ANURAG BACHAN'S

APRIL 2026

Comprehensive Coverage of

CURRENT AFFAIRS

ENTIRE CONTENT OF MARCH 2026

- Indian Economy
- Polity and Governance
- Environment & Ecology
- Art & Culture
- Science and Technology
- Society
- Species in News

Useful for **IAS / PCS / HCS / HAS & other Exams.**

INDEX

INDIAN ECONOMY

Bharat Electricity Summit

The **Bharat Electricity Summit 2026** is a **global conference-cum-exhibition** organised under the leadership of the Ministry of Power, designed to bring together the entire electricity ecosystem—policymakers, regulators, industry leaders, investors, innovators and global stakeholders.

It is not just a conference, but a **platform covering the entire electricity value chain**—generation, transmission, distribution, storage and smart consumption.

The summit reflects a deliberate shift in India's approach:

- From **sectoral policymaking → ecosystem-level coordination**
- From **domestic focus → global leadership in energy transition**

The summit is scheduled:

- **19–22 March 2026**
- Venue: **Yashobhoomi**, New Delhi

It is conceived as a dialogue platform Covering **entire electricity value chain**—generation, transmission, distribution, renewables, storage, and emerging technologies

The structure itself signals:

- Integration of **policy + technology + investment + industry**

Background: Evolution of India's Power Sector

The need for such a summit can only be understood in the context of India's structural transformation in the power sector.

India's Power Sector: Capacity, Potential, and Reforms

1. Scale and Capacity of India's Power Sector

India's power sector today reflects a **mature, large-scale system capable of supporting high economic growth**.

- Installed power capacity: **520.51 GW (January 2026)**
- India has transitioned from:
    - **Power deficit (earlier) → near-zero shortage (0.03% in 2025)**

This is a **structural shift**, not just incremental growth.

Further developments from the summit context:

- Capacity has **more than doubled since 2014**
- Peak demand handled:
    - **250 GW (2024–25)**
    - Prepared for **270 GW and beyond**

This indicates that India is not only expanding capacity but also **strengthening demand-handling capability**.

2. Renewable Energy and Energy Transition

The most important transformation is in the **energy mix**.

- Solar capacity increased:
    - **~2.8 GW → 143+ GW**
- India has already:
    - Achieved **50% non-fossil capacity target ahead of schedule**

This shows:

- Transition is happening at **scale + speed**
- Renewables are no longer peripheral—they are **central to the system**

Also, participation is expanding:

- **32 lakh households + 23 lakh farmers** involved in energy generation

This reflects a shift towards a **"prosumer-based electricity economy"**.

3. Transmission and Grid Strength

India's power system is now supported by a **robust national grid infrastructure**.

- Transmission network expanded by **72%**
- Total network: **5 lakh circuit km**
- India operates **one of the world's largest synchronised grids**

Future planning:

- Transmission plan for **900 GW non-fossil integration by 2035–36**
- Investment: **₹7.93 lakh crore**

This shows that:

- Grid is evolving from **passive carrier → active balancing system**
- Focus is on **renewable integration + grid resilience**

4. Electrification and Access Expansion

A major governance achievement highlighted in PIB:

- **18,374 villages electrified**
- **2.86 crore households connected**
- Investment: **₹1.85 lakh crore**

This marks:

- Transition from **energy scarcity → universal access**
- Electricity becoming a **basic public service**

5. Financial and DISCOM Reforms

One of the most critical structural improvements is in **distribution sector health**:

- Outstanding dues reduced:
  - **₹1.4 lakh crore (2022) → ₹4,109 crore (2026)**
- DISCOMs recorded:
  - **₹2,701 crore profit (FY25)**

This is significant because:

- Historically, DISCOMs were the **weakest link**
- Improvement indicates:
  - Better financial discipline
  - Reform success
  - Improved sector viability

6. Digitalisation and Smart Infrastructure

The sector is moving towards a **technology-driven architecture**:

- Large-scale rollout of **smart meters**

Implications:

- Improved billing efficiency
- Reduction in losses
- Greater consumer participation

This reflects a shift toward:

- **Data-driven electricity management**

7. Investment Potential and Future Growth

The summit strongly emphasises **future potential**:

- ₹50 lakh crore investment opportunity till 2032
- ~₹200 lakh crore investment over next two decades

This covers:

- Generation (especially renewables)
- Transmission expansion
- Storage systems
- Distribution modernisation

Thus, the power sector is:

- Not just infrastructure
- But a **major investment engine of the economy**

8. Emerging Strategic Role of Electricity

PIB clearly positions electricity as:

- Backbone of:
  - Economic growth
  - Industrialisation
  - Digital economy
- Central to:
  - Climate commitments
  - Energy security
  - Global leadership

India is even positioning itself as:

- A **future exporter of energy** (via cross-border grids)

Analytical Conclusion

India's power sector has undergone a **three-stage transformation**:

1. **Access phase** → electrification of villages and households
2. **Adequacy phase** → capacity expansion and near-zero shortages
3. **Transition phase (current)** → clean energy, digitalisation, global integration

This explains why a platform like the **Bharat Electricity Summit becomes necessary**:

- The sector is no longer about solving shortages
- It is about **managing complexity, scale, and transition**

Why the Summit Was Needed (Core Rationale)

The Bharat Electricity Summit emerges as a response to **four structural needs**:

(a) Need for Integrated Policy Dialogue

India's electricity sector involves multiple actors:

- Centre, States, regulators, DISCOMs, private sector

The summit provides a **single platform for coordination across stakeholders**, which is otherwise fragmented.

(b) Need for Global Collaboration

Participation from **80+ countries and international ministers** highlights:

- India's transition is now globally relevant

- Need for **cross-border cooperation in technology, finance and grids**

This aligns with India's broader vision of:

- Global energy leadership
- South-South cooperation

(c) Need for Technological Indigenisation

A major focus is:

- **Make in India in power sector technologies**
- Indigenisation in:
    - Solar equipment
    - Storage systems
    - Transmission infrastructure
    - Digital distribution technologies

Thus, the summit supports **strategic autonomy in energy technologies**.

(d) Need to Align Growth with Sustainability

The theme itself captures the core tension:

"Electrifying Growth. Empowering Sustainability. Connecting Globally"

India must:

- Expand electricity access and demand
- While simultaneously decarbonising

The summit acts as a **balancing platform between growth and climate commitments**.

(e) Massive Investment Requirements

India's power sector is entering a **high-investment phase**:

- Estimated **₹50 lakh crore investment opportunity by 2032** across generation, transmission, distribution and storage

Such scale requires:

- Global capital
- Private participation
- Technology partnerships

Hence, the summit acts as an **investment and collaboration catalyst**.

(f) Increasing Complexity of Power Systems

Modern electricity systems now involve:

- Renewable integration
- Smart grids and digitalisation
- Energy storage
- Decentralised generation

The summit recognises that electricity is no longer just infrastructure—it is a **technology-driven, data-intensive sector**.

