.

#### **Structure of Lichens:**

- The **outer skin** and internal structure of a lichen are primarily made up of **fungal hyphae**, which are thread-like structures.
- Inside the fungal network, individual **algae cells** are interspersed, providing energy through **photosynthesis**.

#### No Roots, No Problem:

Unlike most plants, lichens do not have **roots** or specialized structures for absorbing nutrients from the soil. Instead, they depend on the **atmosphere** for **air** and **water**, which makes them highly sensitive to environmental conditions. This reliance on the atmosphere means that the **quality of the environment** directly impacts the **diversity** and **health** of lichen species.

#### Lichens on Earth: A Wide Presence

Lichens are incredibly widespread, covering about **6 to 8% of Earth's surface**. There are over **15,000 known species** of lichens, each adapted to thrive in different environments, from **mountain tops** to **desert landscapes**, and even **polar regions**.







#### **Ecological Importance of Lichens:**

• **Bioindicators**: Lichens are highly sensitive to **air quality** and **pollution**, making them effective **bioindicators** of environmental health.

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• **Survival in Extreme Conditions**: Some species of lichens are capable of withstanding **harsh climates**, extreme temperatures, and limited water, making them an ideal candidate for studying life in other worlds.

#### Lichens and the Future of Space Exploration:

Lichens' ability to thrive in **extreme environments** like those simulated on Mars suggests that they may play a crucial role in future **space exploration**. Their **resilience** could help researchers understand how life might survive on other planets, especially in places with limited resources, such as **Mars**.

#### **Conclusion: A Step Toward Life Beyond Earth**

The discovery that lichens can thrive in Martian-like conditions brings us closer to understanding how life could exist on **Mars**. As scientists continue to study these fascinating organisms, they may hold the key to unlocking the secrets of **life in space** and the potential for **sustaining life on other planets**.

## Role of V2G Technology in Strengthening India's Power Sector

**Context:** The **Kerala State Electricity Board (KSEB)**, in collaboration with **IIT Bombay**, has launched a **pilot project** to test the integration of **Electric Vehicles (EVs)** with the state power grid through **Vehicle-to-Grid (V2G)** technology.

This initiative aims to explore how **EV batteries** can **support the grid during peak demand periods**, especially when **solar power** is unavailable—transforming EVs into **flexible energy storage units**.

# What is Vehicle-to-Grid (V2G) Technology?

V2G enables bi-directional energy flow between electric vehicles and the power grid.

#### How It Works:

- **Grid-to-Vehicle (G2V):** Power flows from the grid to charge the EV.
- Vehicle-to-Grid (V2G): EVs send stored energy back to the grid during high-demand times.

# **Other Applications:**

- Vehicle-to-Home (V2H): Powering household devices using EV batteries.
- Vehicle-to-Vehicle (V2V): Sharing energy between EVs.

# How V2G Can Strengthen India's Power Sector:

#### 1. Demand-Side Management:

- **Peak Load Reduction:** EVs discharge energy during peak hours, reducing stress on power stations.
- Load Balancing: EVs can be charged during off-peak hours, flattening demand curves.

# 2. Supporting Renewable Energy:

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- **Energy Storage for Renewables:** Stores excess **solar** or **wind power** for later use.
- Grid Stabilization: Offers frequency regulation and voltage support for better reliability.
- 3. Enhancing Grid Flexibility:
  - **Emergency Backup Power:** EVs can act as **portable power banks** during outages.
  - **Decentralized Storage:** Reduces dependence on **centralized energy plants**. ٠

## 4. Economic Advantages:

- **Cost Savings for EV Owners:** Earn incentives by **selling surplus energy** back to the grid. •
- **Utility Efficiency:** Improves **grid reliability** and reduces operational costs.

## **5. Environmental Benefits:**

- **Cleaner Energy Usage:** Promotes **low-carbon solutions** by integrating clean energy into everyday transport.
- Smart Charging Systems: Enables real-time energy management through intelligent communication networks.

## **Global Trends in V2G Adoption:**

## Growing Implementation in EV-Dense Regions:

Countries like the **USA**, **UK**, and **Netherlands** are leading the way, using V2G to boost grid efficiency and renewable energy use.

#### **Incentivized Participation:**

- **United Kingdom & Netherlands:** EV users earn compensation for grid support.
- California, USA: Offers incentives for contributing to grid services like stability and frequency regulation.

#### **Disaster Resilience:**

EVs function as **emergency energy sources** during blackouts or **natural calamities**, improving community resilience.

# V2G in India: Current Landscape:

#### **Still in Early Stages:**

India's focus is currently on **building EV charging infrastructure**, with **limited V2G integration** so far.

#### **Ongoing Pilot Programs;**

Some **DISCOMs** (distribution companies) are exploring **smart charging** and **V2G models**.

The Central Electricity Authority (CEA) has formed a technical committee to study reverse energy flow regulations.

# **Key Challenges:**

- **Grid Readiness:** The current grid setup isn't fully ready for **decentralized systems**.
- **Renewable Intermittency:** Inconsistent solar/wind supply creates **balancing issues**. ٠
- Market Barriers: Lack of regulatory frameworks and incentives.

# What Needs to Be Done?

To realize the full potential of V2G in India, the following steps are crucial:

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- **Develop Bi-Directional Infrastructure**
- **Implement Regulatory Reforms** for energy buy-back and net metering •
- **Incentivize EV Owners** to participate in energy balancing
- Invest in Smart Charging Systems for real-time energy coordination

James Webb Space Telescope (JWST): Unveiling the Secrets of the Universe

Context: The James Webb Space Telescope (JWST), launched in December 2021, is the most advanced space observatory ever constructed. It is the result of a groundbreaking collaboration between NASA, the European Space Agency (ESA), and the Canadian Space Agency (CSA).



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Positioned at the second Lagrange Point (L2), approximately 1.5

million kilometers from Earth, JWST enjoys a stable and unobstructed view of the cosmos. Unlike the Hubble Telescope, JWST operates primarily in the **infrared spectrum**, allowing it to **peer through cosmic** dust and observe the earliest galaxies and distant exoplanets with remarkable clarity.

#### **Key Components of JWST:**

- **Optical Telescope Element (OTE)** Gathers light from distant celestial objects.
- **Integrated Science Instrument Module (ISIM)** Contains the powerful imaging and spectroscopic instruments.
- Sunshield A five-layered structure that protects instruments from the Sun's heat and maintains ultra-cold temperatures.
- **Spacecraft Bus** Supplies power, navigation, and communications for telescope operations.

#### A Breakthrough Discovery: Possible Signs of Life on K2-18b

#### What is K2-18b?

K2-18b is a super-Earth exoplanet located 124 light-years away in the Leo constellation. It lies in the habitable zone of its star—where conditions might allow for liquid water, a crucial ingredient for life.

#### What Did JWST Discover?

In a recent study led by Cambridge University researchers, JWST detected atmospheric chemical signatures that may point to biological activity on K2-18b. Specifically, traces of:

- **Dimethyl Sulphide (DMS)** ٠
- **Dimethyl Disulphide (DMDS)**

These compounds are **biosignature gases** on Earth—produced primarily by marine phytoplankton and certain bacteria. The presence of these gases in vast quantities (thousands of times more than Earth's levels) raises the **strong possibility** of some **life-supporting ecosystem** on this distant world.

#### Why This Discovery Matters:







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- It's the first time JWST has possibly identified biosignatures on an exoplanet.
- The study provides a new direction for the search for extraterrestrial life, shifting focus to waterrich and hydrogen-rich super-Earths.

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K2-18b's atmosphere also contains carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), further supporting the **potential habitability** of this planet.

# **Did You Know?**

- **IWST** can observe objects that are over **13 billion years old**, offering insights into the **early universe**.
- The telescope's mirror is made of **beryllium** and coated with **gold**, optimizing it for **infrared** reflection.
- L2, its orbital point, keeps the Sun, Earth, and Moon behind it, ensuring thermal stability and a clear view of deep space.

# A New Era in Space Exploration:

The **James Webb Space Telescope** is not just a telescope—it's a **cosmic time machine** that is helping us answer some of the most profound questions: Are we alone in the universe? How did the first stars form? What lies beyond our solar system?

With findings like those on **K2-18b**, humanity is on the verge of potentially discovering life beyond Earth a milestone that could **redefine our place in the cosmos**.

# Artificial General Intelligence (AGI): The Future of Human-Like Machines

**Context:** According to **DeepMind**, Google's AI research lab, it is "plausible that powerful AI systems will be developed by 2030." This prediction reflects increasing confidence in the rapid advancement toward Artificial General Intelligence (AGI) — a form of AI that could revolutionize the world as we know it.

# What is Artificial General Intelligence (AGI)?

**AGI** refers to a **hypothetical form of intelligence** in machines

that can perform **any intellectual task** a human can. Unlike current AI systems that excel at specific tasks, AGI aims to **mimic the full range of human cognitive abilities**, including reasoning, learning, problemsolving, and even emotional understanding.

# Levels of AGI (As Identified by DeepMind, 2023):

- 1. **Emerging** Comparable to an unskilled human.
- 2. Competent Matches at least 50th percentile of skilled adults.
- 3. Expert Equals or exceeds the 90th percentile.
- 4. Virtuoso Reaches the 99th percentile of skilled adults.
- 5. Superhuman Outperforms all human beings.

# **AI vs AGI: Key Differences**

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Aspect	Artificial Intelligence (AI)	Artificial General Intelligence (AGI)
Focus	Solves <b>specific tasks</b> with human- like performance	Replicates <b>human-level cognition</b> across domains
Learning Capability	Requires <b>extensive training</b> within a single domain	<b>Self-learns</b> and adapts without prior task-specific training
Scope	Works within <b>narrow, predefined</b> areas	Operates <b>across multiple domains</b> without limitations
Alternate Name	Known as Weak AI or Narrow AI	Also called <b>Strong AI</b>
Cognitive Abilities	<b>Lacks</b> general reasoning and emotional intelligence	Exhibits <b>independent reasoning</b> and <b>emotional understanding</b>
<b>Current Status</b>	Actively developed and used today	Still <b>theoretical</b> and under research

## **Core Technologies Powering AGI Research:**

- **Deep Learning**: Enables machines to learn complex patterns across large datasets.
- Generative AI: Powers the creation of original content (text, image, audio).
- Natural Language Processing (NLP): Helps machines understand and generate human language.
- **Computer Vision**: Allows machines to **see, interpret, and respond** to visual stimuli.
- Robotics: Provides machines with physical interaction abilities, crucial for AGI's sensory and motor functions.

#### Potential Applications of AGI:

- Advanced Problem Solving: Tackles global challenges like climate change and scientific breakthroughs.
- Productivity Boost: Automates complex tasks, drastically increasing efficiency across industries.
- **Creative Empowerment**: Allows humans to focus on **strategic**, **artistic**, **and emotionally rich roles**.
- Healthcare Revolution: Enhances diagnosis, treatment planning, and drug discovery.
- **Personalized Education**: Delivers **adaptive learning** experiences for all learners.
- **Transportation Safety**: Powers **safe, autonomous vehicles**, reducing human error and accidents.
- **24/7 Assistance**: Enables **intelligent virtual assistants** for round-the-clock support.
- Accelerated Innovation: Drives technological advancement and creative discovery.

# **Challenges in AGI Development:**

- **Cross-Domain Learning**: AGI must make **abstract**, **transferable connections** across diverse fields.
- **Emotional Intelligence**: Replicating **human emotions and creativity** remains a major hurdle.
- Sensory Perception: Machines still struggle to process and integrate multisensory data effectively.

#### **Concerns About AGI:**

- Loss of Control: AGI may act independently or unpredictably.
- Job Displacement: Could lead to widespread unemployment in cognitive sectors.
- Security Threats: Risk of misuse in cyberwarfare, surveillance, or autonomous weapons.
- Ethical Dilemmas: Raises questions about machine rights, autonomy, and consciousness.

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Existential Risk: If misaligned with human goals, AGI could threaten human survival. •

#### The Way Forward:

To ensure safe and beneficial AGI development, the global community must:

- Establish international laws and ethical guidelines for AGI research and deployment.
- Prioritize **safety**, **value alignment**, and **responsible decision-making** in system design. ٠
- Implement **real-time monitoring and auditing tools** to detect and prevent misuse. •
- Develop AGI **step-by-step**, ensuring **safety checks** at every milestone.

Artificial General Intelligence holds the promise of transforming our world—but with that power comes immense responsibility. A collaborative, ethical, and cautious approach will be essential as we move toward a future shaped by AGI.

## K2-18b: Tracing the Possibility of Life Beyond Earth

**Context:** On **April 17**, an international team of scientists published a groundbreaking paper suggesting that the distant exoplanet **K2-18b** may exhibit conditions suitable for life.

#### Introduction:

In a remarkable development in the field of space science, researchers analyzing data from the James Webb Space **Telescope (JWST)** have reported signs of potential habitability on the exoplanet **K2-18b**, located about **124 light-years** from

Earth in the **Leo constellation**. The presence of **biomarkers** in its atmosphere has sparked optimism among scientists, though with warranted caution.

#### Understanding K2-18b and Its Discovery:

Discovered in **2015** by NASA's **Kepler Space Telescope**, **K2-18b** is a **super-Earth**—about **5.2 times wider** and nine times more massive than our planet. It orbits a red dwarf star (K2-18) within the habitable zone, receiving a level of stellar radiation similar to Earth.

#### **Kev Milestones:**

- 2019 (Hubble): Water vapor detected in its atmosphere.
- 2023-2024 (JWST): Stronger evidence for methane, carbon dioxide, and other organic molecules essential to life.

# Hycean World Hypothesis and Atmospheric Composition:

Scientists speculate that K2-18b could be a Hycean world—a planet with a hydrogen-rich atmosphere and possibly a **liquid water ocean** beneath it. These planets may support life despite extreme environments, thanks to potentially moderate temperatures and protective atmospheric layers like a stratosphere.

# Key atmospheric findings include:

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- Carbon-based molecules: Carbon dioxide and methane.
- Possible detection of Dimethyl Sulphide (DMS) or Dimethyl Disulphide (DMDS).

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## The Significance of Dimethyl Sulphide (DMS):

The potential detection of **DMS** is a highlight of the K2-18b analysis.

- On **Earth**, DMS is **almost entirely biological** in origin, produced by **marine phytoplankton** and **bacteria**.
- On K2-18b, **DMS-like signals** were reportedly **up to 1,000 times stronger** than on Earth, suggesting an **active production source**.

#### However:

- Spectral overlap between DMS and DMDS complicates analysis.
- Abiotic sources such as volcanic activity or cometary chemistry cannot be ruled out.

## **Caution Against Premature Conclusions:**

Despite the excitement, researchers stress the need for **scientific caution**:

- **JWST limitations**: Data interpretation depends on computer models that may not fully capture unknown atmospheric conditions.
- Past false positives: In 2024, DMS was discovered on comet 67P, generated through non-biological processes.
- Alternative hypotheses:
  - A U.S. study suggests K2-18b might be a **mini-Neptune** with a thick gas envelope, not requiring life to explain its chemical makeup.
  - A 2025 reanalysis challenges earlier findings, claiming no statistically significant evidence of DMS or carbon dioxide.

# Challenges in Confirming Life on Exoplanets:

Detecting extraterrestrial life is one of science's most complex endeavors due to:

- **Indirect methods**: Reliance on molecular signatures, temperature estimates, and radiation modeling.
- Technological limitations: Even advanced tools like JWST cannot directly observe life—only indicators or conditions that might support it.

Thus, while promising, any claims of life on K2-18b must be **treated as preliminary**.

**Conclusion:** K2-18b remains one of the most intriguing exoplanets studied so far. Its **hydrogen-rich atmosphere**, potential **water vapor**, and traces of **organic molecules** present a compelling case for further exploration. The possible detection of **DMS** adds a tantalizing layer of mystery, but **conflicting data** and **technical challenges** mean that conclusions must await more rigorous confirmation.

While we may not yet know if **K2-18b hosts life**, its study is **expanding the frontier of planetary science**, guiding future missions in the search for life beyond Earth.

# SpaDeX Mission: ISRO's Leap into Space Docking Technology

**Context:** In a groundbreaking achievement, the **Indian Space Research Organisation (ISRO)** has successfully completed the **second docking** of its two satellites — **SDX01 (Chaser)** and **SDX02 (Target)** — as part of the **SpaDeX (Space Docking Experiment)** mission. This marks a significant milestone in India's space technology capabilities.



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#### About the SpaDeX Mission:

The **SpaDeX Mission** is a **technology demonstration** initiative by ISRO, aimed at validating the **capability of docking and undocking** two small satellites in **low-Earth orbit (LEO)**. The mission's success represents a critical step towards advancing India's space exploration and in-orbit operations.

#### **Key Mission Details:**

- Satellites Involved:
  - **SDX01 (Chaser)**: The active satellite that performs docking operations.
  - **SDX02 (Target)**: The satellite to be docked.
- Weight: Both satellites weigh approximately 220 kg each.
- **Launch Vehicle**: The satellites were launched by the **PSLV-C60** rocket.
- **Orbit Details**: They were placed in a **460 km circular orbit**, with an inclination of **45 degrees**.