Broader Significance

The summit reflects a deeper shift in India's energy policy:

- Electricity is now central to:
    - Economic growth
    - Industrial policy
    - Climate commitments (NDCs)

- India is positioning itself as:
  - A **global hub for energy transition dialogue**
  - A **leader for the Global South in clean energy pathways**

In essence, the summit marks the transition from:

- **"Power sector management" → "Energy system leadership"**

Core Theme and Its Meaning

Theme:

"Electrifying Growth. Empowering Sustainability. Connecting Globally."

This is not rhetorical—it captures three structural priorities of India's power sector:

Electrifying Growth

Electricity is now central to:

- Industrial expansion
- Digital economy
- Urbanisation and infrastructure

The emphasis is on **scaling supply to match high economic growth**, not just ensuring access.

Empowering Sustainability

Reflects India's transition toward:

- Non-fossil capacity expansion
- Decarbonisation of growth

Electricity becomes the **main vehicle for climate action**, especially through:

- Renewable energy
- Electrification of transport and industry

Connecting Globally

Indicates India's intent to **integrate with global energy systems**

- Expand:
  - Technology partnerships
  - Cross-border electricity trade
  - Global investment flows

This aligns with India's positioning as:

- A **leader of Global South in energy transition**

Key Objectives of the Summit

The summit is designed to go beyond discussion and act as a **strategic coordination platform**.

(a) Cross-sector Dialogue

Brings together Governments (central and state), Regulators, Industry players and Global stakeholders

This addresses the **fragmentation in electricity governance**.

(b) Strengthening International Cooperation

The summit aims to Deepen collaboration with multiple countries

- Facilitate Technology transfer, Financing and Grid connectivity discussions

Electricity is thus treated as a **global public good-type sector**, not purely domestic.

(c) Building Strategic Partnerships

Focus on Long-term partnerships in: Renewable energy, Storage, Grid modernisation

- Encouraging **private and foreign investment**

(d) Showcasing India's Leadership

The summit positions India as:

- A **case study of large-scale energy transition**
- A **hub for innovation and investment in electricity systems**

Key Themes / Focus Areas Emerging from the Summit

(i) Energy Transition at Scale

- Integration of large renewable capacity
- Managing intermittency
- Achieving long-term targets (500 GW and beyond)

The focus is not just expansion, but **system-level transition**.

(ii) Grid Modernisation and Transmission Expansion

- Strengthening national grid
- Planning for future high renewable penetration
- Building **resilient, flexible transmission systems**

This is critical because:

Renewables shift the challenge from generation → grid management

(iii) Distribution Sector Reforms

- Financial sustainability of DISCOMs
- Efficiency improvements
- Reduction of losses

The summit acknowledges that:

Without DISCOM reform, generation and transmission gains cannot sustain

(iv) Digitalisation of Power Sector

- Smart meters
- Data-driven grid management
- Automation and real-time monitoring

Electricity systems are evolving into:

- **Digitally managed networks rather than physical infrastructure alone**

(v) Energy Storage and Future Technologies

- Battery storage
- Pumped storage
- Emerging technologies

These are essential for:

- Renewable integration
- Peak demand management

(vi) Investment and Financing

- Massive capital requirement (₹50 lakh crore+)
- Need for:
    - Global capital
    - Private participation
    - Innovative financing mechanisms

The summit acts as a **bridge between policy and capital markets**.

(vii) Domestic Manufacturing and Indigenisation

- Promoting **Make in India in power equipment**
- Reducing import dependence in:
    - Solar modules

- Storage systems
- Grid equipment

This links electricity policy with:

- Industrial policy
- Strategic autonomy

(viii) Global Energy Connectivity

- Cross-border electricity trade
- Regional grid integration
- India as a potential **energy exporter**

This is a forward-looking dimension rarely emphasised earlier.

Bharat Electricity Summit 2026 – Developments, Announcements and Initiatives

Long-Term Capacity Expansion Roadmap

The most concrete announcement emerging from the summit is:

- India targets **~1,121 GW installed power capacity by 2036**

This is a **formal long-term planning signal**, not just an aspirational statement.

Interpretation

- Nearly **doubling of current capacity (~520 GW)**
- Indicates:
  - Electrification of new sectors (transport, industry, hydrogen etc.)
  - Anticipation of sustained high GDP growth

This marks a shift toward **integrated long-term energy system planning**, rather than short-term capacity addition.

Transmission-Centric Planning Framework

A key development highlighted is the **centrality of transmission planning**.

- Grid expansion is being aligned with **future renewable capacity integration**
- Planning is forward-looking rather than reactive

Why this matters

Earlier model:
Generation → Transmission follows
Emerging model:
Transmission + Generation planned simultaneously
This reflects recognition that:

- Renewable energy is geographically dispersed
- Grid is now the **backbone of the transition**

Investment Push and Sector Positioning

The summit strongly positions the power sector as a **major investment destination**.

- Emphasis on attracting:
  - Global investors
  - Private sector participation

This is not just rhetorical—PIB frames the sector as:

- A **high-growth investment space**
- Central to India's infrastructure expansion

Implication

Electricity is being reframed as:

An economic growth engine, not just a public utility

Focus on Energy Transition with System Stability

The summit highlights a **balanced transition approach**:

- Rapid expansion of non-fossil capacity
- Simultaneous focus on:
  - Grid stability
  - Reliability
  - Demand management

Key Policy Signal

India is not adopting a "rapid coal exit" model, but:

- A **sequenced and stability-oriented transition**

This is crucial for UPSC answers:

- Reflects **energy security + sustainability balancing**

Grid Modernisation and Technological Upgradation

The summit emphasises **modernisation of electricity systems**:

- Smart grid technologies
- Digital monitoring and system optimisation
- Advanced transmission technologies

Interpretation

Electricity system is evolving into:

- A **technology-intensive network**
- With increasing role of:
  - Data
  - Automation
  - Real-time management

Domestic Manufacturing and Supply Chain Development

A clear initiative area highlighted:

- Promotion of **domestic manufacturing ecosystems**
- Strengthening vendor base and supply chains

Policy Link

- Aligns with **Make in India**
- Reduces dependence on:
  - Imported solar equipment
  - Grid components

Electricity infrastructure is thus being treated as a **strategic industrial sector**.

Special Programmatic Initiatives within the Summit

The summit includes structured initiatives (as part of event design):

- **Industry 4.0 in Transmission** – digitalisation of grid
- **Vendor Development Programmes** – supply chain strengthening
- **Global Carbon Markets discussions** – linking electricity with climate finance
- **Women in Electricity initiative** – inclusion and workforce diversity

Significance

These are not random sessions—they reflect:

- Emerging priorities of the power sector:

- Technology
- Finance
- Inclusion
- Global integration

Forward-looking Transmission Investment

- **₹7.93 lakh crore planned investment**
- For integrating large-scale renewable capacity

Interpretation

Shift from:

- Generation-centric → **grid-centric system design**

Major Launchs

(A) National Resource Adequacy Plan (NRAP)

Purpose- Ensure **Reliable supply of electricity at all times**

Focus Areas

- Demand forecasting
- Capacity planning
- Reliability assessment

Significance

- Moves beyond: Installed capacity → **supply adequacy**
- Addresses: Peak demand, Seasonal variation and Renewable intermittency

(B) Transmission Plan for Integration of 900+ GW Non-Fossil Capacity (by 2035–36)

Purpose- Create infrastructure to integrate: **Very high renewable capacity**

Focus Areas

- Inter-state transmission systems
- Renewable energy corridors
- Grid balancing

Scale: Designed for: **900+ GW non-fossil capacity**

Combined Interpretation of Both Reports

Together, they represent:

- **NRAP → "Do we have enough power?"**
- **Transmission Plan → "Can we deliver and balance it?"**

Thus:

Adequacy + Deliverability = Future-ready power system

The Ministry of Power released two key reports for FY 2024–25 during a national-level power sector meeting:

- Consumer Service Ratings of DISCOMs (CSRD)
- Distribution Utilities Ranking (DUR)

These reports are part of ongoing reforms to improve **consumer-centric electricity distribution and financial sustainability of DISCOMs**.

Consumer Service Ratings of DISCOMs (CSRD) Report

The CSRD report assesses the performance of DISCOMs specifically from the **consumer service perspective**. It establishes baseline standards in key areas such as:

- accuracy and timeliness of metering and billing
- effectiveness of grievance redressal mechanisms

- transparency and fairness in tariff determination

The report is designed to create a **comprehensive framework for improving consumer satisfaction**, while also encouraging learning across utilities. It evaluates DISCOMs using service standards prescribed under the Electricity Rules and monitors their adherence and implementation.

Based on performance, DISCOMs are assigned grades across seven categories—**A+, A, B+, B, C+, C, and D**. This grading system is intended to promote **healthy competition and continuous service improvement**.

Out of 66 DISCOMs assessed:

- 6 were rated **A+**
- 21 received **A**
- 27 were graded **B+**

Overall, the results indicate an **improving trend in service delivery**, with a growing share of utilities moving into higher performance categories and a decline in the number of DISCOMs in lower bands (C and D). This suggests broad-based improvement across the sector.

Distribution Utilities Ranking (DUR) Report

The DUR report provides a **holistic and objective evaluation of power distribution utilities** across India. Moving beyond conventional metrics, it adopts a **multi-dimensional assessment framework**, covering:

- institutional capacity
- financial sustainability
- operational efficiency
- quality of service delivery

The objective of the DUR initiative is to support the development of a **financially viable, efficient, and consumer-oriented distribution sector**, which is essential for India's long-term energy transition.

For FY 2024–25, **66 utilities participated** in the assessment exercise.

Coverage of the Reports

- Around **66 DISCOMs assessed nationwide**
- Includes both:
  - State-owned utilities
  - Private DISCOMs
- Covers approximately **34–35 crore electricity consumers**

Key Findings (FY 2024–25)

1. Overall Improvement in DISCOM Performance

- There is a **broad-based improvement in service delivery** across India
- More DISCOMs have moved into **higher rating categories (A+, A, B+)**
- Importantly:
  - **No DISCOM in lowest 'D' category**, indicating systemic improvement

This reflects the impact of sustained reforms and monitoring.

2. Rise in Top-performing DISCOMs

- Around **6 DISCOMs achieved A+ rating** (highest category)
- This marks a clear improvement compared to earlier years when very few or none were in top categories

Notable Top Performers

- Adani Electricity Mumbai Limited – retained top rank nationally

- Tata Power Delhi Distribution Limited
- Noida Power Company Limited
- Dakshin Gujarat Vij Company Limited
- BEST

These utilities stood out due to:

- Reliable supply
- Accurate billing
- Strong grievance redressal
- Digital adoption

3. Private DISCOMs Outperforming

- Private utilities consistently feature among top performers
- Reasons:
  - Better operational efficiency
  - Advanced metering infrastructure
  - Strong customer interface systems

This highlights a **governance and efficiency gap between private and many state DISCOMs**.

4. Improvement in Large States (Example: Uttar Pradesh)

- Most DISCOMs showed **upward movement in ratings**
- Example trends:
  - Movement from B → B+ or B+ → A
  - Only limited stagnation in a few utilities

Indicates:

- Reform measures are reaching traditionally weak states
- However, **intra-state disparities still persist**

5. Key Areas of Improvement

Across India, DISCOMs have improved in:

- Reliability of supply
- Complaint resolution mechanisms
- Customer service responsiveness

This reflects a shift toward **consumer-centric governance** in the power sector.

6. Persistent Challenges

Despite improvements, several issues remain:

- Billing inefficiencies in some DISCOMs
- Slow pace of digital adoption in weaker utilities
- Variation in performance across regions
- Financial stress in many state DISCOMs

Broader Reform Context

These improvements are linked to structural reforms undertaken by the government:

Revamped Distribution Sector Scheme (RDSS)

- Total outlay: ~₹3 lakh crore
- Aim:
  - Reduce AT&C losses
  - Improve operational efficiency
  - Ensure financial sustainability

Other Reform Measures

- Mandatory **timely subsidy payment by states**
- Linking borrowing to **performance improvements**
- Push for **smart metering and digitalization**
- Focus on reducing **ACS-ARR gap** (cost-revenue gap)

Prakriti 2026 & Indian Carbon Market Portal

The **International Conference on Carbon Markets – Prakriti 2026** was held in New Delhi as part of the **Bharat Electricity Summit 2026**.

It is a flagship Government of India event organized by:

- Bureau of Energy Efficiency (BEE)
  Under the patronage of:
- Ministry of Power
- Ministry of Environment, Forest and Climate Change

The event brought together:

- Policymakers
- Industry leaders
- Researchers
- International experts

to deliberate on **carbon markets and climate action**.