## **Objectives of the SpaDeX Mission:**

#### **Primary Objective:**

To develop and demonstrate the ability to **rendezvous**, **dock**, **and undock** spacecraft while in **orbit** — a crucial technology for future space missions.

#### Secondary Objectives:

- 1. **Electric Power Transfer**: The mission aims to showcase the transfer of **electric power** between docked spacecraft, a key capability for future **in-space operations**.
- 2. **Spacecraft Control Systems**: Developing and validating **composite spacecraft control systems** for precise maneuvering in orbit.
- 3. **Payload Operations**: Testing the **payload operations** post-undocking critical for the success of **deep-space missions**.

#### India Joins Elite Space Powers:

With this successful docking mission, **India** becomes the **fourth country** after the **United States**, **Russia**, and **China** to conduct successful **satellite docking operations**. This accomplishment positions ISRO as a growing force in **space exploration** and paves the way for more **complex missions** in the future.

#### **Conclusion: A Step Towards Future Deep-Space Missions**

The **SpaDeX Mission** marks a remarkable achievement for India's space program, demonstrating ISRO's evolving capabilities in **spacecraft rendezvous**, **docking technology**, and **in-orbit operations**. These advancements are vital for **future deep-space missions**, **crew transfer systems**, and more sophisticated space activities.

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#### India's First Fast-Breeder Nuclear Reactor Set for Commissioning by 2026

**Context:** India is set to mark a significant milestone in its nuclear journey with the upcoming commissioning of its **first Prototype Fast Breeder Reactor (PFBR)** at **Kalpakkam, Tamil Nadu**, expected by **2025–26**.

#### What is a Fast Breeder Reactor?

A **Fast Breeder Reactor (FBR)** is a type of nuclear reactor that:

- Generates more fuel than it consumes, using plutonium-239 (Pu-239) and uranium-238 (U-238).
- Aims to maximize energy extraction and fuel efficiency.
- Uses liquid sodium as a coolant and plutonium-based Mixed Oxide (MOX) fuel.

#### Prototype Fast Breeder Reactor (PFBR) – Key Highlights:

Feature		Details	
Developed by		Bharatiya Nabhikiya Vidyut Nigam Ltd. (BHAVINI)	
Location		Kalpakkam, Tamil Nad <mark>u</mark>	
Capacity		500 MW	~
Commission <mark>ing T</mark>	<mark>'ime</mark> line	2025-26	C7
Fuel Used		Plutonium-based MOX fuel	SU
Coolant		Liquid sodium	TS
Nuclear Program	Stage	Second stage of India's 3-stage nuclear strategy	

**Functions and Purpose:** 

- Recycles spent fuel from Pressurized Heavy Water Reactors (PHWRs).
- Reduces radioactive waste and enables a closed nuclear fuel cycle.
- Prepares ground for **thorium-based reactors** in the **third stage**.
- Enhances **fuel efficiency** and promotes **self-reliance in energy**.

# Why It Matters - Significance of the PFBR:

- Supports India's long-term goal of a thorium-based nuclear program.
- Enables **efficient fuel use** by generating more fuel than consumed.
- Essential for **energy security**, especially amid rising power demands.
- Aids in achieving **clean energy targets** by expanding nuclear power output.

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# India's Nuclear Power Ambitions:

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Metric	Data
Current Installed Capacity	8.18 GW
Under Construction	7.30 GW
Target by 2031–32	22.48 GW
Contribution from BHAVINI (FBRs)	3.80 GW
Additional Plans	-15.40 GW from indigenous PHWRs
	- 17.60 GW from Light Water Reactors (with foreign cooperation)
	- <b>Small Modular Reactors</b> and <b>Bharat Small Reactors</b> in partnership with the private sector

#### **Did You Know?**

- India has the world's largest reserves of thorium, making the 3-stage nuclear program uniquely suited to its resources.
- The closed fuel cycle targeted by PFBRs helps reuse spent fuel, minimizing waste and improving sustainability.

#### Conclusion & Way Forward

Despite earlier delays, the **Prototype Fast Breeder Reactor** is a **cornerstone of India's nuclear strategy**. It will:

- Propel India towards a thorium-based, self-reliant energy future.
- Establish a sustainable nuclear cycle with minimal waste.
- Reinforce India's role as a **global leader in innovative nuclear technology**.

#### Genetically Modified (GM) Edible Oils: A Path to Self-Sufficiency for India

**Context:** A **member of NITI Aayog** recently emphasized the need for India to **adopt genetically modified (GM) edible oils** to boost **self-sufficiency**, citing the **success of GM crops** in improving yields in countries like the **United States** and **China**.



#### Why Are Edible Oils Critical to India's Economy?

- India is among the **largest producers of oilseeds globally**, with key oils including **mustard**, **groundnut**, **soybean**, **sunflower**, **safflower**, and **coconut oil**.
- The country contributes about **5–6%** of **global oilseed production**.
- Major oilseed-producing states include **Rajasthan**, **Gujarat**, **Madhya Pradesh**, **Maharashtra**, and **Andhra Pradesh**.

# **Domestic Consumption vs Production:**





- India's total edible oil consumption stands at approximately 25.5 million tonnes.
- The gap between **domestic production** and **consumption** is bridged through **large-scale imports**.

# Breakdown of Consumption (Approximate):

- **Palm oil**: 37%
- Soybean oil: 20%
- Mustard oil: 14%
- Sunflower oil: 13%

# Did You Know?

- India's **per capita annual edible oil consumption** is about **24 kg**, which **doubles the limits** recommended by:
  - o Indian Council of Medical Research (ICMR): 12 kg
  - World Health Organization (WHO): 13 kg
- This marks a massive rise from just 2.9 kg in the 1950s-60s, driven by urbanization, rising incomes, and changing food preferences.

# India's Heavy Dep<mark>endence on Imports:</mark>

Currently, India imports **55–60%** of its edible oil requirements from countries like:

- Indonesia and Malaysia (Palm oil)
- Argentina and Brazil (Soybean oil)
- Ukraine and Russia (Sunflower oil)

In the **2023–<mark>24 oil m</mark>arketing year**, India imported around **15.96 million tonnes** of edible oil.

# Government Measures to Strengthen Self-Reliance:

# 1. National Mission on Edible Oils – Oil Palm (NMEO-OP):

- Goal: Expand oil palm cultivation from **3.7 lakh ha to 10 lakh ha** by **2025–26**
- Support: Financial aid for planting materials, irrigation, and inputs

# 2. National Mission on Edible Oils – Oilseeds:

• Target: Raise domestic oilseed production to **70 million tonnes** by **2030–31** 

# 3. Price Stabilization Fund:

- Objective: **Protect consumers** from volatile international prices
- Mechanism: Support state agencies in procuring and distributing oils at **subsidized prices**

# 4. Import Duty Adjustments:

- Strategy: Adjust import tariffs to control retail inflation
- 5. Promotion of Oilseed Cultivation (NFSM-Oilseeds):
  - Offers high-yielding seed varieties, technical support, and training to farmers

# 6. Public Distribution System (PDS):

Ensures subsidized edible oils reach low-income households, especially during inflationary periods

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## Why GM Edible Oils Could Be a Game-Changer:

## **1. Boosting Agricultural Productivity:**

- India's soybean yields have plateaued, whereas GM adoption has led to yield increases of **70–80%** in the **US** and **China**.
- GM crops can potentially **double India's oilseed output**, making domestic production globally competitive.

#### 2. Reducing Import Dependency:

• With **nearly 16 million tonnes** of edible oil imported annually, GM technology offers a viable path to **reducing this economic burden**.

## 3. Learning from Global Best Practices:

- Countries like the **United States** and **China** have successfully deployed GM technologies **without major reported health or environmental risks**.
- These global models provide evidence-based confidence for India to adopt GM crops in a scientifically regulated manner.

#### **Conclusion:**

India's rising **edible oil demand**, heavy **import dependency**, and stagnant **domestic productivity** underline the urgent need for **innovative solutions**.

**Genetically Modified (GM) edible oils**, if embraced with strong regulatory oversight, public awareness, and scientific rigor, could pave the way for a self-reliant and food-secure future.

# Revolutionary Breakthrough: New Technique to Estimate Helium Abundance in the Sun

**Context:** Researchers from the **Indian Institute of Astrophysics (IIA)** have pioneered a **novel method** to accurately estimate the **abundance of Helium** in the **Sun's photosphere**, overcoming a challenge that has puzzled astrophysicists for decades.

#### Why is Helium Hard to Detect?

Helium is the second most abundant element in the Sun. However, its detection in the photosphere is extremely difficult due to the absence of visible spectral lines.

Until now, scientists relied on indirect methods such as:

- Solar wind and coronal data
- Extrapolations from hotter stars
- Helioseismology (studying solar interior vibrations)

These approaches lacked precision since they did **not involve direct photospheric measurements**.

#### What's the New Method?

The IIA team developed an **innovative approach** using **indirect spectral analysis** of:

- Neutral Magnesium (Mg I) and Neutral Carbon (C I) lines
- Molecular lines of MgH, CH, and C<sub>2</sub>







This method is grounded in the idea that **Helium abundance influences Hydrogen availability**, which in turn affects the **strength and formation of molecular lines** such as CH and MgH.

By analyzing **atomic and molecular abundances** of Magnesium and Carbon at various **Helium-to-Hydrogen (He/H) ratios**, the researchers found:

**Only at a He/H ratio of ~0.1** do the data align — validating the commonly accepted solar helium abundance.

## **Quick Facts About Helium:**

- **Element Type**: **Noble gas**, chemically **inert** due to its **closed-shell electronic configuration**
- **Discovery**: Identified in **1868** by **Jules Janssen** and **Norman Lockyer** during a **solar eclipse**
- Name Origin: Derived from the Greek word 'Helios' meaning 'Sun'
- Major Global Reserves: United States, Algeria, Russia
- India's Treasure Trove: The Rajmahal Volcanic Basin in Jharkhand houses a significant helium reserve, estimated to have been trapped for billions of years

#### **Conclusion:**

This **breakthrough by Indian scientists** marks a major step forward in **solar physics**, offering a more **reliable and direct estimation** of **helium abundance** in the Sun's **photosphere**. It not only sharpens our understanding of solar composition but also enhances models of **stellar evolution**.

## 3D Microscope: A New Era in Medical Precision

**Context:** In a historic first, the **Indian Army's Department of Ophthalmology** at **Army Hospital (Research and Referral)**, New Delhi, has successfully performed **Minimally Invasive Glaucoma Surgery (MIGS)** using a cutting-edge **3D Microscope**. This marks a major leap forward in the use of advanced technology for complex eye surgeries in India.

#### Microscope: A Window to the Invisible World

#### What is a Microscope?



A **microscope** is an instrument that **magnifies tiny objects**, making them visible to the human eye by **refracting (bending) light rays** through **curved lenses**.

The most familiar type is the **optical microscope**, which uses **visible light** focused through a series of lenses to create an **enlarged image** of the specimen.

# 3D Microscope: Adding a New Dimension to Vision:

#### What is a 3D Microscope?

- A **3D Microscope** goes beyond traditional imaging by producing images with **depth information** along the **X**, **Y**, **and Z axes**.
- Unlike the flat images from conventional microscopes, **3D microscopes** use **advanced optical**, **electronic**, **or computational techniques** to capture and reconstruct **three-dimensional data**, providing a more detailed and realistic view of specimens.
- This revolutionary technology is extremely useful for studying **complex biological samples** like **soil microbes**, **aquatic organisms**, **human tissues**, and **microplastics**.

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#### **Outstanding Features of the 3D Microscope:**

- Three-Dimensional Visualization: Allows surgeons to navigate intricate structures with remarkable precision, especially during complex eye surgeries like squint correction, cataract removal, glaucoma treatment, corneal surgeries, and retinal procedures.
- State-of-the-Art Display: Equipped with a 55-inch 4K Ultra-HD screen, offering surgeons a crystalclear, enlarged view of the surgical field.
- **3D Polarization Glasses**: Surgeons wear **specialized glasses** to perceive the surgery in **true 3D**, improving **depth perception** and **accuracy**.
- **Reduced Surgical Time**: Faster procedures with **lower complication rates** compared to surgeries performed using traditional 2D microscopes.
- Lower Photo-toxicity: The system needs reduced endoilluminator power, minimizing the risk of light-induced damage to delicate eye tissues.
- Enhanced Handling of Complex Cases: Makes it easier to perform surgeries on rare and intricate medical conditions.

#### Extra Knowledge: Where Else Are 3D Microscopes Used?

- Neurosurgery: For operating on extremely delicate parts of the brain and spinal cord.
- **Oncology**: For removing tumors with high precision, minimizing damage to surrounding tissues.
- Material Science: To study microstructures of metals, semiconductors, and nanomaterials.
- **Forensic Science**: To analyze microscopic evidence with depth and clarity.

#### **Conclusion:**

The introduction of the **3D Microscope** in India's premier military hospital showcases the transformative power of **technological innovation** in **healthcare**. As surgeries become safer, faster, and more precise, **3D imaging** is set to become a cornerstone of **modern medicine**, revolutionizing how doctors see and treat the human body.

# DRDO's Major Leap: India Advances in Hypersonic Propulsion Technology

**Context:** The **Defence Research and Development Laboratory (DRDL)**, a key unit of **DRDO**, has successfully completed ground testing of an **Active-Cooled Scramjet Subscale Combustor**.

The test, conducted for over **1000 seconds**, marks a significant achievement towards developing indigenous **hypersonic weapon technology** in India.



#### **Understanding Hypersonic Propulsion Technology:**

**Hypersonic propulsion** is a cutting-edge domain focused on enabling vehicles to travel at speeds exceeding **Mach 5** (five times the speed of sound).

#### **Applications:**

- Hypersonic cruise missiles
- Advanced aerospace systems

# What is a Mach Number?





A **Mach number** represents the ratio of the object's speed to the speed of sound. For instance, Mach 5 means five times faster than the speed of sound.

#### **Key Features of Hypersonic Propulsion:**

#### **Air-Breathing Engines:**

Hypersonic vehicles employ **Scramjet Engines** (**Supersonic Combustion Ramjet**) which **breathe atmospheric oxygen** for combustion, eliminating the need to carry onboard oxidizers. This significantly enhances the **efficiency** and **range** of hypersonic vehicles.

#### Scramjet Engine: The Core of Hypersonic Flight

#### What is a Scramjet?

A **Scramjet** is a type of **air-breathing engine** designed to operate efficiently at hypersonic speeds. Unlike conventional engines, it allows **supersonic combustion** of incoming air.

#### Key Differences: Scramjet vs Ramjet

- **Ramjet**: Slows down incoming air to **subsonic speeds** before combustion.
- Scramjet: Maintains supersonic airflow throughout the combustion process, enabling much higher speeds.

#### Working Principle:

• Utilizes the vehicle's **forward motion** to compress incoming air without using any **rotating compressors**.

India is now the **fourth country** — after the **USA**, **Russia**, and **China** — to successfully demonstrate **flight testing** of a Scramjet engine.

#### **Importance of the Latest Scramjet Test:**

#### Validation of Long-Duration Supersonic Combustion:

- The successful **1000-second test** confirms the **design reliability** and **efficiency** of India's scramjet technology.
- It builds upon the earlier **120-second test** held in **January**, showcasing continuous progress.

#### Boost to India's Hypersonic Missile Program:

- Scramjet engines enable air-breathing propulsion, reducing dependency on onboard oxidizers and significantly enhancing missile range and payload capacity.
- This successful test lays the groundwork for **full-scale flight testing** of **hypersonic cruise missiles** in the near future.

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Sarhul Festival: Jharkhand's Grand Celebration of Nature and Adivasi Culture

**Context:** The **Adivasi communities** of **Jharkhand** and the **Chhotanagpur region** are set to celebrate the **Sarhul Festival** on **April 1, 2025**. This grand occasion marks the **New Year** and the much-anticipated **arrival of spring**.

#### What is Sarhul?

**Sarhul** is a **New Year festival** celebrated by the **tribal communities** of **Jharkhand** as part of the **Sarna religion**. Held in the **Hindu month of Chaitra**, it

occurs **three days after the new moon**. The festival is a vibrant **celebration of spring** and a **reverent homage to nature**.

#### Nature Worship at the Heart of Sarhul:

• The term **Sarhul** literally means **"worship of the Sal tree"**. The **Sal tree** is considered the **abode of Sama Maa**, the **village-protecting deity**. This festival, deeply rooted in **nature worship**, reflects the Adivasi's **profound connection to the environment**.

#### Symbolizing the Union of Sun and Earth:

• Sarhul symbolizes the harmonious union of the Sun and the Earth. The pahan (male priest) represents the Sun, while his wife, the pahen, symbolizes the Earth. This connection highlights the importance of sunlight and soil for sustaining life.