Theme of the Conference

"Unlocking Carbon Finance for NDC Implementation through Global Partnerships and Digital Pathways"

Implications of the Theme

- Focus on **mobilizing climate finance**
- Emphasis on **international cooperation**
- Use of **digital systems (MRV, platforms)**
- Linking carbon markets with **India's NDC targets under the Paris Agreement**

Launch of Indian Carbon Market Portal

A key highlight was the launch of:

- **Indian Carbon Market (ICM) Portal**

Purpose

The portal serves as a **central digital platform** for:

- Implementation of the Indian Carbon Market
- Administration of carbon credit mechanisms
- Ensuring transparency and credibility

India's Approach to Carbon Markets

Policy Direction

India is positioning carbon markets as:

- Tools for **climate action**
- Drivers of **innovation**
- Enablers of **sustainable economic growth**

The approach integrates:

- Climate responsibility

- Economic development

Carbon Credit Trading Scheme (CCTS)

Key Features

India has already operationalized:

- **Carbon Credit Trading Scheme (CCTS), 2023**

Progress Highlighted

- **9 notified methodologies**
- **40+ registered entities**
- Projects in:
  - Biogas
  - Green hydrogen
  - Forestry

Compliance Mechanism

- **Greenhouse Gas Emission Intensity (GEI) targets notified**
- Covers:
  - ~490 obligated entities
  - Across **7 energy-intensive sectors**

Significance

- Ensures emissions reductions are:
  - Measurable
  - Reportable
  - Verifiable

Role of Carbon Markets

Economic and Strategic Role

Carbon markets are projected to:

- Act as **economic platforms**
- Encourage:
  - Innovation
  - Investment
  - Entrepreneurship

They are not merely compliance tools but:

- **Growth instruments for green economy**

"Three Cs" of Carbon Markets

Highlighted by Minister of State for Power:

1. Credibility

- Achieved through **digital MRV systems**
- Ensures verifiable emission reductions

2. Capital

- Mobilizing large-scale investments into:
  - Renewable energy
  - Green hydrogen
  - Clean technologies

3. Collaboration

- Through **Paris Agreement Article 6 mechanisms**

- Enables international carbon trading and cooperation

Sectoral and Structural Insights

Integration and Expansion

- Expansion of CCTS methodologies across sectors
- Inclusion of:
  - Buildings
  - Cooling sector

Inclusivity

Carbon markets aim to:

- Empower:
  - MSMEs
  - Farmers

Digital Transformation

- Strong emphasis on:
  - Digital MRV (Monitoring, Reporting, Verification)
- Ensures transparency and credibility

Key Discussion Areas in Conference

The conference included sessions on:

- Global carbon markets under **Paris Agreement Crediting Mechanism (PACM)**
- Compliance frameworks
- Carbon border adjustment policies
- Digital MRV technologies
- Corporate climate action
- Climate finance for clean technologies
- Role of agriculture and farmers

India–Africa Strategic Partnership Meet

The **India–Africa Strategic Partnership Meet** was convened during the **Bharat Electricity Summit 2026** under the Ministry of Power.

The meeting focused on strengthening **India–Africa cooperation in the power and energy sector**, particularly in the context of clean energy transition and sustainable development.

Objective of the Meet

The meeting aimed to:

- Deepen **India–Africa energy cooperation**
- Promote **capacity building and technology transfer**
- Facilitate **investment and partnerships in power infrastructure**
- Align cooperation with **global climate goals and sustainable development**

It reflects India's broader diplomatic outreach through **South-South cooperation**.

Key Areas of Cooperation

1. Renewable Energy Expansion

Both sides agreed to collaborate in:

- Solar energy
- Wind energy
- Other clean energy technologies

Significance

- Supports Africa's energy access goals
- Aligns with India's leadership in renewable energy (ISA, etc.)

2. Grid Connectivity and Infrastructure

Focus on:

- Development of **interconnected power grids**
- Strengthening **transmission infrastructure**

Implication

- Improves reliability and regional energy trade
- Supports integrated energy markets in Africa

3. Capacity Building and Skill Development

India emphasized:

- Training of African professionals
- Institutional partnerships
- Knowledge sharing

This builds on India's experience in:

- Power sector reforms
- Grid management
- Renewable integration

4. Technology Transfer

Cooperation in:

- Clean energy technologies
- Digital solutions in power sector
- Energy efficiency practices

India positions itself as a **technology partner for the Global South**.

5. Energy Access and Sustainability

The partnership focuses on:

- Expanding **electricity access in Africa**
- Promoting **affordable and sustainable energy solutions**

This aligns with:

- **SDG 7 (Affordable and Clean Energy)**

Strategic Significance

For India

- Strengthens role as a **leader of Global South**
- Expands diplomatic footprint in Africa
- Opens avenues for:
    - Indian companies
    - Investments in energy sector

For Africa

- Access to:
    - Affordable technology
    - Financing and expertise
- Accelerates:
    - Electrification

- Clean energy transition

Link with Global Climate Frameworks

The cooperation supports:

- **Paris Agreement commitments**
- Transition toward **low-carbon development pathways**

It highlights:

- Role of developing countries in **collective climate action**

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Biopharma SHAKTI

(Strategy for Healthcare Advancement through Knowledge, Technology and Innovation)

The Union Budget 2026–27 marks a strategic shift by placing **biopharma and biologic medicines at the centre of India's healthcare and manufacturing strategy**. The objective is to transform India into a **leading global biopharma industry** and capture about **5% of the global biopharmaceutical market**.

The policy recognises that rising non-communicable diseases and growing global demand for biologics make biopharma a high-value sector critical for both public health and economic growth.

What is Biopharma?

Biopharma refers to medicines produced using **living biological systems** such as human cells, microbes, or fungi. Examples include:

- vaccines
- antibody therapies
- gene therapies
- cell-based treatments
- recombinant protein drugs
- modern insulin

These therapies are complex and highly targeted, making them central to modern treatment of infectious and chronic diseases.

Core Budget Announcement

The Budget launched **Biopharma SHAKTI**, a national initiative to strengthen India's **end-to-end ecosystem for biologics and biosimilars**.

Financial outlay

- ₹10,000 crore
- 5-year period

Strategic aims

- support domestic development and manufacturing of high-value biopharmaceuticals
- reduce import dependence
- enhance global competitiveness in biologics supply chains

Major Institutional Measures-

Human resource development

- 3 new National Institutes of Pharmaceutical Education and Research (NIPERs)

- Upgradation of 7 existing NIPERs
  Purpose: create specialised workforce for research, manufacturing and regulation.

Clinical research ecosystem

- Development of 1,000+ accredited clinical trial sites nationwide
  Purpose: improve advanced clinical trial capacity and global research participation.

Regulatory strengthening

- Capacity expansion of Central Drugs Standard Control Organisation (CDSCO)
- Induction of specialised scientific personnel
- Alignment with global approval standards
  Purpose: faster and more efficient evaluation of complex biologics.

The initiative links manufacturing scale, skilled workforce, clinical research capacity and regulatory credibility into a single framework to move India from a **generic drug producer to an innovation-driven biopharma hub**.

India's Existing Biopharma Ecosystem

India is already 3rd globally in pharmaceutical production by volume and 14th by value.
Government has developed a multi-layered support ecosystem involving industry, academia and start-ups.

Major Supporting Programmes -

National Biopharma Mission (Innovate in India – i3)

- Launched 2017
- Cost ₹1,500 crore
- Co-funded by World Bank
- Implemented by Biotechnology Industry Research Assistance Council (BIRAC)
- Focus: vaccines, biotherapeutics, diagnostics and medical devices
- Supports industry-academia collaboration and innovation

BIRAC Innovation Support

Provides funding, incubation and mentorship to biotech startups through multiple schemes such as Biotechnology Ignition Grant, SEED Fund and LEAP Fund.

Manufacturing and Industrial Support Measures

The government has implemented several schemes to strengthen pharmaceutical manufacturing:

- Production Linked Incentive (PLI) Scheme for Pharmaceuticals
- Strengthening of Pharmaceutical Industry (SPI) scheme
- Bulk Drug Parks scheme

Research and Innovation Support

Promotion of Research and Innovation in Pharma-MedTech (PRIP)

- Outlay ₹5,000 crore
- Supports R&D in new drugs, biosimilars and medical devices
- Encourages industry-academia collaboration

Biotechnology Ecosystem Policies

BioE3 Policy (2024)

Focus areas include:

- precision biotherapeutics
- functional foods
- climate-resilient agriculture

- carbon capture
- bio-AI and biomanufacturing

Bio-RIDE Scheme

- Integrates biotechnology R&D and entrepreneurship
- Supports biomanufacturing and bio foundries
- Promotes industry-academic collaboration

The combined measures represent a coordinated national strategy to build a **resilient biopharma ecosystem spanning research, innovation, manufacturing and entrepreneurship**.

The policy is especially important because India's disease burden is shifting toward chronic conditions requiring biologic therapies

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RELIEF Scheme
(Resilience & Logistics Intervention for Export Facilitation)

RELIEF is a **time-bound, targeted government intervention** launched in March 2026 under the **Export Promotion Mission (EPM)** by the Ministry of Commerce & Industry.

It aims to support Indian exporters affected by **logistics disruptions due to the West Asia crisis**, particularly in the Gulf maritime corridor.

Financial outlay: **₹497 crore**

Background

The scheme arises from disruptions in West Asia due to geopolitical tensions affecting key maritime routes such as the Strait of Hormuz.

This has led to:

- Vessel diversions and longer routes
- Congestion at transshipment hubs
- Sharp rise in freight costs
- Increase in war-risk insurance premiums

These factors created **uncertainty in export logistics and increased costs for Indian exporters**, especially MSMEs.

Facts

RELIEF Scheme:

- Full form: Resilience & Logistics Intervention for Export Facilitation
- Ministry: Ministry of Commerce & Industry
- Mission: Export Promotion Mission (EPM)
- Outlay: ₹497 crore
- Nature: Time-bound, crisis-response intervention

Implementing Agency

- Export Credit Guarantee Corporation of India Ltd. - wholly owned by Government of India (Ministry of Commerce & Industry)
    - Responsible for verification, claim processing, disbursement and monitoring
    - ECGC's established experience in providing export credit risk cover against commercial and political risks, including war-related contingencies, is expected to ensure credible and timely delivery of assistance.

Institutional Mechanism

- Inter-Ministerial Group (IMG) on Supply Chain Resilience
- Daily monitoring mechanism initiated from March 2026

Coverage (Geographical)

Applies to exports destined to or transiting through:

- UAE, Saudi Arabia, Kuwait, Israel, Qatar, Oman, Bahrain, Iraq, Iran, Yemen

Key Features / Components

The scheme has **three components covering both past and future exports**:

(1) Retrospective Protection

- For exporters already having ECGC insurance
- Provides **up to 100% risk coverage (over and above existing cover)**
- Period: 14 Feb 2026 – 15 March 2026

(2) Prospective Support

- For future consignments
- Government-supported **up to 95% risk coverage** over and above ECGC Coverage.
- Period: 16 March – 15 June 2026

(3) MSME Support (Most Important)

- For exporters without ECGC cover
- **Partial reimbursement up to 50%** of freight/insurance costs for eligible non-ECGC-insured MSME exporters
- Cap: ₹50 lakh per exporter
- Target: MSMEs

Additional Operational Measures

Before financial intervention, government also initiated:

- Waiver of port storage/dwell charges
- Procedural relaxations for stranded cargo
- Advisory on shipping line pricing transparency
- Monitoring of insurance risks and inland logistics

Significance

The scheme aims to:

- **Mitigate immediate export disruption** due to geopolitical crises
- Maintain **continuity of trade flows**
- Prevent **order cancellations and loss of market share**
- Protect **MSME exporters**, who are most vulnerable
- Safeguard **employment in export-linked sectors**
- Enhance **resilience of India's supply chains**

Issues / Limitations (Analytical – Mains)

- Short-term measure; does not address structural logistics dependence
- Heavy reliance on maritime routes through volatile regions
- Limited coverage period (time-bound intervention)
- Insurance-based support may not fully offset demand-side shocks
- MSMEs may still face liquidity constraints despite reimbursement

Way Forward

- Diversification of trade routes (e.g., INSTC, IMEC)
- Development of domestic shipping and insurance ecosystem
- Strengthening supply chain resilience frameworks
- Reducing dependence on geopolitically sensitive chokepoints

Export Credit Guarantee Corporation of India (ECGC)

1. Basic Identification

Export Credit Guarantee Corporation of India is a **Government of India enterprise** under the Ministry of Commerce & Industry.

It is India's **official export credit agency (ECA)**.

Established: 1957

2. Core Function (What it does)

ECGC provides **insurance and credit risk protection to exporters and banks** involved in export financing.

In essence, it **protects exporters from the risk of non-payment** by foreign buyers.

3. Types of Risks Covered (Very Important)

(A) Commercial Risks

- Buyer insolvency
- Failure to pay
- Protracted default

(B) Political Risks

- War / civil disturbance
- Import restrictions by foreign government
- Currency transfer restrictions
- Cancellation of import license

4. Key Services

1. **Export Credit Insurance**
   - Covers exporters against non-payment risk
2. **Export Credit Insurance for Banks**
   - Protects banks that lend to exporters
3. **Overseas Investment Insurance**
   - Covers Indian investments abroad against political risks
4. **Support in Crisis Situations**
   - Enhanced risk coverage (e.g., under RELIEF Scheme)

5. Importance

ECGC plays a crucial role in:

- Promoting **India's exports**, especially to risky markets
- Enabling exporters to **explore new and non-traditional markets**
- Supporting **MSMEs**, which are more vulnerable to payment risks
- Strengthening **export credit ecosystem**
- Reducing uncertainty in international trade

Export Promotion Mission (EPM)

1. Basic Identification

The Export Promotion Mission is a **recent umbrella initiative of the Government of India** aimed at **boosting India's exports through coordinated, multi-ministerial efforts**.

Nodal Ministry: Ministry of Commerce & Industry

Nature: **Mission-mode, whole-of-government approach** (not a single standalone scheme)

2. Background

India has set an ambitious target of becoming a **major global export hub** (including goods + services). However, exports face structural challenges:

- High logistics costs
- Fragmented policy support
- Limited market diversification
- Vulnerability to global disruptions

EPM is designed to **bring convergence across schemes, ministries, and stakeholders** to address these bottlenecks.