#### A Festival Ce<mark>lebratin</mark>g Life's Cycle:

• Sarhul marks the **renewal of life**. Only after the **rituals are completed** do Adivasis commence **agricultural activities** such as **ploughing**, **sowing**, and **forest gathering**. This tradition emphasizes the festival's **deep-rooted ties to nature and sustenance**.

#### **Diverse Traditions Among Tribes:**

• While **Sarhul** is celebrated by various tribes, including the **Oraon, Munda, Santal, Khadia, and Ho**, each group has its own **unique customs** and **names** for the festival.

#### From Hunting to Agriculture:

• Originally focused on **hunting**, the festival has **evolved over time** into an **agriculture-based celebration**, mirroring the **changing lifestyle** of Adivasis in the **Chhotanagpur region**.

#### Sarhul's Journey Across Lands:

• During the **19th and early 20th centuries**, Adivasi communities took **Sarhul** with them when they were sent as **indentured laborers**. As a result, Sarhul is now celebrated in places like **Assam's tea gardens**, the **Andaman and Nicobar Islands**, **Nepal**, **Bangladesh**, and **Bhutan**.

#### The Three-Day Celebration:

#### **Day One: Preparations**

• The festival kicks off with **decorations** at **homes and Sarna Sthals (sacred groves)**, featuring **triangular red and white Sama flags**. The **pahan** observes a **fast** and collects **ceremonial water**,

Download Our Application, while the community prepares the sacred sites and gathers Sat flowers.-----







#### **Day Two: Main Rituals**

• At the **Sarna Sthal**, villagers **offer Sal flowers** to the deity and **sacrifice a rooster** to ensure **prosperity**. The **pahan** sprinkles **holy water** while villagers perform **traditional dances** like **Jadur**, **Gena**, and **Por Jadur**. Young men participate in **ceremonial fishing** and **crab-catching**.

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#### **Day Three: Community Feast and Blessings**

• The festival concludes with a **grand community feast**, featuring **handia (rice beer)** and traditional dishes. The **pahan blesses the villagers**, marking the **end of the celebrations**.

#### **Transformation Over the Years:**

#### **Evolving Symbol of Identity:**

• In the **1960s**, **Baba Karthik Oraon**, a notable **Adivasi leader**, initiated a **procession from Hatma to Siram Toli Sarna Sthal**. Today, these **processions** have become a **central feature**, showcasing **Adivasi identity** and fostering a sense of **community pride**.

#### Debate Over Religious Identity:

• While some **tribal groups** advocate for recognizing the **Sarna religion** as **distinct from Hinduism**, others argue that **Adivasis** are inherently part of **Hindu culture**. This debate continues to shape **identity politics** in the region.

#### A Festival Honoring Nature:

#### Nature at the Center:

• Unlike other festivals that celebrate **human achievements**, **Sarhul** is dedicated to **nature**, with the **Sal tree** as its central symbol. The festival is devoid of **idols** or **temple processions**, focusing purely on the **worship of nature**.

#### **Preserving Adivasi Heritage:**

• As **urbanization** impacts **tribal traditions**, Sarhul emerges as a **cultural movement** reinforcing **Adivasi identity**. It offers a **valuable lesson** to modern celebrations—teaching us that **true festivity lies in respecting nature, not in extravagant displays**.

#### Abel Prize 2025: Celebrating Mathematical Excellence

**Context:** The **Abel Prize** is a prestigious international award recognizing groundbreaking contributions to the field of **mathematics**. Established by the **Norwegian Parliament in 2002** to mark the 200th anniversary of the birth of the brilliant Norwegian mathematician **Niels Henrik Abel (1802-1829)**, the prize has become a highly coveted honor in the mathematical community.



Often regarded as the **"Nobel Prize of Mathematics,"** the Abel Prize fills the void left by the absence of a mathematics category in the Nobel Prizes. It carries a **monetary award of 7.5 million kroner (approximately \$720,000)** and a **glass plaque** crafted by Norwegian artist **Henrik Haugan**.

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The award is managed by the **Norwegian Academy of Science and Letters** on behalf of the **Norwegian government**. Recipients are selected by a specialized committee appointed by the Academy with guidance from the **International Mathematical Union (IMU)** and the **European Mathematical Society (EMS)**.

#### Abel Prize 2025 Winner: Masaki Kashiwara

This year, the **Abel Prize** has been awarded to **Masaki Kashiwara**, a **Japanese mathematician** whose pioneering work has profoundly transformed **algebraic analysis**, **representation theory**, **and sheaf theory**.

## Kashiwara's most celebrated contributions include:

- **Development of the Theory of D-Modules:** A framework essential for understanding systems of differential equations and their solutions.
- **Discovery of Crystal Bases:** A revolutionary approach that simplifies complex algebraic calculations by replacing them with graphs of **vertices and edges**. This has become a powerful tool in **representation theory** and has led to significant advancements in understanding symmetries in mathematical structures.

His work has bridged previously unconnected areas of mathematics, creating new pathways for **future research** and contributing to solving longstanding, challenging problems.

## The Significance of Masaki Kashiwara's Work:

- **Crystal Bases and Quantum Groups:** Kashiwara's discovery of crystal bases provided a fundamental structure within the theory of **quantum groups**, which play a crucial role in both pure mathematics and theoretical physics.
- **D-Modules:** His theory of **D-modules** has applications beyond mathematics, influencing areas such as **string theory**, **algebraic geometry**, **and representation theory**.
- **Collaborations and Influence:** Kashiwara's work has inspired numerous mathematicians worldwide, contributing to a deeper understanding of **algebraic structures** and their applications.

#### Did You Know?

- **Niels Henrik Abel**, after whom the prize is named, died at the age of **26** but made monumental contributions, including proving the impossibility of solving general quintic equations by radicals.
- The Abel Prize is often compared to the **Fields Medal**, but unlike the Fields Medal, which is awarded every four years to mathematicians under the age of **40**, the Abel Prize has **no age restriction** and is awarded **annually**.

# Legacy and Future Impact:

Masaki Kashiwara's contributions continue to inspire **new research** and drive innovation in mathematics. His breakthroughs have not only resolved deep mathematical puzzles but also established tools that future generations of mathematicians will build upon.

The **Abel Prize 2025** stands as a testament to Kashiwara's brilliance, dedication, and vision, solidifying his legacy as one of the foremost mathematicians of our era.

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#### **GI Tag Recognition for Warangal Chapata Chilli & Kannadippaya**

**Context:** India's **Geographical Indications (GI) registry** has expanded once again, with two culturally significant additions: Warangal Chapata Chilli from Telangana Kannadippaya tribal handicraft from Kerala.

These recognitions not only protect the uniqueness of indigenous **products** but also uplift the communities that preserve them.

## What is a Geographical Indication (GI) Tag?

A GI Tag is a form of intellectual property right that identifies a product

as originating from a specific **geographical location**, possessing qualities, reputation, or characteristics unique to that area.

#### **Key Features:**

- Exclusive Use: Only authorized users from the region can use the GI name. •
- Legal Protection: Prevents imitation and misuse of the name or product.
- **Validity**: GI registration is valid for **10 years** and is **renewable**.
- **Governed by:** 
  - **Geographical Indications of Goods (Registration and Protection) Act, 1999**  $\circ$
  - **TRIPS Agreement (WTO)**
  - **Administered by**: Department for Promotion of Industry and Internal Trade (DPIIT), Ministry 0 of Commerce and Industry

## Warangal Chapata Chilli – Telangana's Fiery Pride

**GI Fact File:** 

- GI Status: 18th GI-tagged product from Telangana
- Agricultural GI: 3rd after Banaganapalli Mango and Tandur Red Gram •

#### **Unique Features:**

- Appearance: Bright red colour, round and tomato-like shape
- Spice Profile: Less spicy, but rich in flavor and color, thanks to high capsicum oleoresin content
  - Known for anti-obesogenic, antioxidant, anti-inflammatory, and neuroprotective 0 properties
- Varieties:
  - **Single Patti** 0
  - **Double Patti** 0
  - Odalu 0

#### **Cultivation Legacy:**

- Grown for over 80 years in Nagaram (Jammikunta Mandal)
- Nadikuda village is believed to be the oldest cultivation site



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- Thrives in the **distinct red and black soils** of the region
- Its terroir (soil, water, climate) makes it irreplicable outside Warangal

A perfect example of how nature and tradition combine to create regional exclusivity

# Kannadippaya - Kerala's Tribal Mirror Mat

# **GI Fact File:**

- Kerala's First Tribal Handicraft GI Tag
- A symbol of the craftsmanship of indigenous communities of the Western Ghats

# Artisan Communities:

- Oorali, Mannan, Muthuva, Malayan, Kadar
- Ulladan, Malayarayan, Hill Pulaya
- Spread across Idukki, Thrissur, Ernakulam, and Palakkad •

# **Special Features:**

- Name Meaning: Kannadi (mirror) + Paya (mat) = Mirror Mat
- Crafted from reed bamboo (Teinostachyum wightii)
- Made using **the soft inner layers** of bamboo •
- **Functional Benefits:** 
  - Keeps warm in winter 0
  - Provides coolness in summer  $\sim$
- Cultural Heritage: Once presented as a token of honor to kings

A shining example of tribal legacy, sustainable practices, and natural materials

# Why GI Tags Matter

- Promote rural and tribal livelihoods
- Enhance market value and global branding
- Encourage cultural preservation ٠
- Enable legal protection and exclusive marketing rights •

With over **600 GI-tagged products**, India is not just preserving heritage—it's **branding identity and** empowering communities.

Jaya Sri Maha Bodhi Tree: A Sacred Symbol of Enlightenment and Legacy

Context: Prime Minister Narendra Modi recently paid a visit to the sacred Jaya Sri Maha Bodhi temple in Anuradhapura, Sri Lanka — a site of immense spiritual, historical, and cultural significance.

# About the Jaya Sri Maha Bodhi Tree:

Located in Anuradhapura, Sri Lanka, the Jaya Sri Maha Bodhi is believed to be the **oldest living cultivated tree** in the world with a known planting date.

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• It is a **direct descendant** of the **original Bodhi Tree** in **Bodhgaya, India**, under which **Gautam Buddha** attained **enlightenment**.

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• The sacred **branch** was brought to Sri Lanka in the **3rd century BCE** by **Sanghamitra**, daughter of **Emperor Ashoka** and a Buddhist nun.

#### Uduvapa Poya Festival:

- Sanghamitra's arrival with the Bodhi sapling is celebrated as **Uduvapa Poya**, held annually on a **full moon night in December**.
- The festival commemorates the **spread of Buddhism** to Sri Lanka and the planting of the sacred tree.

# Anuradhapura: A Cradle of Sri Lankan Civilization

- Anuradhapura was the political and spiritual capital of Sri Lanka for over 1,300 years.
- Now a **UNESCO World Heritage Site**, it flourished as a hub of **Buddhist learning** and **monastic culture**.
- The city was **abandoned in 993 CE** following an **invasion by the Chola Empire** from South India.

## The Mission of Sanghamitra and Mahinda:

- **Sanghamitra** arrived in Sri Lanka at the **invitation of the king**, following the suggestion of her brother **Mahendra (Mahinda)**.
- Their journey was part of a larger mission following the 3rd Buddhist Council during Emperor Ashoka's reign, aimed at spreading Buddhism across Asia.
- Mahinda led the initial mission and met King Devanampiya Tissa in Anuradhapura, eventually converting the king and his court to Buddhism.

# The Mahabo<mark>dhi Tree</mark> in Bodhgaya, India:

- The original Bodhi Tree, under which the Buddha attained enlightenment, is believed to have been destroyed—some legends attribute this to Tishyarakshita, a queen of Ashoka.
- However, the present tree at Bodhgaya is believed to have grown from the genetic lineage of the
  original, continuing the legacy of enlightenment.

#### **Did You Know?**

- Bodhi trees (Ficus religiosa) are revered in Buddhism as symbols of wisdom, peace, and awakening.
- The Jaya Sri Maha Bodhi is so sacred that it is protected 24/7, and only designated caretakers are allowed near its trunk.
- Anuradhapura was once home to one of the **largest monastic complexes** in the world, with thousands of monks in residence.

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Ancient Jawbone Discovery Reveals Wider Reach of Mysterious Denisovans

**Context:** A **remarkable fossilized jawbone**, known as **Penghu 1**, has been recovered from the **Penghu Channel near Taiwan**, shedding new light on the **geographic spread** and **evolutionary history** of the **Denisovans** — a long-lost branch of the human family tree. This discovery, made accidentally during **commercial fishing operations**, is changing our understanding of where these ancient humans lived and how adaptable they were.



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#### Who Were the Denisovans?

The **Denisovans** are an **extinct group of archaic humans** known mostly through scarce fossil remains and groundbreaking **genetic analysis**.

#### **Origins and First Discovery:**

- First identified in **2010** from DNA extracted from a **finger bone** found in **Denisova Cave**, **Siberia**.
- Genetic studies revealed they were a **distinct lineage**, closely related to both **Neanderthals** and **modern Homo sapiens**.

#### **Physical Characteristics:**

- Based on **DNA methylation reconstruction**, Denisovans likely had:
  - A **broader skull** structure.
  - A **longer dental arch** than Neanderthals or modern humans.
- Their **robust jawbones** and **large molars** suggest powerful chewing capabilities, possibly adapted to a tough diet.

#### Significance of the Penghu 1 Discovery:

#### **Expanding Their Geographic Footprint:**

The jawbone discovery off **Taiwan's coast** extends the known range of Denisovans to **East and Southeast Asia**, reinforcing their **adaptability to diverse environments**.

Previously Known Denisovan Fossil Sites:

- Denisova Cave, Siberia (Russia): Finger bone and teeth.
- Baishiya Karst Cave, Tibetan Plateau (China): Jawbone and rib fragment.
- **Cobra Cave, Laos**: A molar (likely Denisovan based on morphology).
- **Penghu Channel, Taiwan**: Newly found Penghu 1 jawbone.

This wide distribution shows Denisovans thrived from **icy highlands** to **subtropical coastal zones** — a level of ecological flexibility once underestimated.

#### **Challenges in Dating the Fossil:**

- The exact age of Penghu 1 remains undetermined due to the lack of traditional stratigraphic context.
- Estimated to be between 10,000 and 190,000 years old, based on nearby animal fossils.

#### Lasting Genetic Legacy:

Denisovans **interbred** with both **Neanderthals** and **early Homo sapiens**, contributing **genetic material** still present in modern human populations, especially in **Asia and Oceania**.

#### Modern-Day Impacts of Denisovan DNA:

- High-altitude **adaptation genes** in **Tibetans** trace back to Denisovans.
- Traits related to the **immune system** and **skin pigmentation** also show Denisovan influence.

#### Looking Ahead: Unlocking More Secrets:

#### New Frontiers in Research:

The Penghu 1 discovery underscores the importance of investigating **submerged landscapes**—once accessible during Ice Ages when sea levels were lower.

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#### Future breakthroughs may come from:

• **Paleoproteomics**: Studying **ancient proteins** in fossils to identify species and relationships when DNA isn't preserved.

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• **Underwater archaeology**: Exploring **submerged land bridges** and **coastal shelves** that may have supported early human populations.

#### **Recognition in the Field:**

In **2022**, Swedish geneticist **Svante Pääbo** was awarded the **Nobel Prize in Physiology or Medicine** for pioneering work on the **genomes of extinct hominins**, including **Denisovans**. His research has been foundational in understanding how ancient DNA informs **human evolution**.

#### **Did You Know?**

- Modern humans carry up to **5% Denisovan DNA** in some **Melanesian and Aboriginal Australian populations**.
- Denisovan remains are **so rare**, most knowledge about them comes from **genomics**, not traditional fossil records.
- The **Denisovan genome** was the first of an extinct human group to be sequenced with such high quality.

**Conlusion**: The discovery of the **Penghu 1 jawbone** doesn't just expand the **map of Denisovan existence** it deepens the mystery and wonder surrounding these **ancient relatives** of ours. As science advances, we may find even more clues buried in the **earth—or under the sea**.

#### **Thangjing Hill: Sacred Summit Amidst Strife**

**Context:** Tensions have escalated in **Manipur** as a **Meitei organization** strongly criticized **Kuki civil society groups** for allegedly threatening Meitei pilgrims against undertaking their **annual religious journey** to **Thangjing Hill**. This age-old pilgrimage, steeped in cultural and spiritual reverence, now finds itself entangled in the region's ongoing **ethnic unrest**.



#### **Geographical Setting of Thangjing Hill:**

**Thangjing Hill** is situated in the **buffer zone** that lies between the **Churachandpur** and **Bishnupur** districts of Manipur.

It rests on a **north-south aligned mountain range**—known locally as the **Thangjing Range** or **Thangjing Hills**—which also serves as a **natural boundary** on the **western edge of the Imphal Valley**.

#### Legal and Environmental Status:

- The hill range is part of the **Churachandpur-Protected Forest**, declared as such in **1966** under **Section 29** of the **Indian Forest Act**, **1927**.
- Additionally, Thangjing Hill has been recognized as a protected historical site under Section 4 of the Manipur Ancient and Historical Monuments and Archaeological Sites and Remains Act, 1976.

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#### **Religious and Cultural Importance:**

# To the Meitei Community:

Thangjing Hill holds deep spiritual significance for the **Meitei people**, as it is home to the revered **Ibudhou Thangjing Temple**.

It is believed to be the **original abode of Lord Thangjing**, a prominent **ancestral deity** in the **Meitei pantheon** and one of the **four guardian deities of Manipur**.

# To the Kuki Community:

Kuki communities, who refer to the area as **"Thangting"**, also consider the hill range to be a **culturally important site**. While the hill is not part of their mainstream religious canon, it lies within **territories inhabited by Kuki tribes**, making it symbolically and politically significant.

# **Current Dispute: Sacred Ground or Political Battleground?**

Since the outbreak of **ethnic clashes in 2023**, **claims over access and rights to worship** at Thangjing Hill have become **highly contentious**.

What was once a **shared or overlapping spiritual space** is now a **flashpoint of ethnic assertion**, where the **right to pilgrimage** is being challenged by issues of **territoriality and identity**.

- The Meitei community insists on **uninterrupted access** to the hill for religious purposes.
- Kuki groups, citing security concerns and alleged land claims, have opposed such movements, deepening the divide.

#### A Shared He<mark>ritage at</mark> Risk:

- The current conflict risks eroding centuries of **cultural coexistence**, as both communities stake symbolic and emotional claims over **Thangjing Hill**.
- Experts stress that **dialogue**, **trust-building**, and **cultural preservation efforts** are crucial to avoid the hill becoming a symbol of division rather than unity.

# **Conclusion: Can Sacred Spaces Heal Divided Communities**

**Thangjing Hill**, once a serene symbol of **spirituality**, now stands as a poignant reminder of Manipur's **ethnic fragility**. With its **legal**, **ecological**, **and religious importance**, the hill demands **inclusive stewardship**— not just by the communities who revere it, but also by **state authorities**, **historians**, and **peace advocates** working toward reconciliation in the region.

# **Exploring the Ancient Maritime Legacy: Dwarka & Beyt Dwarka**

**Context:** The **Archaeological Survey of India (ASI)** has initiated an in-depth **scientific study** to explore the submerged archaeological remains at **Dwarka** and **Beyt Dwarka** in **Gujarat**, aiming to uncover the secrets of an ancient maritime civilization.

# Dwarka: The Ancient Port City of Lord Krishna

**Dwarka**, located at the mouth of the **Gulf of Kutch**, holds immense **religious** and **historical** significance. Revered as one of the **Char** 



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**Dham pilgrimage sites**, this city is traditionally believed to be the place where **Lord Krishna** settled after departing from **Mathura**.

**ASI's findings since 1963** have revealed submerged structures, **stone jetties**, **anchors**, and **fortified walls**, all pointing to the existence of a prosperous **ancient port city**. Some key highlights include:

- **Dwarkadhish Temple (Jagat Mandir)**: A major **Krishna Bhakti shrine** rebuilt in the **16th century** after being destroyed by **Mahmud Begada**.
- Sharada Peeth: The western matha (monastery) established by the great philosopher Adi Shankaracharya.

As per legend, **Krishna** is said to have reclaimed land from the sea to establish **Dwarka**, making it the first capital of **Gujarat**.

#### Beyt Dwarka: The Sacred Island of the Mahabharata

**Beyt Dwarka**, also known as **Shankhodhar**, is an **island** located **30 km off the coast** of **Okha port** in Gujarat. This island is identified in the **Mahabharata** as **Antardvipa**, a place of great **mythological significance**.

**Archaeological excavations** on the island have traced human habitation back to both the **Harappan** and **Mauryan** periods, indicating its long-standing importance as a center of trade and culture. Some fascinating facts about Beyt Dwarka include:

- Guru Vallabhacharya Temple: A temple dedicated to Guru Vallabhacharya, associated with the island.
- **Historical Significance**: The area was once under the rule of the **Gaekwads of Baroda** and was briefly seized during the **1857 rebellion** by the **Vaghers**.

#### Modern Dev<mark>elopmen</mark>ts: Connecting Dwarka to the World

In 2024, the **Sudarshan Setu**, India's longest **cable-stayed bridge**, was inaugurated, significantly improving access to **Beyt Dwarka** and enhancing **tourism** and **research opportunities** for this historical island.

#### **Conclusion: Unveiling the Past, Connecting the Future**

The ongoing **archaeological explorations** at **Dwarka** and **Beyt Dwarka** are revealing fascinating insights into the region's **ancient maritime history**. These findings not only shed light on the past but also help preserve the rich **cultural heritage** of Gujarat for future generations.

#### Mahadev Koli Tribe: Guardians of Tradition and Nature

**Context:** A **recent study** has shed light on the **Mahadev Koli tribe's** deeprooted **ecological and medicinal wisdom**, emphasizing its potential to **enhance global climate resilience**. Their intimate connection with nature, passed down through generations, could play a key role in shaping sustainable environmental practices worldwide.



#### Who are the Mahadev Koli?

The **Mahadev Koli** (also spelled **Mahadeo Koli**) are a **sub-group of the Koli community**, predominantly residing in the **Maharashtra** and **Goa** states of **India**.

- The tribe derives its name from **Lord Mahadev (Shiva)**, their revered deity.
- They primarily inhabit the **Mahadev hills** and are found in districts such as **Pune, Nashik, and Ahmednagar**.

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Officially recognized as a **Scheduled Tribe (ST)** under the Indian Constitution, they are entitled to various social and economic benefits.

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#### Language & Culture:

- The Mahadev Kolis speak Marathi, using the Devanagari script for reading and writing.
- The community is structured into **24 exogamous clans**, each using the **clan name as a surname**.
- Their cultural identity is deeply rooted in **Hindu traditions**, and each clan worships its **own deity**.
- Major community celebrations include Shivratri, Gudi Padwa, and local harvest festivals.

# Lifestyle & Occupation:

## **Traditional Diet:**

#### Their staple foods include:

• Rice, Nagli (Ragi), Varai (Barnyard millet), and Wheat – all rich in nutrition and suited to their agrarian lifestyle.

## **Occupational Practices:**

- Primarily engaged in **agriculture**.
- Supplemented by **cattle rearing**, **dairy and poultry farming**, and **wage labor**.
- Many have adapted to **modern livelihoods** while maintaining their connection to the land.

## Medicinal and Ecological Expertise:

One of the **unique strengths** of the Mahadev Koli tribe lies in their **traditional medicinal knowledge**:

- They utilize over 50 native tree species for healing practices.
- Their understanding of local flora and fauna is not just cultural but scientifically valuable, especially in biodiversity conservation and climate resilience efforts.
- Practices like **soil preservation**, **water conservation**, and **organic farming** are ingrained in their lifestyle.

# Historical Legacy: The Braveheart of Sinhagad

The **legendary warrior Tanaji Malusare**, a **trusted general of Chhatrapati Shivaji Maharaj**, hailed from the Mahadev Koli community.

- His heroic role in the **Battle of Sinhagad (1670)** is a symbol of **valor and sacrifice**, immortalized in folklore and modern cinema.
- He remains a **cultural icon** for the community and Maharashtra at large.

# Additional Facts & Insights:

- The Mahadev Kolis are considered **ecological stewards**, often participating in **forest protection committees** in Maharashtra.
- The **Government of Maharashtra** runs welfare schemes and educational programs targeted at the **upliftment** of ST communities like the Mahadev Koli.

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- They play an active role in **local governance**, especially through **Gram Sabhas** in tribal areas.
- Folk arts, such as Lezim and Koli dances, reflect their rich oral tradition and storytelling.

# The Road Ahead:

To preserve and promote the **Mahadev Koli heritage**, it's important to:

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- Document their traditional knowledge and integrate it with modern science.
- Ensure better access to education, healthcare, and employment opportunities.
- Involve tribal communities in **climate action plans** and **biodiversity conservation policies**.

The Mahadev Koli tribe stands as a vibrant example of how tradition, culture, and ecological harmony can coexist. Empowering such communities not only honors India's rich tribal heritage but also contributes to a more sustainable and inclusive future.

# Bhagavad Gita & Natyashastra Join UNESCO's Memory of the World Register

**Context:** In a proud moment for India, the **manuscripts of the Bhagavad Gita and Bharata's Natyashastra** have been officially included in **UNESCO's Memory of the World Register**, among **74 new entries**. **Prime Minister Narendra Modi** celebrated the recognition, emphasizing how these ancient texts have **deeply shaped civilizations** and continue to **inspire humanity across the globe**.



UNESCO's Memory of the World Programme: Safeguarding Humanity's Collective Memory

Launched in **1992**, the **Memory of the World (MoW) Programme** is UNESCO's global initiative to **preserve** and promote documentary heritage of international significance.

## **Objective & Vision:**

- Prevent the loss of invaluable records and **collective amnesia**.
- Ensure long-term access to documents that represent the cultural identity, memory, and history
  of peoples worldwide.
- Promote **global accessibility** and **preservation of rare manuscripts**, oral traditions, and archival collections.

# About the Register:

- A **biennially updated list** featuring **documents, manuscripts, audio-visual records**, and more.
- Includes globally significant entries such as:
  - Mahavamsa (Sri Lanka's ancient chronicle)
  - Auschwitz Trial Recordings (Germany)
  - Sheikh Mujibur Rahman's Historic Speech (Bangladesh)

# India's Glorious Contributions to the MoW Register:

India has made **13 submissions**, including **two joint entries**, reflecting its **rich intellectual and spiritual legacy**.

# Notable Indian Entries:

- **Rig Veda** (2005)
- Shaiva Philosopher Abhinavagupta's Works (2023)
- Archives of the Non-Aligned Movement (NAM) Summit (2023, joint entry)
- Dutch East India Company Records (2003, joint entry)

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#### 2024 Additions:

Bhagavad Gita and Natyashastra — preserved at the Bhandarkar Oriental Research Institute, Pune — recognized for their **universal value and literary brilliance**.

## Natyashastra: Blueprint of Indian Performing Arts

#### Authorship & Era:

- Attributed to Sage Bharata.
- Estimated to have been compiled between **500 BCE to 500 CE**; UNESCO suggests **2nd century BCE** as most plausible.

#### **Scope & Structure:**

- A monumental treatise with **36,000 verses**, covering:
  - Drama (Natya) 0
  - **Performance (Abhinaya)** 0
  - Music (Sangita) 0
  - **Emotions** (Bhava) 0
  - Aesthetic experience (Rasa) 0

#### **Core Concept: Rasa Theory**

- **Rasa** means "essence" or "flavor"—the emotional impact of art on the audience.
- Bharata famously stated: "No meaning can blossom without rasa."
- Scholar **Wallace Dace** notes: Actors may imitate emotions, but the audience actually experiences them.
- According to Susan L. Schwartz, this immersive process allows viewers to enter a "parallel reality", enriching their spiritual and moral understanding.

#### **Global Impact:**

Recognized as one of the earliest aesthetic theories in the world, influencing not only Indian but also Asian and global performance traditions.

# Bhagavad Gita: A Timeless Dialogue of Dharma and Devotion

# **Philosophical Depth:**

- A **700-verse Sanskrit scripture**, part of the **Mahabharata's Bhishma Parva**.
- Traditionally ascribed to Sage Vyasa.
- Described by UNESCO as a cornerstone of India's philosophical thought, blending ideas from:
  - Vedic traditions
  - **Buddhism**  $\circ$
  - Jainism 0
  - Charvaka (materialist) philosophy 0

# **Dating and Origins:**

- Believed to be composed between the **1st-2nd century BCE**.
- Possibly transcribed much later from oral traditions.

#### The Sacred Conversation: Jownload Our Application











- Set on the battlefield of Kurukshetra, it captures a spiritual dialogue between Prince Arjuna and Lord Krishna, his charioteer and divine guide.
- Arjuna's moral crisis triggers Krishna's teachings on:
  - Dharma (duty) 0
  - Karma (action) 0
  - Bhakti (devotion) 0
  - Moksha (liberation) 0
  - Self-realization and detachment 0

#### **Universal Relevance:**

- The Gita has inspired philosophers, leaders, and reformers including Mahatma Gandhi, Aldous Huxley, and Carl Jung.
- Its message continues to serve as a **spiritual compass** for people around the world.

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#### The Majestic Amur Tiger: Guardians of the Snowy Forests

**Context:** The **Amur Tiger** (*Panthera tigris altaica*), also known as the **Siberian Tiger**, is a symbol of strength and resilience, roaming the icy landscapes of eastern Russia, China, and possibly North Korea. Renowned for their **immense size and stunning beauty**, these tigers are uniquely adapted to **survive in harsh, cold environments**.

**Conservation Status & Population:** 

- IUCN Red List Status: Endangered
- Estimated Population (2022): Approximately 265–486 in Russia, with a small population in China and possibly North Korea.
- Major Threats: Habitat loss, poaching, roadkill incidents, and prey depletion.

**Latest News:** A study published in *Oryx* highlights a worrying **increase in tiger roadkill incidents**, which could jeopardize their **long-term survival**.

#### Habitat & Distribution:

- Primary Habitat: Eastern Russia's birch forests.
- Other Regions: Northeastern China and possibly parts of North Korea.
- **Preferred Environment: Dense forests** with ample prey and minimal human disturbance.

#### Diet & Hunting Habits:

- **Diet:** Carnivorous, primarily preying on elk, wild boar, and other ungulates.
- Hunting Technique: Stealthy ambush predator, relying on strength and agility to take down large prey.
- Daily Food Requirement: Can consume up to 60 pounds of meat in one sitting.

# **Physical Characteristics & Unique Adaptations**:

- Size: Up to 10.75 feet in length.
- Weight: Can reach 660 pounds, making them the largest tiger subspecies.
- Lifespan: 10-15 years in the wild, up to 20 years in captivity.

#### **Special Adaptations:**

- Thick Fur: Protects against freezing temperatures.
- Large Size: Provides strength to take down powerful prey.
- Lighter Coat Color: Helps in camouflaging within snowy landscapes.
- Fat Layer: Provides insulation against the cold.

#### Fascinating Facts About Amur Tigers:

- Largest Wild Cat: The Amur Tiger is the largest of all tiger subspecies.
- **Territorial Giants:** Male Amur tigers can have territories spanning **up to 4,000 square miles**.
- **Exceptional Swimmers:** Despite their cold habitat, Amur tigers are **strong swimmers** and can cross rivers to expand their territory.

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• Cultural Significance: Revered in Russian and Chinese folklore as a symbol of power and bravery.

# **Conservation Efforts & Challenges**:

Despite successful conservation efforts in recent years, including **anti-poaching measures** and **habitat restoration**, **Amur Tigers** continue to face severe threats. The **rise in roadkill incidents**, as noted in the latest studies, calls for **urgent interventions** to ensure their **survival and recovery**.

**Did you know?** Amur tigers have a more robust and muscular build compared to other tigers, allowing them to tackle larger prey in snowy and rugged terrain.

The battle to save these **magnificent creatures** is ongoing, and efforts must continue to preserve their place in the **wild world**.

# The Chicken's Neck Corridor: India's Strategic Lifeline

**Context:** The **Chicken's Neck Corridor**, also known as the **Siliguri Corridor**, is a **narrow and vulnerable strip of land** located in the **northern part of West Bengal**, connecting **mainland India** to its **northeastern states**. Despite its slender size, the corridor holds **immense strategic and geopolitical importance** for India.

Geography & Location:

- Location: Northern West Bengal, India.
- Width: Approximately 22 kilometers at its narrowest point.
- Bordering Nations:
  - **Nepal** to the **west**.
  - **Bhutan** to the **north**.
  - Bangladesh to the south.
- **Connectivity:** Links India's Northeastern Region (NER), comprising eight states:
  - Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura, to the rest of India.

# Significance of the Siliguri Corridor:

The **Chicken's Neck Corridor** is often referred to as **India's Achilles' heel** due to its **geopolitical sensitivity and strategic value**.

Why It's So Important:

- **Critical for Connectivity:** Acts as the **sole land link** between **mainland India** and its **Northeast**.
- Military Movement: Essential for the deployment of troops, supplies, and defense equipment to the northeast, especially in the event of conflict.
- Economic Lifeline: Facilitates the movement of goods and essential supplies between the Northeast and the rest of India.

**Proximity to China:** 

• Located near the India-China border, particularly the Chumbi Valley in Tibet.

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SILIGURI







• China has built significant military infrastructure in the region, raising concerns about the corridor's security and accessibility.

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• In case of conflict, **China could potentially cut off India's access to its northeastern states** by targeting this corridor.

#### Latest Developments & News:

Recently, **Bangladesh has invited China** to **invest in a river conservation project** near the **Chicken's Neck Corridor**. This development raises **geopolitical concerns** for India due to the **involvement of China** in an area so **close to its sensitive border region**.