3. Important Facts

- It is **not a scheme with fixed budget allocation**, but a **coordinating mission framework**
- Works through **inter-ministerial coordination mechanisms**
- Focuses on **goods and services exports**
- Linked with crisis-response interventions such as the RELIEF Scheme

Institutional Mechanism

- Inter-Ministerial Group (IMG) on export and supply chain issues
- Real-time monitoring of export disruptions

4. Key Focus Areas

EPM targets multiple dimensions of export competitiveness:

1. **Logistics & Supply Chain Efficiency**
   Reduction of turnaround time and costs
2. **Market Access Expansion**
   Trade agreements and diversification
3. **Export Credit & Insurance Support**
   Strengthening role of ECGC
4. **MSME Export Promotion**
   Inclusion of smaller exporters
5. **Sector-Specific Promotion**
   Electronics, pharmaceuticals, agriculture, etc.
6. **Crisis Response Capability**
   Handling shocks like geopolitical conflicts (e.g., RELIEF Scheme)

5. Significance

EPM represents a shift from **fragmented export schemes → integrated export strategy**.

It helps in:

- Enhancing **competitiveness of Indian exports**
- Building **resilient supply chains**
- Supporting **MSME participation in global trade**
- Improving **policy coordination across ministries**
- Strengthening India's position in **global value chains (GVCs)**

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Restoration of RoDTEP Benefits (2026)

The Government of India (Ministry of Commerce & Industry) has **restored full rates and value caps under the RoDTEP scheme** with effect from **23 March 2026** (PIB).
This reverses the earlier **50% restriction imposed in February 2026**.

Background
The temporary curtailment of benefits was undertaken due to fiscal considerations. However, exporters faced multiple external shocks:

- Disruptions in West Asia trade routes
- Increase in freight and insurance costs
- Supply chain uncertainties

Restoration of full benefits is thus a **counter-cyclical support measure** to sustain export momentum.

RoDTEP Scheme – Detailed Notes
RoDTEP (Remission of Duties and Taxes on Exported Products) is a **WTO-compliant export support scheme** launched in 2021.
It aims to **refund hidden/embedded taxes and levies** that are not reimbursed through other mechanisms.
Replaced: MEIS (which was challenged at WTO)

Rationale
In India's export structure, several taxes are **not refunded through GST or duty drawback**, such as:

- State taxes on electricity used in manufacturing
- VAT on fuel used in transport
- Mandi taxes
- Embedded taxes in logistics chain

These increase the **cost of exported products**, reducing competitiveness.
→ RoDTEP ensures **zero-rating of exports** (a key principle in international trade)

Key Features

- Covers **10,000+ tariff lines (HS codes)**
- Provides **sector-specific rates** notified by government
- Refund is given as **electronic duty credit (e-scrip)**
- E-scrips are:
    - Transferable
    - Usable for payment of customs duty
- Fully **digitized system** via customs portal
- Applicable to **both merchant and manufacturer exporters**

Nature of Benefit (Important Distinction)
RoDTEP is a **remission scheme**, not an incentive/subsidy.
This means:

- It refunds taxes already incurred
- Does not artificially promote exports

→ Hence, it is **WTO-compliant**, unlike MEIS

Restoration Decision – Key Details

- Full rates and value caps restored from **23 March 2026**
- Earlier notification limiting benefits to 50% has been withdrawn

- Rates restored to **pre-February 2026 levels**
- Applicable to all eligible export sectors

Significance

Short-term

- Provides **immediate cost relief** to exporters
- Improves **profit margins and liquidity**
- Helps sustain exports amid global disruptions

Medium-term

- Maintains **price competitiveness of Indian goods**
- Prevents loss of export orders
- Supports **labour-intensive sectors** like textiles, leather, gems

Structural

- Aligns India with **global best practices (zero-rated exports)**
- Enhances integration into **global value chains**

Linkages with Other Policies

RoDTEP operates alongside:

- Export Credit Guarantee Corporation of India (risk coverage)
- Export Promotion Mission (coordination framework)
- National Logistics Policy (cost reduction)

Together, they form a **comprehensive export support ecosystem**.

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RBI Liquidity Injection via 3-Day VRR Auction

The Reserve Bank of India injected **₹25,101 crore** into the banking system through a **3-day Variable Rate Repo (VRR) auction**.

Background

The banking system experienced **tightening of liquidity conditions** due to:

- Large **advance tax outflows**
- Anticipation of **GST-related payments**
- Seasonal financial year-end pressures

As a result:

- Liquidity surplus sharply declined
- Even turned into **deficit (~₹65,000 crore later)**

→ RBI intervened to ensure **adequate liquidity and financial stability**

What is VRR Auction? (Very Important Concept)

A **Variable Rate Repo (VRR)** is a liquidity management tool where:

- RBI lends short-term funds to banks
- Banks bid for funds → **interest rate is market-determined**
- Collateral: **Government securities**

Difference from Repo

- Repo: Fixed rate (policy rate)
- VRR: **Market-based rate via auction**

Types of Liquidity (Conceptual Clarity)

(A) Transient Liquidity (VRR)

- Short-term (overnight to few days)
- Used to manage **temporary mismatches**

(B) Durable Liquidity

- Long-term
- Injected via:
  - Open Market Operations (OMO)
  - Forex swaps

RBI injected **₹3.5 lakh crore durable liquidity since Jan 2026**

Broader Liquidity Management Context (Important)

This 3-day VRR was part of a **series of interventions**:

- 7-day VRR (₹48,014 crore)
- Overnight VRR (₹79,256 crore)
- Total injections > ₹1.5 lakh crore in March

→ Shows **active liquidity management by RBI**

Significance

(A) Monetary Policy Transmission

- Ensures policy rates effectively influence market rates

(B) Financial Stability

- Prevents liquidity crunch during high outflows

(C) Banking System Efficiency

- Enables banks to meet short-term funding needs

(D) Market Confidence

- Signals RBI's proactive stance

****

UN IGME Report 2025 – Child Mortality

1. Basic Identification

The **United Nations Inter-agency Group for Child Mortality Estimation (UN IGME)** publishes the annual report **"Levels and Trends in Child Mortality"**.

- Published by: UNICEF, WHO, World Bank, UN DESA
- Nature: **Global statistical estimation report**
- Purpose:
  - Track child mortality trends
  - Monitor SDG targets (SDG 3.2)

2. Key Global Findings (Latest – 2025 Report)

Overall Child Mortality

- **4.9 million children (under-5) died in 2024**
- Of these:
  - **2.3 million deaths were newborns (neonatal)**

→ Indicates that **nearly half of under-5 deaths occur in the first month**

Trend

- Global under-5 deaths have:

- Declined significantly since 2000
- BUT **progress has slowed since 2015**

→ Key theme of report: **"stalling progress"**

3. Causes of Death (Very Important for Prelims)

- **Primary Causes of Death:**
  - **Newborns (0-28 days):** Complications from preterm birth (36%) and complications during labour and delivery (21%).
  - **Post-neonatal (1-59 months):** Infectious diseases such as pneumonia, diarrhoea, and malaria remain the biggest killers.