**Historical Context & Challenges:** 

- **Partition of 1947:** The creation of **East Pakistan (now Bangladesh)** left the **Siliguri Corridor** as India's **only land bridge** to the northeast.
- **Geographical Vulnerability:** Its **narrow width** makes it highly **susceptible to blockades or disruption**, whether by natural calamities or external threats.
- **Infrastructure Challenges:** Ensuring **uninterrupted connectivity** through the corridor requires **constant monitoring and development** of **roads**, **railways**, **and communication networks**.

Additional Facts & Knowledge:

- Alternative Connectivity: India has been actively working on the Kaladan Multi-Modal Transit Transport Project and the Agartala-Akhaura rail link to improve connectivity with the Northeast via Bangladesh.
- New Rail Links: Indian Railways is developing broad-gauge rail connectivity to the Northeast through the corridor to strengthen supply lines.
- Strategic Concerns: Any blockade or disruption could severely impact India's national security and economic stability.
- **Economic Growth Potential:** Enhanced connectivity through the corridor is crucial for **boosting trade and development** in the **Northeastern Region**.

The **Chicken's Neck Corridor** remains a **strategic chokepoint** for India. With the **involvement of China in projects nearby**, the **importance of securing and developing the corridor** has become more crucial than ever.

# Place in News: Gas Pipeline Burst in Malaysia

**Context:** A **gas pipeline explosion** in **Putra Heights, central Selangor state, Malaysia** has left **several individuals injured**. The incident highlights the **infrastructure vulnerabilities** in one of Malaysia's rapidly developing regions.

#### **Political Features of Malaysia:**

# Location and Division:

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- Region: Southeast Asia, north of the Equator.
- Division: Malaysia is divided by the South China Sea into:
  - Peninsular Malaysia (West Malaysia).
  - **East Malaysia** (located on Borneo Island).



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# Land Bordering Countries:

- **Thailand** (to the north of Peninsular Malaysia).
- **Indonesia** (to the south and west of East Malaysia).
- Brunei (located entirely on the island of Borneo, sharing borders with East Malaysia).

# **Maritime Bordering Countries:**

- **Singapore** (separated by the **Strait of Johor**). •
- **Philippines** (to the northeast across the **Sulu Sea**).
- Vietnam (to the north across the South China Sea).

# **Surrounding Water Bodies:**

- Strait of Malacca (One of the world's busiest maritime trade routes).
- **Celebes Sea** (Southeast of East Malaysia, crucial for biodiversity). •
- **South China Sea** (Vital for trade, energy resources, and maritime disputes). •

# **Geographical Features of Malaysia:**

# **Highest Peak:**

Mount Kinabalu (4,095 meters / 13,435 feet), located in Sabah, East Malaysia — A popular site for mountaineering and biodiversity research.

# **Important Rivers:**

- **Rajang River:** Longest river in **Malaysia**, located in **Sarawak**, East Malaysia.
- Kinabatangan River: Renowned for wildlife diversity, situated in Sabah, East Malaysia.
- Pahang River: Longest river in Peninsular Malaysia, essential for agriculture and water resources.

# Additional Insights:

- **Biodiversity Hub:** Malaysia is part of the **Coral Triangle**, known for its **rich marine biodiversity**.
- Economic Centers: Kuala Lumpur (capital city), Putrajaya (administrative capital), and George Town (UNESCO World Heritage Site).
- **Energy Infrastructure:** Incidents like the **Putra Heights pipeline burst** raise concerns over **energy** infrastructure safety and maintenance.

# Katchatheevu Islands: Renewed Calls for Retrieval by Tamil Nadu Assembly

**Context:** The **Tamil Nadu Legislative Assembly** has **unanimously** adopted a resolution urging the Union government to retrieve Katchatheevu from Sri Lanka. The call reflects ongoing concerns over fisheries rights, historical claims, and cultural significance.

# About Katchatheevu Islands:

Location:

Katchatheevu is a 285-acre uninhabited island located in the Palk Strait between India and Sri Lanka.



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• Situated 33 km northeast of Rameswaram (India) and 62 km southwest of Jaffna (Sri Lanka).

# Strategic Importance:

- Serves as a **maritime boundary marker** between India and Sri Lanka.
- Fisheries-rich zone, crucial to Tamil Nadu's fishing economy.
- Houses **St. Anthony's Church**, a place of **religious significance for fishermen** from both nations.

# Historical Ownership of Katchatheevu:

- The island emerged due to a volcanic eruption in the 14th century.
- Initially ruled by the Jaffna Kingdom (Sri Lanka), later controlled by the Ramnad Zamindari under the Nayak dynasty of Madurai.
- During the **British colonial era**, both **British India and Sri Lanka** claimed the island.
- The dispute was resolved in Sri Lanka's favor under the 1974 Indo-Sri Lankan Maritime Boundary Agreement.

# International Maritime Boundary Line (IMBL):

- The IMBL between India and Sri Lanka was delineated in 1974 through the Indo-Sri Lankan
  Maritime Boundary Agreement.
- Established based on the United Nations Convention on the Law of the Sea (UNCLOS).
- Maritime boundaries are often defined by the equidistance principle, ensuring a medial line equidistant from both nations' coasts.
- The IMBL determines zones such as:
  - Exclusive Economic Zones (EEZs)
  - Territorial Waters
  - Other Maritime Zones
- The **1974 agreement** adjusted the **equidistant line**, placing **Katchatheevu under Sri Lanka's sovereignty**.

# **Other Maritime Disputes Involving India:**

# 1. Sir Creek Dispute (With Pakistan):

- Dispute over the **demarcation of a 96 km estuary** located in **Gujarat**.
- Remains unresolved with **contentious claims over territorial waters and maritime boundaries**.

# 2. New Moore Island Dispute (With Bangladesh):

- Known as the **South Talpatti dispute**.
- Permanently settled in **Bangladesh's favor** following a **2014 ruling by the Permanent Court of Arbitration**.

# **Conclusion:**

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The **Katchatheevu Islands issue** remains a **contentious topic**, particularly for **Tamil Nadu's fishing community**. While the **1974 agreement ceded the island to Sri Lanka**, the **Tamil Nadu government's repeated resolutions** highlight the **ongoing socio-economic and cultural concerns** associated with the island.

# The Dhansiri River: Lifeline of Northeast India

**Context:** The **Dhansiri River** serves as a crucial watercourse in the **Golaghat District of Assam** and the **Dimapur District of Nagaland**. Known for its rich biodiversity and cultural significance, this river is an essential tributary to the **Brahmaputra River**. However, recent environmental concerns have emerged, highlighting the urgent need for sustainable management.



#### **Recent Environmental Concerns:**

Environmentalists have raised alarms over alleged **hazardous effluent discharge** from **Numaligarh Refinery Limited (NRL)** into the **Dhansiri River**. Complaints submitted to the **Central Pollution Control Board (CPCB)** emphasize the potential for **severe ecological damage**, particularly affecting aquatic life, forest ecosystems, and communities reliant on the river.

#### Course and Flow of the Dhansiri River:

- **Origin:** The river originates from **Laisang Peak** in **Nagaland**, known for its lush forests and diverse wildlife.
- Initial Flow: For the first 40 km, the river flows in a northwesterly direction.
- Mid-Course: After this, it changes course to flow northeast for about 76 km until reaching Dimapur, the largest city in Nagaland.
- Later Course: Beyond Dimapur, the river adopts a generally northerly flow until it reaches Golaghat in Assam. Here, it takes a dramatic turn northwest and finally merges with the Brahmaputra River at Dhansirimukh, Assam.

#### Vital Statistics:

- Total Length: Approximately **352 km** from source to outfall.
- Catchment Area: Spans around 1,220 sq. km.
- Flora and Fauna: Flows through the Nagaland-Assam border, sheltering diverse ecosystems, including:
  - **Dhansiri Reserved Forest** (Assam): Renowned for its rare and endangered species.
  - **Intanki National Park** (Nagaland): A haven for wildlife, including elephants, tigers, and various bird species.

#### **Ecological and Cultural Significance:**

The **Dhansiri River** not only supports a variety of **flora and fauna** but also plays a pivotal role in the **livelihoods of local communities**. From agriculture to fishing, its waters are integral to the socio-economic fabric of the region.

Additionally, the river is part of the **Brahmaputra Basin**, which contributes significantly to the hydrological and agricultural landscape of **Northeast India**. Its natural corridors are essential for maintaining **biodiversity connectivity** between **Assam and Nagaland**.

# **Interesting Fact:**





The **Dhansiri River Basin** is home to several **ethnic communities** whose cultures and traditions are intricately linked to the river. Festivals and rituals celebrating the river's bounty are commonplace, underscoring its **deep cultural significance**.

#### Call for Conservation:

Amid increasing **industrialization and pollution**, the **Dhansiri River** faces unprecedented threats. Sustainable policies, stricter regulations, and **community-based conservation efforts** are essential to preserve its ecological balance for future generations.

# Greenland in the Spotlight: Arctic Sovereignty and Strategic Interests

**Context:** Greenland (**Capital: Nuuk**), the world's **largest island**, has once again found itself at the center of **geopolitical tensions**. In response to renewed interest from the **United States** regarding potential acquisition, **Denmark's Prime Minister** has firmly rejected any notion of annexation. Instead, Denmark has called for **stronger Arctic defense cooperation**, underlining the importance of respecting Greenland's **semiautonomous status** within the **Kingdom of Denmark**.

#### **Geopolitical Significance of Greenland:**

- Location: Situated in the North Atlantic Ocean, Greenland occupies a vital position in the Arctic region, acting as a bridge between North America and Europe.
- Neighbors: Its nearest neighbor is Canada's Ellesmere Island, located just 16 miles to the north, while Iceland is its closest European neighbor.



#### Natural and Strategic Resources:

- **Greenland Ice Sheet**: Covering nearly **80%** of the island, this is the **second-largest ice sheet** in the world after Antarctica. It holds about **8% of the world's fresh water**, making it a potential **future water source**.
- **Rare Earth Elements (REEs)**: Greenland is rich in **strategic minerals**, including **REEs** critical for **green technologies** like wind turbines and electric vehicles.
- **Energy Reserves**: The island is believed to have untapped reserves of **oil and natural gas**, increasing its relevance in future **energy security** debates.
- **Fisheries**: Its surrounding waters are home to **rich marine biodiversity**, supporting a vital **fishing industry** and **global seafood supply**.
- **Climate Change Hotspot**: Greenland is a key area for understanding **global warming**, with ice melt contributing significantly to **sea level rise**.

#### **Strategic and Military Importance:**

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 US Military Presence: The Thule Air Base, a critical American military installation, underscores Greenland's role in Arctic defense and missile early warning systems. Download Our Application

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• **Trans-Arctic Shipping**: As **climate change** opens up new **northern sea routes**, Greenland could become a hub for **future Arctic shipping**, significantly shortening global trade routes between **Europe and Asia**.

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#### Why Greenland Matters:

Greenland's unique blend of **strategic location**, **natural resources**, and **environmental importance** makes it a focal point in emerging **Arctic geopolitics**. As global powers shift their gaze northward, Greenland will continue to play a **pivotal role** in shaping the **future of the Arctic**.

# Diego Garcia & The Chagos Archipelago: A Strategic Outpost in the Indian Ocean

**Context:** In a significant show of force, the **United States has deployed six B-2 Spirit stealth bombers** to **Diego Garcia**, a remote but strategically vital base in the **Indian Ocean**, amidst escalating tensions with **Iran**. This move underscores the island's crucial role in **American global military reach**, particularly across **Asia**, **Africa**, **and the Middle East**.

Geography & Significance: Where Is Diego Garcia?

- Diego Garcia is the largest island in the Chagos Archipelago, located about 500 km south of the Maldives.
- It lies just **7° south of the equator**, making it an ideal launch point for long-range military operations in the **Indo-Pacific**.

# The Chagos Archipelago: A Disputed Legacy

#### Location & Composition:

The Chagos Archipelago consists of 58 small islands scattered in the central Indian Ocean.

#### **Colonial History:**

- Originally settled in the **late 18th century** by **enslaved African and Indian laborers** brought by the French for coconut plantations.
- In **1814**, under the **Treaty of Paris**, **France ceded Mauritius and Chagos** to **Britain**, initiating British colonial control.

#### **Separation from Mauritius:**

- In **1965**, the **UK separated Chagos from Mauritius**, forming the **British Indian Ocean Territory (BIOT)**.
- Mauritius received a £3 million grant in compensation.
- **Creole-speaking Chagossians**, the native islanders, were **forcibly evicted between 1967–1973** to make way for a U.S. military facility.

#### Diego Garcia: A Military Stronghold

• Leased to the U.S. in 1967, Diego Garcia became fully operational as a U.S. military base in 1986.

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• It features airstrips, naval facilities, satellite tracking, and strategic command centers.

#### Global Military Operations: Download Our Application \_\_\_\_\_





)— Chagos Islands







- Played critical roles in:
  - The Gulf War (1991)
  - Afghanistan and Iraq wars
  - Post-9/11 operations
- A vital pivot in **Indo-Pacific geopolitics**, enhancing **U.S. rapid deployment capabilities** across three continents.

# Sovereignty Dispute & Legal Developments:

- Though Mauritius gained independence in 1968, Chagos remained under British rule.
- In **2019**, the **International Court of Justice (ICJ)** ruled that the UK's continued administration of the islands was **unlawful** and that **sovereignty rightfully belongs to Mauritius**.
- In **2024**, the **UK agreed to transfer sovereignty** of the Chagos Archipelago to **Mauritius**, while retaining **control over Diego Garcia** under a **99-year lease agreement** with the U.S.

# Why Is Diego Garcia So Important?

# **Strategic Location:**

- Serves as a key node in the U.S. Indo-Pacific Command (INDOPACOM)
- Offers **deep-sea anchorage**, long-range airstrike capability, and secure communications

# Geopolitical Relevance:

- Balances Chinese influence in the Indian Ocean
- Acts as a forward base for deterrence and humanitarian operations

# Human Righ<mark>ts Conce</mark>rns:

- The forcible eviction of native Chagossians remains a controversial and unresolved issue.
- Many continue to demand the right to return and reparations, supported by UN resolutions and international human rights bodies.

# Conclusion: A Hotspot of Strategic and Political Contest

The ongoing presence of U.S. military forces on **Diego Garcia**, coupled with its **complex colonial history**, makes the Chagos Archipelago a **flashpoint of geopolitical**, **legal**, **and ethical debates**. As global powers continue to jostle in the Indo-Pacific, Diego Garcia remains a **linchpin of Western military strategy**—but also a **symbol of unresolved colonial injustice**.

# Mount Kanlaon: The Towering Fire Giant of Negros

**Context:** In a recent dramatic display of nature's power, **Mount Kanlaon**, one of the **Philippines' most active volcanoes**, erupted with a forceful **ash plume rising 4,000 meters** (approximately **2.5 miles**) into the sky. The explosion, though typical for the volcano, served as a stark reminder of its volatile nature and the constant monitoring required for the safety of surrounding communities.



# **About Mount Kanlaon:**

# Geographical and Geological Highlights:

 Mount Kanlaon is a stratovolcano situated in the north-central region of Negros Island, Philippines.
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- Towering at **2,465 meters above sea level**, it is the **highest peak on Negros** and ranks as the **42nd tallest island peak** in the world.
- As part of the **Pacific Ring of Fire**, Kanlaon is frequently active due to tectonic movements along this seismically volatile region.

# **Structure and Composition:**

- The volcano is composed of **multiple pyroclastic cones** and **craters**, showcasing a complex geological history.
- Its summit features a **broad**, **elongated northern caldera** that contains a **crater lake**, alongside a **smaller but higher southern crater** known for historical eruptions.
- Kanlaon's base spans approximately 30 km by 14 km, underlain by layers of lava flows, lahar (volcanic mudflow) deposits, airfall tephra, and pyroclastic materials.

#### **Ecological and Hydrological Importance:**

- Mount Kanlaon is a **biological hotspot**, hosting diverse **flora and fauna**, including several **endemic and endangered species**. It forms part of the **Mount Kanlaon Natural Park**, a protected area established to conserve its rich biodiversity.
- The **lush slopes** of the volcano serve as vital **headwater catchments**, feeding **major river systems** that sustain life and agriculture across Negros Island.

#### **Eruption History and Volcanic Activity:**

- **Documented eruptions date back to 1866**, most of which have been **phreatic**—steam-driven explosions resulting from water coming into contact with hot volcanic material.
- These eruptions are typically moderate in scale, producing minor ashfall in nearby areas but often
  prompting precautionary evacuations and flight warnings.

#### Extra Insights:

- Kanlaon is a favorite among trekkers and mountaineers, offering scenic trails—but hiking activities are often **suspended during volcanic unrest**.
- The volcano plays a **cultural role** in local folklore, sometimes revered as a sacred mountain by indigenous groups.

**Safety Note:** The **Philippine Institute of Volcanology and Seismology (PHIVOLCS)** closely monitors Kanlaon for signs of increased activity. Residents and visitors are advised to follow official advisories and respect the **4-kilometer permanent danger zone** around the summit.