India's Performance: A Global Exemplar

- **Under-5 Mortality Rate (U5MR):** India registered a massive **79% decline**, dropping from 127 deaths per 1,000 live births in 1990 to **27 in 2024**.
- **Neonatal Mortality Rate (NMR):** The NMR has witnessed a **70% decline**, falling from 57 per 1,000 live births in 1990 to **17 in 2024**.
- **Infant Mortality Rate (IMR):** In 2024, IMR reduced to roughly 23.3 per 1,000 live births.

Mortality Indicators

- **Neonatal Mortality Rate (NMR):**
  - **Definition:** The number of infant deaths that occur **within the first 28 days of life**, per 1,000 live births in a given year.
  - **National NMR (NFHS-5): 24.9** per 1,000 live births. *(down from 29.5 in NFHS-4)*.
- **Infant Mortality Rate (IMR):**
  - **Definition:** The number of deaths of children **under one year of age**, per 1,000 live births in a given year.
  - **National IMR (NFHS-5): 35.2** per 1,000 live births. *(down from 40.7 in NFHS-4)*.
- **Under-Five Mortality Rate (U5MR):**
  - **Definition:** The probability of a child dying **between birth and exactly 5 years of age**, expressed per 1,000 live births.
  - **National U5MR (NFHS-5): 41.9** per 1,000 live births. *(down from 49.7 in NFHS-4)*.
- **Maternal Mortality Ratio (MMR):**
  - **Definition:** The number of maternal deaths (women dying from pregnancy-related complications or during childbirth) per **1,00,000 live births**.
  - **National MMR:** The **Registrar General of India's Sample Registration System (SRS)** recorded a decline to 97 per lakh live births (2018-20) from 130 per lakh live births (2014-16), bringing India well within the **Sustainable Development Goal (SDG) target of reducing MMR to less than 70 by 2030**.

4. Regional & Inequality Patterns

Regional Concentration

- Majority of deaths occur in:
  - Sub-Saharan Africa
  - South Asia

Inequality

Child survival depends heavily on:

- Income levels
- Maternal education
- Access to healthcare

- Water & sanitation
- Conflict conditions

→ Report strongly highlights **"where a child is born determines survival chances"**

5. Key Structural Insight (Very Important for Mains)

As countries progress:

- Share of deaths shifts from infectious diseases → **congenital conditions**
- Indicates **epidemiological transition in child mortality**

7. Concern Areas Highlighted

(A) Slowing Progress

- Reduction rate has slowed since 2015

(B) Preventable Deaths

- Most deaths are still **preventable with low-cost interventions**

(C) External Risks

- Conflict
- Climate change
- Economic instability
- Decline in global health funding

8. SDG Linkage (Very Important)

Linked to **SDG 3.2**:

- Target:
  - Under-5 mortality ≤ 25 per 1000 live births
  - Neonatal mortality ≤ 12 per 1000

Risk

- Many countries are **off-track to meet 2030 targets**

9. Key Recommendations (From Report)

- Strengthen **primary healthcare systems**
- Expand:
  - Immunization
  - Nutrition programs
  - Maternal care
- Focus on:
  - Fragile and conflict-affected regions
- Improve:
  - Data systems and monitoring

****

Initiatives for Orange Economy

T**hree major initiatives have been launched by the Ministry of Information & Broadcasting** to promote India's **Orange Economy (creative economy)**.

Objective:

- Strengthen **media & entertainment ecosystem**
- Promote **creative economy**
- Build **future-ready workforce in M&E sector**

2. What is Orange Economy

- Refers to the **economy driven by creativity, culture, and intellectual property**
- Value derived from:
  - Ideas
  - Knowledge
  - Artistic expression
  - Cultural content

Sectors Included

- Media & entertainment
- Animation, VFX, gaming (AVGC)
- Digital content & OTT
- Music, films, advertising

Key Initiatives Announced

(A) National AI Skilling Initiative

- Launched in partnership with **Google & YouTube**
- Implemented through **Indian Institute of Creative Technologies (IICT)**

Features:

- **15,000 creators and media professionals** to receive training
- Focus on:
  - AI tools in content creation
  - Digital storytelling
  - Media production skills

Objective:

- Build **AI-skilled workforce for M&E sector**
- Prepare creators for **future digital economy**

(B) MyWAVES Platform

- A **citizen-centric content creation platform** on WAVES OTT

Features:

- Enables users to:
  - Create
  - Upload
  - Share content
- Integrated with:
  - **Create in India Challenge**

Objective:

- Democratise content creation
- Promote **user-generated creative ecosystem**
- Expand participation in digital economy

(C) DD Free Dish Access Reform

Key Innovation:

- **Televisions with in-built satellite tuners**
- Advanced **Electronic Programme Guide (EPG)**

Impact:

- No need for:

- Set-top box
- Additional wiring

Objective:

- Improve **accessibility of public broadcasting**
- Reduce cost burden on households
- Enhance user experience

Institutional Ecosystem (Important Linkages)

(A) Prasar Bharati

- Role: Strengthening public broadcasting

(B) IICT (Indian Institute of Creative Technologies)

- Role:
  - AI skilling
  - Training
  - Talent development

(C) WAVES OTT Platform

- Role:
  - Content hosting
  - Creator ecosystem development

→ Shows **institution-based approach to creative economy**

Broader Government Strategy

India's Orange Economy push is based on:

(A) Skilling + Education

- Creator labs in:
  - 15,000 schools
  - 500 colleges
- Target: **~2 million professionals by 2030**

(B) Platform-Based Growth

- WAVES Summit
- WAVES Bazaar
- Creator discovery programmes

→ Connect creators with:

- Investors
- Global markets
- Production ecosystem

(C) Digital & AI Integration

- AI-led content creation
- OTT expansion
- Platform economy growth

****

AgriPV (Agrivoltaics) – Dual Use of Land

1. Basic Concept

AgriPV (Agrivoltaics / Agro-photovoltaics) refers to the **simultaneous use of the same land for agriculture and solar power generation**.

In this system:

- Solar panels are installed **above or between crops**
- Land is used for **both food production and electricity generation**

→ Core idea: **"Harvesting sunlight twice" — for crops and for energy**

2. Background (Why in News)

India faces a structural challenge:

- Need for **rapid solar energy expansion**
- At the same time, agriculture occupies **large land area (~60%)**

Traditionally:

- Solar parks → compete with farmland

AgriPV resolves this conflict by **converting farms into dual-purpose assets**.