# Lesotho: The Mountain Kingdom in the Spotlight

**Context: Lesotho**, with its capital at **Maseru**, has recently found itself at the heart of a major **international trade dispute**. The **United States** has imposed a staggering **50% tariff** on goods imported from Lesotho — the **highest tariff rate** applied to any country at present. This move has sparked concerns about the economic implications for this small but strategically significant African nation.

# **Political Overview:**

Nestled entirely within the borders of **South Africa**, **Lesotho** is a **landlocked** and **mountainous** country often referred to as **"The Mountain Kingdom"**. It maintains its sovereignty despite its geographic dependency, with a *Download Our Application* \_\_\_\_\_\_



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**constitutional monarchy** as its form of government. Lesotho is one of only **three enclaved countries** in the world — the others being **San Marino** and **Vatican City**.

#### **Geographical Highlights:**

Lesotho's unique topography is dominated by **high-altitude terrain**, with its lowest point at **1,400 meters** — the **highest "lowest point"** of any country in the world.

**Climate:** Thanks to an average elevation of **3,096 meters**, Lesotho experiences a **cooler climate** than typically expected at its latitude of **30°S**. The country's weather is influenced by **both the Indian and Atlantic Oceans**, creating significant **temperature variations** and making it one of the few sub-Saharan countries that **receives snowfall in winter**.

**Mountains:** Lesotho is home to the **Drakensberg** and **Maloti** mountain ranges, which offer breathtaking landscapes and are essential to both **biodiversity** and **local tourism**.

**Rivers:** The **Orange River**, one of **southern Africa's largest and most vital rivers**, originates in the **Lesotho Highlands**. It plays a critical role in providing water to **South Africa**, especially through the **Lesotho Highlands Water Project**, a major bi-national infrastructure initiative.

#### World Heritage Site:

Lesotho shares the **Maloti-Drakensberg Park**, a **UNESCO World Heritage Site**, with South Africa. This **transboundary protected area** includes the **Ukhahlamba Drakensberg National Park** and **Sehlabathebe National Park**. It is renowned for its **biodiversity**, **dramatic landscapes**, and **San rock art**, which dates back thousands of years.

#### Did You Know?

- Lesotho is the **only country in the world** that lies entirely above **1,000 meters in elevation**.
- The country relies heavily on the export of textiles and water, making recent tariff decisions particularly impactful.
- Its blanket-wearing culture, horseback herders, and Basotho hats (Mokorotlo) are iconic symbols
  of its rich heritage.

# India's Presidential Visit to Portugal & Slovakia: A Strategic Diplomatic Milestone

**Context:** India's recent Presidential visit to **Portugal** and **Slovakia** marks a pivotal moment in strengthening its engagement with **Europe**, reaffirming long-standing ties and opening avenues for enhanced bilateral cooperation.



# Geopolitical & Geographical Highlights:

#### Portugal: Gateway to the Atlantic

- Located on the **western edge of the Iberian Peninsula**, **Portugal** is the **westernmost country in continental Europe**.
- Bordered by **Spain** (north and east) and the **North Atlantic Ocean** (south and west).
- Administers two **autonomous regions**: the **Madeira** and **Azores** archipelagos in the Atlantic.
- Lisbon, its capital, is among Europe's oldest cities, with a rich maritime and colonial legacy.
- **Climate**: Maritime temperate—**cool and rainy in the north**, **warmer and drier in the south**.

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• The highest point is Ponta do Pico (Pico Alto) in the Azores.

# Presidential Visit to Portugal:

- This visit is **historic**, commemorating the **50th anniversary** of **India-Portugal diplomatic relations**.
- Bilateral trade currently stands at USD 1.5 billion, showing steady growth.
- Portugal was the **first European nation** to sign a **Migration and Mobility Agreement** with India, reflecting strong **people-to-people and institutional ties**.

# Slovakia: At the Crossroads of Europe:

- A landlocked country in Central Europe, strategically situated between Eastern and Western Europe.
- Borders: Poland (north), Ukraine (east), Hungary (south), Austria (west), Czech Republic (northwest).
- Dominated by the **Carpathian Mountain range**, especially the **Tatra Mountains**, a major **tourist and** ecological zone.
- Highest peak: Gerlachovský Peak, located in the High Tatras.
- Major rivers: **Danube**, **Váh**, and **Hron**—crucial for **inland navigation and hydroelectric energy**.

# Presidential <mark>Visit to</mark> Slovakia:

- Marks the **30th anniversary** of the **Indian Embassy in Bratislava**, symbolizing **three decades of diplomatic partnership**.
- India expressed deep gratitude for Slovakia's strategic support during the 2022 evacuation of Indian students from war-affected Ukraine, underlining solidarity in times of crisis.

# Strengthening Europe-India Ties:

The twin visits reinforce India's commitment to **deepening engagement** with European partners through **shared values**, **economic collaboration**, and **strategic alliances**. These diplomatic efforts showcase India's growing stature on the **global stage** and the emphasis on building a **people-centric foreign policy**.

# **Bandipur National Park**

**Context: 'Save Bandipur'** protest launched as the **Karnataka government** considers lifting the **night traffic ban**, raising concerns about wildlife safety and ecosystem disturbance.

# Location:

- Located in **Chamarajanagar and Mysuru districts** of **Karnataka**.
- Situated at the **tri-junction** of **Karnataka**, **Tamil Nadu**, and **Kerala**.

# Formation and History:











- Established as Venugopala Wildlife Park in 1931.
- Declared a Tiger Reserve under Project Tiger in 1973. •
- Upgraded to National Park status in 1974.

# **Rivers and Geography:**

- Kabini River flanks the park in the north. •
- Moyar River borders it in the south. ٠
- The **Nagu River** flows through the park.

# **Climate and Vegetation:**

- Tropical climate with distinct wet and dry seasons.
- Encompasses multiple **biomes**:
  - Dry deciduous forests
  - Moist deciduous forests 0
  - **Shrublands**  $\cap$

# Flora:

- Home to valuable **timber species**: •
  - Teak, Rosewood, Sandalwood 0
  - Indian Laurel, Indian Kino tree, Giant clumping bamboo 0

#### Fauna:

- Hosts the second-highest tiger population in India. •
- Other key species include:
  - Leopard, Dhole (wild dog), Sambar deer, Sloth bear, Chital (spotted deer), Blue Peafowl
- One of the last strongholds of the endangered Asiatic wild elephant.

**Ecological Significance:** 

- Part of the Nilgiri Biosphere Reserve, the largest protected area in Southern India. ٠
- Recognized as the largest habitat for wild elephants in South Asia.
- Shares boundaries with:
  - Nagarahole National Park (Karnataka) 0
  - Wayanad Wildlife Sanctuary (Kerala)
  - Mudumalai National Park (Tamil Nadu) 0

New Research Suggests the Splitting of the Indian Continental Plate

**Context:** Recent studies have proposed a **groundbreaking theory** suggesting that the **Indian Continental Plate** may be **splitting apart** as it interacts with the Eurasian Plate. This new insight challenges previous understanding and provides a fresh perspective on the geological processes shaping the region.



# **Understanding the Indian Continental Plate:**

The Indian Plate is a major tectonic plate that interacts with four other significant plates:

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- Eurasian Plate
- Arabian Plate
- African Plate
- Australian Plate

For over **60 million years**, the **Indian Plate** has been moving **northward**, colliding with the **Eurasian Plate**, leading to the formation of the **Himalayas** and the **Tibetan Plateau**.

# Traditional Theories on the Emergence of the Himalayas and Tibetan Plateau:

- **1. Underplating Theory:** The traditional explanation for the formation of the **Himalayas** suggests that the **denser Indian lower crust** is forced to slide beneath the **less dense Eurasian crust** as the plates converge. This **underplating** process leads to the upward thrust of material, forming mountain ranges.
- 2. Subduction Theory: In the conventional model of plate tectonics, subduction occurs when the denser plate slides beneath the less dense one. However, unlike oceanic plates, continental plates like the Indian Plate are much thicker and more buoyant, making subduction unlikely in the traditional sense.

# A New Theory: <mark>Delamination and Splitting of the India</mark>n Plate

Recent research suggests a third possibility — that the Indian Plate is undergoing a process known as delamination. In this scenario, the dense lower section of the plate may be peeling away and sinking deeper into the Earth's mantle, causing the plate to split apart as it continues its northward motion beneath the Eurasian Plate.

# What is Delamination?

• Delamination is a geological process in which a **tectonic plate's lower, denser section** detaches and sinks into the mantle, possibly leading to **tectonic shifts** and changes in the **structure of the plate** itself. This phenomenon could provide new insights into the **dynamics of plate interactions**.

# Implications of the New Theory:

• If this theory holds true, it would have significant implications for our understanding of not only the **Himalayan formation** but also the **tectonic processes** at play in the **Indian subcontinent**. It could also help explain the **seismic activity** and **earthquakes** experienced in the region, as the **Indian Plate** continues to evolve and interact with surrounding plates.

# **Conclusion: A Changing Landscape of Earth's Tectonics**

The possibility of the **Indian Plate** splitting apart introduces a new chapter in the study of **plate tectonics**. This evolving understanding promises to deepen our knowledge of the **geological forces** shaping the **Himalayas**, the **Tibetan Plateau**, and the broader **Indian subcontinent**. As further research unfolds, it could reshape how we view **continental drift**, **mountain formation**, and **plate interactions**.

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# Dal Lake: The Sparkling Jewel of Srinagar

**Context:** Recently, a **tourist shikara** tragically overturned in Srinagar's iconic **Dal Lake** as **strong winds** swept through parts of **Jammu and Kashmir**, plunging a tourist family and a boatman into the cold waters. Thankfully, rescue teams acted swiftly. This incident is a reminder of both the beauty and unpredictability of this legendary water body.

**Overview of Dal Lake:** 

• Dal Lake is a mid-altitude urban lake located in the heart of Srinagar, the summer capital of Jammu and Kashmir.



- The "Jewel in the Crown of Kashmir"
- Or "Srinagar's Jewel"
- The lake is also affectionately known as the **"Lake of Flowers"**, thanks to its blooming **lotus gardens**in summer.

#### Geography & Structure:

- Area: Spans approximately **18 sq. km**, forming part of a larger **wetland ecosystem** of **21.1 sq. km**.
- **Depth**: Has an average depth of 5 feet, with the deepest point reaching 20 feet.
- Shoreline: Measures about 15.5 km, edged by a scenic boulevard filled with:
  - Mughal-era gardens
  - Historic parks
  - Luxurious houseboats
  - Heritage hotels

# Unique Features of Dal Lake:

- **Floating Gardens**: Known as **"Raad"** in local Kashmiri, these gardens **float atop the lake's surface**, and come alive with **lotus flowers** during **July and August**.
- **Divided Basins**: The lake is separated by natural and man-made causeways into four main basins:
  - Gagribal
  - o Lokut Dal
  - o Bod Dal
  - Nagin (often considered a separate lake)
- Islands Within:
  - **Lokut Dal** houses **Rup Lank (Char Chinari)** famous for its four majestic **Chinar trees**.
  - **Bod Dal** contains **Sona Lank**, another picturesque island.

# Cultural & Tourist Hotspot:













• **Shikara Rides**: The lake is renowned for its colorful **Shikaras** – traditional wooden boats that glide across the serene waters.

April

- **Floating Markets**: Vendors sell **Kashmiri handicrafts**, **flowers**, and **fresh produce** from their Shikaras, offering tourists a unique shopping experience.
- Houseboats: Tourists can stay in ornately decorated houseboats, enjoying sunset views and Kashmiri cuisine right on the lake.

#### **Did You Know?**

- Dal Lake freezes completely during **harsh winters**, creating a surreal, icy landscape.
- The word "**Dal**" in Kashmiri actually **means "lake"**, so "Dal Lake" is technically "Lake Lake".
- The lake has been featured in countless **Bollywood movies**, making it an iconic romantic and cultural symbol.
- Environmental challenges, such as encroachments and pollution, have led to multiple conservation efforts by the Jammu and Kashmir Lakes and Waterways Development Authority (LAWDA).

# A Living Heritage:

Dal Lake is more than just a water body—it's a **living, breathing icon of Kashmir's heritage**, ecology, and tourism economy. Whether it's the **gentle ride of a Shikara**, the **blooming lotus gardens**, or the **echo of history in Mughal gardens**, Dal Lake offers a magical experience to every visitor.

# Cloudburst, Landslide, and Flash Floods: Nature's Sudden Fury

**Context: Torrential rains** in **Ramban tehsil**, Jammu and Kashmir, have led to **casualties**, **massive infrastructure damage**, and **emergency evacuations**. Authorities report that **cloudbursts**, **landslides**, and **flash floods** are the primary causes of the widespread destruction.

# What is a Cloudburst?

# **Definition:**

A **cloudburst** is a **sudden, extremely intense rainstorm**, delivering **more than 10 cm of rain in under an hour** over a small area (around 10 km<sup>2</sup>).

It is often accompanied by **thunder**, **lightning**, and sometimes **hail**.

# Common in:

- Mountainous regions, especially the Himalayas
- Hard to predict due to their localized nature

#### **Causes:**

- **Orographic Lifting**: Moist air ascends mountain slopes, cools, and condenses, causing rainfall.
- **Upward Air Currents**: These can hold raindrops longer, causing them to grow. Once the currents weaken, a **sudden downpour** occurs.
- Monsoon Dynamics: Monsoon clouds moving from the Bay of Bengal or Arabian Sea collide with the Himalayas, triggering intense rain. *Download Our Application*

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# **Examples:**

- Himachal Pradesh (2024) Cloudburst led to deadly floods
- Uttarakhand (2021) Massive rainfall, landslides, and infrastructure collapse

# What is a Landslide?

# **Definition**:

A **landslide** is the **downward movement of rock, soil, or debris** on a slope under the influence of **gravity**. It is a form of **mass wasting**.

# Causes:

- Natural Triggers: Heavy rainfall, earthquakes, and water seepage
- Human Activities: Deforestation, unregulated construction, and mining
- Geological Factors: Weak soil layers, steep terrain, and poor vegetation cover

# Landslide-Prone Areas in India:

- North East & North West Himalayas
- Western Ghats, Konkan Hills, Eastern Ghats

Total Area Prone: 0.42 million sq. km (12.6% of India's land)

# **Examples:**

- Wayanad, Kerala (2024) Significant landslide events
- Kedarnath, Uttarakhand (2013) Over 5,700 deaths due to massive landslide and floods
- Chamoli (2021) Triggered by glacier burst and heavy rainfall

# What is a Fla<mark>sh Flood</mark>?

# **Definition**:

A **flash flood** is a **sudden and intense flooding** event, occurring within **6 hours of heavy rainfall**. These floods are **short-lived**, but **extremely destructive**.

# Causes:

- Heavy Rainfall that exceeds soil absorption and overwhelms drainage
- Rapid Snowmelt or glacial lake outbursts
- Dam or Levee Breaks
- Urbanization: Impervious surfaces like concrete increase runoff

# **Examples:**

- Himachal Pradesh (2023) Intense rainfall caused sudden floods
- Uttarakhand (2013) Cloudbursts triggered flash floods and landslides
- Mumbai (2005) Over 944 mm of rain in a day caused major urban flooding

# Did You Know?

- India sees an average of **30–40 cloudburst events** annually, especially during the **monsoon**.
- Flash floods account for more than 40% of flood-related deaths globally.
- Landslides cost India millions in damages each year and displace thousands of people.

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#### **Final Thoughts:**

Understanding **natural disasters** like cloudbursts, landslides, and flash floods is crucial for **disaster preparedness and climate resilience**. As extreme weather events become more frequent due to **climate change**, both **governments and citizens** must work together to minimize the risks through **early warning systems**, **eco-sensitive planning**, and **community awareness**.

# Syria's First Wheat Shipment Marks a Step Toward Recovery

**Context:** In a pivotal moment for **Syria's food security**, the **port of Latakia** has received its **first wheat shipment** since the **departure of former President Bashar al-Assad** in **December 2024**. This development reflects Syria's ongoing efforts toward **economic stabilization and agricultural recovery** amidst a challenging post-conflict environment.

# Understanding Syria: Land of Heritage and Resilience:

#### Geographic Location:

- Situated in Southwest Asia, Syria lies along the eastern coast of the Mediterranean Sea.
- **Capital City: Damascus**, one of the **oldest continuously inhabited cities** in the world.



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#### **Bordering Nations:**

#### Syria shares its borders with:

- **Turkey** to the north
- Iraq to the east
- Jordan to the south
- Israel and Lebanon to the southwest

This strategic location has made Syria a **crossroads of civilizations**, but also a hotspot for **regional geopolitics**.

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# **Geological and Natural Features:**

#### **Mountain Ranges:**

- **Al-Anṣariyyah Mountains**: Running parallel to the coast, these peaks reach heights of **~1,562 meters**, forming a natural barrier between the **coastal plain** and the **interior plateau**.
- Other notable ranges include:
  - Mount Al-Durūz (in the south)
  - Abū Rujmayn and Bishrī Mountains (in the east-central region)

#### **Rivers and Water Bodies:**

• **Euphrates River**: Originating in **Turkey**, this is Syria's **primary water artery**, vital for agriculture and hydroelectric power. The **Euphrates Dam** forms **Lake Al-Asad**, a major **reservoir**.

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- **Orontes River**: Flows **northward**, defying typical river paths, through the **Ghāb Depression** before emptying into the Mediterranean.
- **Yarmouk River**: A key tributary that **forms part of the Syria–Jordan border**.

# Plains and Deserts:

• Syrian Desert (Al-Bādiyah): A vast expanse of rocky and gravelly terrain, it covers much of southeastern Syria. Despite its arid nature, it has served as a corridor for ancient trade and pastoral nomadism.

# Lakes:

- Al-Jabbūl Lake: Syria's largest seasonal salt lake, important for migratory birds and salt extraction.
- Other significant lakes:
  - Lake Qattinah (man-made)
  - Lake Muzayrīb
  - o Lake Khātūniyyah near the northeast

# **Did You Know?**

- Syria is home to **ancient cities** like **Palmyra**, a UNESCO World Heritage Site.
- The **Orontes River** is one of the few rivers in the Middle East that **flows north** instead of south.
- Agriculture once accounted for more than 25% of Syria's GDP before the civil conflict.

# The Road Ah<mark>ead:</mark>

The arrival of wheat at Latakia Port is more than a shipment—it's a symbol of hope and revival. As Syria aims to rebuild its economy, ensuring food sovereignty, restoring agricultural infrastructure, and revitalizing rural livelihoods will be central to its recovery.

#### FOGETHER WE SCALE HEIGHTS

# Brazil Hosts the 15th BRICS Agriculture Ministers' Meeting

# **Context: A Hub for Agriculture and Global Cooperation**

- **Brazil** is not only the **largest country in South America** but also the **fifth largest nation** in the world, holding a strategic position in global affairs.
- Capital City: Brasília
  - A planned city known for its modernist architecture and futuristic layout.
- Geographical Position:
  - Brazil spans both the Equator and the Tropic of Capricorn, resulting in a diverse climate, ranging from humid tropical to subtropical zones.
  - The country is bordered by every South American country except **Chile** and **Ecuador**, making it a central player on the continent.











- The Amazon:
  - Home to the **world's largest river system** and the **largest remaining virgin rainforest**, the **Amazon River** and its basin are crucial for global biodiversity and carbon regulation.

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- The Amazon rainforest is often called the **"lungs of the Earth"** for its vital role in absorbing carbon dioxide and producing oxygen.
- Economic Power:
  - Brazil is the world's **leading producer of niobium**, a rare metal essential for high-tech industries, and the **second-largest producer of iron ore**, **manganese**, **tantalite**, and **bauxite**.
  - $\circ~$  These resources are pivotal for the global supply chain, particularly in technology and construction.
- Climate Diversity:
  - Despite its predominantly tropical and subtropical climate, Brazil has a **drier region** in the **Northeast**, making the country a case study in climatic variation.
- Agriculture Focus:
  - The **BRICS Agriculture Ministers' Meeting** (hosted in Brazil) serves as a key event for discussing global food security, sustainable farming practices, and international agricultural collaboration.

#### Brazil: A Land of Abundance and Influence

- As a powerhouse in both natural resources and agriculture, Brazil plays a crucial role in shaping global markets and environmental policies.
- The **BRICS nations** (Brazil, Russia, India, China, South Africa) continuously engage in fostering mutual growth and addressing challenges like climate change, agricultural productivity, and food security.

Brazil's remarkable geographic and economic advantages make it an essential player on the world stage, and meetings like the BRICS Agriculture Ministers' event highlight its importance in shaping the future of global agriculture and sustainability.

# **UNESCO Expands Global Geoparks Network with 16 New Sites**

**Context:** In a milestone celebration of the **10th Anniversary of UNESCO Global Geoparks (UGGPs), 16 new sites** across **11 countries** have been designated as part of the **Global Geoparks Network (GGN)**, a non-profit international association founded under **UNESCO**. These newly added sites hold immense geological significance and demonstrate a commitment to sustainable development, education, and preservation of Earth's natural heritage.



# Key Features of UNESCO Global Geoparks:

• **Global Geoparks Network (GGN)**: GGN is an international network that establishes ethical standards for **Global Geoparks**, which must be followed to maintain membership.

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- UGGPs (UNESCO Global Geoparks): UGGPs are geographical areas of international geological significance. These parks are managed holistically to integrate protection, education, and sustainable development.
  - **Management**: Each park is managed by an entity with **legal recognition** under national laws.

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- **Reassessment**: The **UGGP status** is not permanent, and parks are reassessed every **four years** to ensure they meet the required standards.
- **Membership**: **Networking** within the GGN is mandatory for all UNESCO Global Geoparks.
- **Current Statistics**: As of now, there are **229 UNESCO Global Geoparks** across **50 countries**. Interestingly, **India** does not currently have any UNESCO Global Geoparks.

# **Prominent New Geoparks Added:**

- 1. **Kanbula (China)**: Situated on the edge of the **Qinghai-Tibet Plateau**, Kanbula is home to the ancient **Maixiu volcanoes** and the **Yellow River**, showcasing well-preserved geological formations.
- 2. **Mt Paektu (North Korea):** Famous for its role in the **Millennium Eruption** around **1000 CE**, this area is a significant volcanic site with both historical and geological importance.
- 3. North Riyadh (Saudi Arabia): The Obaitharan Valley (Wadi Obaitharan), nestled at the base of the Tuwaiq Mountain, is a lush region critical to the local water supply and home to ancient coral reef systems.

# The Vision B<mark>ehind UN</mark>ESCO Global Geoparks:

The UNESCO Global Geoparks initiative was introduced in 2015 as part of the International Geosciences and Geoparks Programme (IGGP). Its primary goal is to promote geological conservation, enhance community engagement, and stimulate sustainable tourism.

These new additions strengthen the network's global presence, underscoring the importance of preserving the Earth's geological heritage for future generations.

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# Costa Rica in News: Poás Volcano Erupts in Central America

**Context: Costa Rica**, with its capital at **San José**, has recently made headlines due to the **eruption of Poás Volcano** — one of its most iconic geological features. Known for its rich biodiversity and progressive environmental policies, Costa Rica stands out as a jewel in **Central America**.

# **Location & Borders**

- **Region:** Central America
- Neighboring Nations:
  - Nicaragua to the north
  - **Panama** to the **southeast**
- Coastlines:





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- **Caribbean Sea** to the **east**
- Pacific Ocean to the west  $\cap$

# **Natural Landscape & Geological Marvels**

# **Mountain Ranges**

- Cordillera Volcánica: A major volcanic range running through central Costa Rica.
- Cordillera de Talamanca: Located along the Costa Rica-Panama border, this range is recognized as a **UNESCO World Heritage Site** for its **unique ecosystems** and **high endemism**.

# **Active Volcanoes**

- **Poás Volcano**: Recently erupted; known for its **large acidic crater lake** and **frequent gas emissions**.
- **Irazú Volcano**: The highest active volcano in Costa Rica, last erupted in 1994.
- **Arenal Volcano**: Famous for its **perfect cone shape** and **tourism appeal**, although now in a resting phase since 2010.

# Extra Insight: Costa Rica's Environmental Ethos

- **Over 25%** of Costa Rica's land is protected through **national parks and reserves**.
- It runs **almost entirely on renewable energy**, primarily hydro, wind, and geothermal sources.
- The country is often dubbed the "Switzerland of Central America" for its peaceful policies and lack of a standing army since 1948.

# Did You Know?

- **Poás Volcano** is one of the **most accessible active volcanoes** in the world and is a key feature in Poás Volcano National Park.
- Costa Rica is part of the **Pacific Ring of Fire**, explaining its **volcanic activity and seismic risk**.

# 6.2 Magnitude Earthquake Strikes Istanbul - Epicenter in Sea of Marmara

**Context:** A **powerful earthquake** measuring **6.2 on the Richter scale** recently struck Istanbul, with its epicenter located in the Sea of **Marmara**. The tremors were felt widely across the city, sparking concerns over future seismic threats in this geologically active zone.

# About the Sea of Marmara:

The Sea of Marmara is a small inland sea situated entirely within Turkey, acting as a natural divider between the European and Asian **parts** of the country.

# **Key Facts:**

- Area: Approximately 11,350 sq.km
- Length: About 280 km



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• Widest Point: Up to 80 km

# It forms a vital link between seas:

- Northeast: Connected to the Black Sea via the Bosphorus Strait
- Southwest: Linked to the Aegean Sea through the Dardanelles Strait

As a result, the Sea of Marmara acts as a **transitional zone** between the **Black Sea** and the **Mediterranean Sea**.

# **Unique Salinity and Water Layers:**

Due to the inflow of **cold**, **fresh water** from the **Black Sea** and **warm**, **salty water** from the **Mediterranean**, the sea displays a **layered water structure**:

- Surface: Fresher water
- Bottom: Much saltier water

# Climate and Conditions:

The region enjoys a **humid subtropical climate**, characterized by:

- Hot summers
- Cold, wet winters

This climate supports rich biodiversity and dense human settlements along its coasts.

# Tectonic Activity and Earthquake Risk:

Beneath the Sea of Marmara runs the North Anatolian Fault, a major seismic fault line responsible for multiple devastating earthquakes in Turkish history — making this region highly seismically active.

# Major Island<mark>s in the</mark> Sea:

Some of the **notable islands** include:

- Marmara Island Turkey's second-largest island, rich in marble
- Prince Islands
- Avşa, Imrali, Ekinlik, and Paşalimani Islands

# **Key Coastal Cities:**

Several major cities lie along the **Sea of Marmara**, including:

- Istanbul
- Izmit
- Balikesir
- Yalova
- Tekirdag
- Bursa
- Çanakkale

These urban areas are both culturally significant and economically vital, making earthquake preparedness even more crucial.

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# **Conclusion:**





This recent **earthquake in the Sea of Marmara** serves as a **stark reminder** of the region's **seismic vulnerability**. As urban development continues along its shores, there is a growing need for **resilient infrastructure** and **disaster preparedness** to safeguard both **lives** and **livelihoods**.

# **Continental Shelf: Gateway to Oceanic Wealth**

**Context:** India has **expanded its claim** in the **Central Arabian Sea** by nearly **10,000 sq. km** as part of its **Extended Continental Shelf** initiative. Significantly, India also **modified an earlier claim** to sidestep a **longstanding maritime boundary dispute** with **Pakistan**, reflecting strategic foresight in international maritime law.



#### **Understanding the Continental Shelf:**

#### What is a Continental Shelf?

The **Continental Shelf** is the **submerged extension** of a coastal country's landmass, lying under relatively **shallow ocean waters**. It stretches from the **shoreline** to a point known as the **shelf break**, after which the sea floor slopes steeply down into the **continental slope** and eventually to the **deep ocean basin**.

Importantly, a **continent's true geological boundary** lies not at its coastline, but at the **edge of the continental shelf**.

#### How are Continental Shelves Formed?

- Inorganic materials, carried by rivers as sediments (rock, soil, gravel), gradually accumulate at the ocean's edge.
- **Organic materials** such as the remains of marine plants and animals also settle, enriching the sediments.
- This process spans **millions of years**, leading to the creation of broad, fertile shelves.

#### Key Characteristics:

- Average Width: About 65 km (40 miles), but can vary greatly.
- Average Depth: Around 60 meters (200 feet) underwater.
- **Sunlight Penetration**: Allows for rich ecosystems, including **microscopic shrimp**, **seaweed forests** (like **kelp**), and **vibrant marine life**.
- Nutrient Flow: Ocean currents and river runoff bring nutrients, making shelves ideal for marine biodiversity.
- Surface Coverage: Continental shelves make up less than 10% of the total oceanic area.

In certain regions, **deep underwater canyons** and **submarine channels** slice through the shelves, forming **unexplored and mysterious zones**.

#### The Concept of the Extended Continental Shelf (ECS):

#### **Legal Framework:**

Under the **United Nations Convention on the Law of the Sea (UNCLOS)**, coastal nations enjoy **exclusive rights** over the continental shelf up to **200 nautical miles** from their baseline, known as the **Exclusive Economic Zone (EEZ)**.

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However, nations can claim an even **greater maritime area** if they can **scientifically prove** that their continental shelf **geologically continues** beyond 200 nautical miles. This claim must be presented to the **Commission on the Limits of the Continental Shelf (CLCS)**, a special UN body.

#### Why Extend the Continental Shelf?

- **Resource Access**: Countries gain sovereign rights to **explore and exploit** the **seabed and subsoil** for **minerals**, **polymetallic nodules**, **oil reserves**, and **gas hydrates**.
- Strategic Control: Securing an extended shelf strengthens national security and economic influence.
- **Environmental Stewardship**: Nations are also responsible for **protecting the marine environment** within their ECS.

#### **Conclusion:**

The **Continental Shelf** is more than just a geological formation; it is a **strategic and economic asset**. As nations like **India** move to secure their rightful claims, the **race for underwater resources** intensifies. Understanding the science and law behind continental shelves is essential to appreciating their **growing importance** in global affairs.



# **Context:** A "breathing" cap of magma has been discovered inside the Yellowstone supervolcano, according to a new study.

This discove<mark>ry could</mark> help scientists **better predict** when Yellowstone might **erupt next**.

# About the Ye<mark>llowston</mark>e Supervolcano:

Location:

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- Lies beneath Yellowstone National Park, in the western United States.
- Recognized as one of the **largest active volcanic systems** in the world.

# What is it?

- **Yellowstone** is a **caldera** a **large crater** formed after the collapse of land following a major volcanic eruption.
- It is part of an **active supervolcanic system**, continuously monitored for activity.

# Size of the Caldera:

• Measures about 55 x 72 kilometers (34 x 45 miles).

# Formation of the Caldera:

- Formed when **pyroclastic material** explosively ejected from the volcano, **partly emptying the magma chamber**.
- As the **magma chamber emptied**, the **roof collapsed**, creating a **bowl-shaped depression** in the ground.

# **Eruption History:**

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# Yellowstone has experienced **three colossal eruptions** at the **Yellowstone hotspot**:

Event	Approximate Time
1st Major Eruption	2.1 million years ago
2nd Major Eruption	1.3 million years ago
3rd Major Eruption	640,000 years ago

Two of these eruptions released such massive amounts of material that Yellowstone earned its status as a **supervolcano**.

# What is a Supervolcano?

- A supervolcano is defined as a volcano that has erupted more than 1,000 cubic kilometers of deposits in a single event.
- Supervolcanic eruptions are extremely rare but catastrophically powerful.

# **Potential Impact of Another Eruption:**

- A future **supervolcanic eruption** at Yellowstone could:
  - Blanket North America in ash.
  - Areas near the hotspot could be buried under **more than one meter** of debris. 0

# **Climate Effects:**

- **Supervolcanoes** release significant amounts of **sulfur dioxide** into the atmosphere during eruptions.
- **Sulfur dioxide** forms **aerosols** that **block sunlight**, leading to **global cooling** for several years.
- This cooling effect would eventually **fade** as the sulfur dioxide **washes out** of the atmosphere.

roodol

# Zero Shadow Day (ZSD): A Fascinating Celestial Event

Context: The Cosmology Education and Research Training Center (COSMOS) in Mysuru, under the Indian Institute of Astrophysics, recently observed 'Zero Shadow Day'.

# What is Zero Shadow Day?

Zero Shadow Day (ZSD) is a unique celestial phenomenon where no shadow of any **vertical object** is seen at a particular location.

# Why does it happen?

- It occurs when the **Sun is exactly overhead** at noon.
- On this day, the **Sun's declination** becomes **equal to the latitude** of the location.
- As the **Sun crosses the local meridian**, its rays **fall exactly vertically** on objects, **eliminating their** shadows.

# **Scientific Explanation:**

- Due to the **tilt of Earth's axis** and its **revolution around the Sun**, the **angle of sunlight** hitting Earth changes throughout the year.
- This change in the Sun's angle affects shadow lengths and directions.

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When the Sun is exactly overhead, shadows disappear briefly, creating the Zero Shadow Day effect.

# When Does Zero Shadow Day Occur?

- **ZSD happens twice a year** for locations between the **Tropic of Cancer** and the **Tropic of Capricorn**.
- It corresponds to:
  - **Uttarayan** (when the Sun moves **northward**).
  - Dakshinayan (when the Sun moves southward). 0

Duration: The exact "zero shadow" moment lasts for a fraction of a second, but the visible effect can persist for about one to one-and-a-half minutes.

# Where Can It Be Observed in India?

ZSD can be seen in regions **south of Bhopal**, covering a wide range of Indian states, including:

Region	States/UTs
Southern and Western India	Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Telangana, Goa, Maharashtra
Eastern India	Odisha, Jharkhand, West Bengal, Tripura, Mizoram
Union Territories	Andaman & Nicobar Islands, Puducherry, Daman & Diu, Dadra & Nagar Haveli
Central India	Chhattisgarh, Southern parts of Madhya Pradesh
Western Indi <mark>a</mark>	Most of Gujarat

Zero Shadow Day is a remarkable reminder of the dynamic relationship between Earth and the Sun, and how simple observations can reveal profound truths about our planet's movements.

History and Evolution of Monsoon Forecasting in India

Context: The India Meteorological Department (IMD) recently forecasted 'above normal' rainfall (105% of the Long-Period Average) for the 2025 southwest monsoon (June-September).

This prediction holds vital significance, as the **southwest monsoon accounts** for nearly 70% of India's annual rainfall, playing a critical role in agriculture, the economy, and water resource management.



**Did You Know? Ancient Indian Weather Wisdom:** 

- Meteorology in India has deep roots in ancient knowledge systems. ٠
- Classical Indian texts such as the Upanishads, Brihatsamhita, Arthashastra, and Meghdoot contain detailed observations on rainfall patterns, clouds, and seasons.
- These works demonstrated an advanced understanding of nature's cycles long before modern meteorology.

# **Scientific Beginnings and Colonial Developments:**

The modern study of meteorology in India began in the **17th century** when **Edmund Halley** proposed a scientific explanation for the **monsoon winds**.

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- During British rule, early observatories were established in Madras (1796), Calcutta (1829), and Bombay (1841).
- **Captain Henry Piddington**, a British officer, coined the term **"cyclone"** while studying tropical storms in the Bay of Bengal.

# Timeline of Monsoon Forecasting in India:

# **1877 – Forecasting Begins:**

• IMD started monsoon forecasting following the **Great Famine of 1876–78**, which highlighted the urgent need for rainfall prediction.

# 1886 - First Long-Range Forecast:

• Henry Francis Blanford, IMD's first Meteorological Reporter, linked Himalayan snow cover to monsoon strength and made the first seasonal forecast.

# 1904–1920s – Sir Gilbert Walker's Contributions:

- Sir Gilbert Walker introduced statistical models using 28 global parameters, including the Southern Oscillation (SO)—a precursor to what we now know as ENSO (El Niño-Southern Oscillation).
- He divided India into **three meteorological subregions** for better accuracy.

# Post-Independence Developments:

# Challenges with Early Models:

- Walker's model continued until 1987, but its effectiveness declined due to changing climate patterns.
- In 1988, a new regression model (called the Gowariker Model) was introduced using 16 predictors, but it struggled with regional accuracy.

# Modernization and Technological Shifts:

# Key Improvements Over the Years:

# 2003 – Two New Models Introduced

• IMD added two statistical models using 8 and 10 parameters, along with a two-stage forecast strategy.

# 2007 - Statistical Ensemble Forecasting System (SEFS):

- Introduced **ensemble forecasting**, which uses **multiple model runs** to provide a range of outcomes.
- The number of parameters was reduced to **streamline predictions**.

# 2012 - Monsoon Mission and MMCFS:

- The Monsoon Mission Coupled Forecasting System (MMCFS) was launched.
- It integrates **ocean**, **atmospheric**, and **land interactions**, greatly enhancing forecast accuracy and long-range prediction capability.

# 2021 – Multi-Model Ensemble (MME):

• IMD adopted a **global ensemble model approach**, combining outputs from multiple climate models, including **MMCFS**, to refine and **increase the reliability** of forecasts.

# **Impact and Accuracy Gains:**

• From **1989 to 2006**, monsoon forecast errors were significantly higher.











• Since 2007, the absolute forecast error has dropped by 21%, a testament to technological upgrades and scientific advancements.

#### Why It Matters:

- The **southwest monsoon** is the **lifeline of Indian agriculture**, especially for rain-fed farming systems.
- Accurate forecasting:
  - Helps farmers plan sowing and harvesting cycles
  - Aids in **drought and flood preparedness**
  - Informs water reservoir management
  - Supports policymakers and disaster response agencies

# Extra Insight: What is the Long-Period Average (LPA)?

The **LPA** refers to the **average rainfall received during the monsoon season over a 50-year period** (currently calculated from 1971–2020).

It acts as a **benchmark** to define monsoon categories:

- **Below Normal**: < 96% of LPA
- Normal: 96–104% of LPA
- Above Normal: 105–110% of LPA
- Excess: >110% of LPA

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TOGETHER WE SCALE HEIGHTS







#### Inflammatory Bowel Disease (IBD): Understanding and Managing a Chronic Condition

**Context:** The Jawaharlal Institute of Postgraduate Medical Education and Research (**IIPMER**) recently launched a **support group for patients with** Inflammatory Bowel Disease (IBD), aiming to provide guidance, emotional support, and improved management strategies.



#### What is Inflammatory Bowel Disease (IBD)?

Inflammatory Bowel Disease (IBD) is a collective term for conditions that

cause chronic inflammation and swelling of the digestive tract's tissues. It primarily includes two types:

- 1. Ulcerative Colitis:
  - Involves **inflammation and ulcers** (open sores) along the **lining of the colon and rectum**.
  - Symptoms often include **bloody diarrhea**, abdominal pain, and fatigue.
- 2. Crohn's Disease:
  - Causes inflammation of the digestive tract lining, often affecting deeper layers of the  $\circ$ intestinal wall.
  - Commonly impacts the **small intestine**, but can also affect the **large intestine** or, less frequently, the upper gastrointestinal tract.
  - Symptoms may include persistent diarrhea, weight loss, and abdominal pain. 0

#### **Common Symptoms of IBD:**

Patients with **IBD** may experience a range of symptoms, often varying in severity. These include:

- Abdominal Pain
- **Diarrhea** (which may be bloody) •
- **Rectal Bleeding** •
- Severe Fatigue ٠
- Weight Loss

#### What Causes IBD?

The exact cause of Inflammatory Bowel Disease remains unclear, but research points to several contributing factors:

- **Immune System Dysfunction:** 
  - The body's immune system may incorrectly react to environmental triggers, such as bacteria or viruses, causing inflammation of the gastrointestinal tract.
- **Genetic Predisposition:** 
  - Those with a **family history of IBD** are at a higher risk of developing the condition, suggesting  $\cap$ a hereditary component.

# **Treatment Options for IBD:**

While **IBD** is a **chronic condition**, various treatments are available to **manage symptoms and prevent** flare-ups. These include:

1. Medications:

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- Anti-inflammatory drugs (e.g., corticosteroids, aminosalicylates).
- **Immune system suppressors** to reduce inflammation.
- **Biologics** that target specific proteins involved in inflammation.
- 2. Surgical Options:
  - **Resection:** Removing the damaged portion of the digestive tract.
  - **Ileostomy or Colostomy:** Creating an opening for waste to exit the body, if necessary.

# Living with IBD:

Managing **IBD** often involves a **combination of medical treatment, dietary adjustments, and lifestyle changes**. **Support groups**, such as the one launched by **JIPMER**, provide valuable assistance through **education, peer support, and practical advice** for managing symptoms.

# Type 5 Diabetes Officially Recognized: A Malnutrition-Driven Diabetes Variant

**Context:** In a groundbreaking development, the **International Diabetes Federation (IDF)** has officially recognized **Type 5 Diabetes** — a **malnutrition-induced form** of the disease, primarily affecting **lean**, **undernourished adolescents and young adults** in low- and middle-income countries. Long overlooked, this **neglected subtype** is finally gaining the attention it deserves after nearly **seven decades of clinical ambiguity**.



# What is Type 5 Diabetes?

**Type 5 Diabetes** is a **distinct metabolic disorder** where the primary issue is **severely impaired insulin production** due to **chronic malnutrition**, rather than insulin resistance as seen in **Type 2 Diabetes**.

- It predominantly affects **young**, **underweight individuals** with **a history of poor nutrition**, often beginning **in the womb**.
- The disease is **non-autoimmune** and **non-genetic**, setting it apart from Types 1 and 2.
- It has often been **misdiagnosed** as atypical Type 1 or Type 2, leading to **ineffective treatment**.

# A Historic Step: Recognition and Endorsement

The term **"Type 5 Diabetes"** was formally introduced by **Prof. Peter Schwarz**, President of the **IDF**, in **January 2025**. It was **officially recognized** at the **75th World Diabetes Congress** in **Bangkok**, marking a **milestone in global diabetes research and policy**.

# A Long-Overdue Acknowledgment

- First described in 1955 in Jamaica as "J-type Diabetes"
- Later labeled by WHO (1985) as "Malnutrition-Related Diabetes Mellitus (MRDM)"
- Removed in 1999 due to insufficient evidence, despite strong clinical signals

# **Global Prevalence and At-Risk Regions:**

# An Underreported Epidemic:

**Type 5 Diabetes** is now estimated to affect **approximately 25 million people globally**, particularly in the **Global South**.

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- Countries with significant cases include: India, Sri Lanka, Bangladesh, Uganda, Ethiopia, Rwanda, and South Korea
- It primarily exists in economically disadvantaged communities with long-standing food insecurity

# **Recent Scientific Breakthroughs and Renewed Focus:**

# Why Now?

Recent research highlights how **malnutrition during early life stages** — including **fetal development and childhood** — causes **permanent damage to pancreatic beta cells**, impairing their ability to produce insulin later in life.

- Micronutrient deficiencies, particularly of zinc, magnesium, and vitamin B12, play a key role.
- Advances in **epigenetic studies** have shown that **in-utero malnutrition** alters gene expression linked to insulin production.

# Key Clinical Features of Type 5 Diabetes:

# How to Identify It?

Unlike other forms, **Type 5 Diabetes** is unique and often subtle in presentation:

- Very Low Body Mass Index (BMI): Often below 18.5 kg/m<sup>2</sup>
- **Extremely Low Insulin Levels:** Lower than Type 2, slightly higher than Type 1
- Minimal Body Fat: Especially in limbs and trunk
- **Chronic Undernutrition:** With **low intake of protein, fiber, and micronutrients**
- Absence of Autoimmune or Genetic Markers

# The Root Ca<mark>use: Mal</mark>nutrition from the Womb:

# A Life-Cycle Disease:

Experts emphasize that **undernutrition during pregnancy**, coupled with **continued poor nutrition post-birth**, leads to lifelong pancreatic underdevelopment.

- Children who **remain lean and stunted** throughout adolescence are most at risk.
- Historical factors such as **colonial food policies**, **war-time scarcity**, and **intergenerational poverty** have contributed to its silent spread.

# **Current and Emerging Treatment Approaches:**

While official treatment guidelines are still being drafted, early interventions focus on **nutritional rehabilitation** and **customized glycemic control**.

# Preliminary Management Strategies Include:

- High-Protein, Nutrient-Dense Diets: To reverse malnutrition and support insulin production
- Balanced Carbohydrate and Fat Intake: Customized for age, BMI, and energy needs
- Medical Management: Anti-diabetic drugs or insulin, based on individual glucose profiles
- **Community-Based Programs:** Especially in low-resource settings, to deliver **sustainable nutrition and diabetes education**

The **Type 5 Diabetes Working Group**, established under the IDF, aims to roll out **formal diagnostic and treatment protocols** within the next **two years**.

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#### Why This Matters: A Public Health Turning Point

The formal recognition of Type 5 Diabetes signals a **paradigm shift** in how the global health community understands and addresses **diabetes in undernourished populations**.

#### **Key Implications:**

- Redefines diagnostic models in countries with high undernutrition
- Promotes targeted intervention programs in vulnerable populations
- Influences nutrition policies, especially maternal and child health programs

#### Making Primary Health Care Visible, Accessible, and Affordable

**Context:** India is undergoing a transformation in the **primary healthcare sector**, with a focus on making health services more **visible**, **accessible**, and **affordable**. Through innovative policies and national programs, the government aims to bridge the healthcare divide and strengthen its grassroots infrastructure.

#### Understanding Primary Health Care (PHC):

As defined by the **World Health Organization** (WHO), Primary Health Care (PHC) is a whole-of-society approach



#### **Core Principles of PHC:**

- Accessibility: Healthcare available to all.
- Affordability: Services without financial burden.
- **Comprehensiveness**: Including **preventive**, **promotive**, **curative**, **rehabilitative**, and **palliative** care.
- Rooted in the **Alma-Ata Declaration of 1978**, which called for **universal health care** through scientifically sound and socially acceptable methods.

#### Key Challenges in India's Primary Healthcare System:

#### 1. Urban vs. Rural Divide:

- Urban Slums: Proximity to healthcare centers but face overcrowding and affordability issues.
- Rural India: Home to 65% of the population, yet faces shortages of PHCs, trained staff, and poor connectivity.

#### 2. Human Resource Shortages (2023-24):

- **77% shortage** of surgeons, **69% obstetricians**, and **70% physicians** at Community Health Centres.
- **10–25% nurse vacancies** in several states.

#### 3. Burden of Non-Communicable Diseases (NCDs) and Mental Health:

• PHCs now address **lifestyle diseases and mental health**, but **limited training** and **infrastructure** hinder effective care.

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# **Government Initiatives Strengthening Primary Health Care:**

# **National Health Mission (NHM):**

A vast network of **1.6 lakh Sub-Centres**, **26,636 PHCs**, and **6,155 CHCs** acting as the **first point of contact** for health services.

# **Ayushman Bharat Program (2018):**

- Focuses on Health and Wellness Centres (HWCs) to provide services related to:
  - NCDs, maternal and child health, mental health, and elderly care.

# **Comprehensive Primary Health Care (CPHC):**

- Part of the **National Health Policy 2017**.
- Emphasizes Universal Health Coverage (UHC).
- Integrates AYUSH systems (Ayurveda, Yoga, Unani, Siddha, Homeopathy) with modern medicine.

# **Targeting Underserved Areas:**

- Aspirational Districts and Blocks Programs focus on health equity in underdeveloped regions. Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM):
  - Aims to strengthen public health infrastructure with an investment of **64,180 crore**.

# Women-Led Health Empowerment:

Self Help Groups (SHGs): Over 1.9 crore women spread awareness and promote utilization of PHC services.

# **Global Support and Initiatives:**

# Universal Health Coverage (UHC):

- Ensures quality healthcare access without financial hardship.
- Scaling P<mark>HC in low</mark>- and middle-income countries could:
  - Save 60 million lives 0
  - **Increase life expectancy by 3.7 years** by 2030 0

# **Key Global Programs:**

- The Global Fund: Supports integrated health responses for HIV, TB, and Malaria.
- Gavi, the Vaccine Alliance: Strengthens immunization and health systems in developing countries.

# Way Forward: Building a Resilient Primary Healthcare System:

# **Strengthening Infrastructure:**

- Expand **HWCs**, especially in rural and remote areas.
- Promote **telemedicine** to bridge urban-rural healthcare gaps.

# **Enhancing Awareness:**

Conduct health education campaigns and community outreach to promote service visibility and utilization.

# **Ensuring Affordability:**

Minimize out-of-pocket expenses through schemes like PM-JAY.

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Provide **financial protection** for vulnerable populations.

# **Conclusion:**

A robust primary healthcare system is the cornerstone of a healthy nation. By enhancing **visibility**, accessibility, and affordability, India can ensure equitable healthcare for all, particularly for those most in need. With sustained effort, policy innovation, and community engagement, primary healthcare can become truly universal and inclusive.

# India's First Human Gene Therapy Trial for Haemophilia: A Medical Milestone

**Context:** In a groundbreaking achievement, **BRIC-inStem**, Bengaluru, in collaboration with CMC Vellore, has successfully completed India's firstin-human gene therapy trial for Haemophilia. This marks a significant advancement in the field of genetic medicine and offers renewed hope for patients suffering from this rare disorder.



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#### What is Gene Therapy?

**Gene therapy** is a cutting-edge **biomedical technique** that modifies or

replaces faulty genes within a person's cells to treat or prevent diseases. It aims to address the root genetic causes rather than just managing symptoms.

Key Approaches:

- **Replacing** a mutated gene with a healthy version
- Inactivating a malfunctioning gene 🕖 🕗
- Introducing an entirely new gene into the body

Unlike traditional treatments, gene therapy targets the **genetic blueprint** itself, using approaches like:

- **Ex vivo** modification of **stem cells** or **T-lymphocytes** outside the body
- **In vivo** delivery of gene-editing tools directly into the patient

# **Understanding Haemophilia**

**Haemophilia** is a **rare genetic bleeding disorder** where the blood **fails to clot properly** due to mutations in genes that encode **clotting proteins**.

**Quick Facts:** 

- The disorder is **X-linked**, making **males more prone** to it
- Affects approximately 1 in 10,000 people globally
- India bears a high patient burden, highlighting the need for advanced therapies

#### About BRIC-inStem

**BRIC-inStem** is a premier institute under the **Biotechnology Research and Innovation Council (BRIC)**. It integrates 14 autonomous research institutions across India and is a frontrunner in translational and regenerative medicine.

Key Innovations:

Gene therapy trials for rare diseases

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- Anti-viral germicidal masks developed during COVID-19
- 'Kisan Kavach', a protective pesticide shield for farmers
- Biosafety Level III Lab for handling high-risk pathogens under the One Health Mission

#### Why This Matters

This successful gene therapy trial is not just a national achievement — it represents a new frontier in precision medicine in India. It shows that homegrown scientific excellence can lead transformative healthcare initiatives that save lives and set global benchmarks.

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