3. How AgriPV Works

- Solar panels are mounted at a **height (2–5 metres)**
- Crops grow **beneath or between panel rows**
- Panel spacing is optimized for:
  - Sunlight sharing
  - Farm machinery movement

Different models:

- Elevated panels
- Vertical panels
- Solar greenhouses

4. Key Benefits (Core of Article)

(A) Land Use Efficiency

- Same land produces:
  - Food + Energy
- Improves **land productivity (Land Equivalent Ratio > 1)**

(B) Farmer Income Diversification

- Income from:
  - Crop production
  - Solar power (leasing / selling electricity)

→ Reduces **income risk in agriculture**

(C) Climate Resilience

Solar panels create a **microclimate effect**:

- Reduce heat stress on crops
- Lower evaporation → **water conservation (up to ~50%)**
- Protect crops from extreme weather

(D) Energy & Sustainability

- Boosts **renewable energy generation**
- Reduces dependence on fossil fuels

- Supports **decarbonisation of agriculture**

(E) Rural Development

- Provides:
  - Local energy access
  - Employment
  - Infrastructure development

5. India-Specific Potential

India has **huge scope for AgriPV**:

- Large agricultural land base
- High solar irradiation

Studies suggest:

- Potential capacity up to **several TW-scale (theoretical)**

Policy linkages:

- PM-KUSUM scheme (solarisation of agriculture)
- Renewable energy targets (500 GW non-fossil capacity)

6. Suitable Crops (Important Concept)

AgriPV is more suitable for:

- Shade-tolerant crops:
  - Vegetables
  - Spices
  - Horticulture

Less suitable for:

- High sunlight crops (e.g., wheat, rice)

7. Challenges

(A) Technical

- Optimal panel height and spacing
- Crop-specific design complexity

(B) Economic

- High initial investment
- Need for viable business models

(C) Institutional

- Lack of clear policy framework
- Land-use regulations

(D) Agricultural Trade-offs

- Some crops may experience **reduced yields** due to shading

8. Global & Strategic Significance

AgriPV addresses the **Food–Energy–Water Nexus**:

- Food security
- Energy security
- Water conservation

→ Seen as a **key solution for climate-resilient agriculture**

Why AgriPV Matters for India (Advanced Understanding)

India's energy transition requires:

- Massive solar capacity addition (target: 500 GW non-fossil by 2030)
- But land availability is constrained

AgriPV provides a **system-level solution** by:

- Avoiding land acquisition conflicts
- Integrating **energy + agriculture + water systems**

→ This aligns with the **Food–Energy–Water Nexus approach**

3. Is Government Promoting AgriPV?

Key Insight (Very Important for UPSC)

India does NOT yet have a dedicated AgriPV scheme.

However, AgriPV is being **indirectly promoted through solarisation of agriculture policies**, especially:

4. Core Scheme: PM-KUSUM

4.1 Basic Overview

PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan) is the **flagship scheme for solarisation of agriculture**.

- Ministry: MNRE
- Target: **34,800 MW solar capacity by 2026**

4.2 Components (Very Important for Prelims)

Component A

- Decentralised solar plants (up to 2 MW) on **farmer land**
- Farmers can **sell electricity to DISCOMs**

This component is **closest to AgriPV model**

- Allows solar plants on agricultural land
- In practice, can enable **dual land use (agriculture + solar)**

Component B

- Standalone solar pumps for irrigation

Component C

- Solarisation of existing grid-connected pumps
- Farmers can:
  - Use electricity for irrigation
  - Sell surplus power

4.3 Financial Structure (Highly Important)

- 30% Central subsidy
- 30% State subsidy
- 30% bank loan
- Only ~10% farmer contribution

→ Makes solar adoption financially viable

4.4 Relevance to AgriPV

- Encourages farmers to become **"prosumers" (producer + consumer)**
- Promotes:
  - Decentralised solar generation
  - Income diversification

However:

- **AgriPV is not explicitly mandated**

- No specific design guidelines for:
  - Panel height
  - Crop compatibility

5. Emerging Policy Development (Very Important)

Recent PIB-level developments indicate:

- Government is working on **PM-KUSUM 2.0**
- Proposed feature:
  - **Dedicated ~10 GW AgriPV component**
  - Explicit promotion of **co-location of crops and solar panels**

This is a **major policy signal**

→ AgriPV may soon become a **formal policy focus**

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Amendment to Captive Power Generation Rules (2026)

1. Basic Identification

The Government of India (Ministry of Power) has notified the **Electricity (Amendment) Rules, 2026**, amending **Rule 3 of the Electricity Rules, 2005** relating to Captive Generating Plants (CGPs).

Objective:

- Remove **interpretational ambiguities**
- Improve **ease of doing business**
- Align captive power framework with **industrial growth and energy transition**

2. What is Captive Power (Concept – Very Important)

Captive power refers to **electricity generated by an industry for its own consumption**.

Legal basis:

- Electricity Act, 2003

Key conditions (Prelims important):

- Minimum **26% ownership** by captive users
- Minimum **51% consumption** of generated power by them

3. Background (Why Amendment Needed)

Earlier rules created:

- Disputes over **ownership structure (SPVs, subsidiaries)**
- Issues in **group captive projects**
- Lack of clarity in:
  - Consumption norms
  - Verification process

With increasing:

- Renewable captive projects
- Complex corporate structures

→ Need for a **clear and predictable framework**

4. Key Amendments (Most Important Section)

(A) Clarification of Ownership

- Ownership now includes:
  - Holding company

- Subsidiaries
- Other subsidiaries of same holding company

→ Entire group treated as **single captive user**
Very important for prelims (statement-based)

(B) Flexibility in Group Captive (AoP)

- Earlier: strict proportional consumption required
- Now:
  - Users can draw power based on operational needs
  - Excess consumption → treated as non-captive (not disqualification)
- Exception:
  - If a user holds ≥26% ownership → no proportional restriction

→ Reduces **risk of losing captive status due to minor mismatches**

(C) Recognition of Modern Structures

- Special Purpose Vehicles (SPVs) treated as **Association of Persons (AoP)**
- Allows:
  - Project-based ownership structures
  - Flexible investment models

(D) Verification Mechanism Introduced

- Intra-state:
  - State-designated **nodal agency**
- Inter-state:
  - **National Load Despatch Centre (NLDC)**

→ Ensures uniform and transparent verification

(E) Protection from Surcharges (Very Important)

- During verification:
  - **No Cross-Subsidy Surcharge (CSS)**
  - **No Additional Surcharge (AS)**
    (if declaration submitted)
- If later found non-captive:
  - Charges become payable with interest

→ Provides **certainty to industry**

(F) Annual / Flexible Assessment

- Captive status assessed over:
  - Full financial year
  - Flexibility for operational period

→ Improves practicality of compliance

(G) Energy Storage Recognition

- Electricity stored and later consumed also counted as **captive consumption**

→ Important for renewable + storage integration

5. Significance (Mains)

(A) Industrial Competitiveness

- Provides **reliable and cost-effective power**
- Reduces dependence on DISCOMs

(B) Ease of Doing Business

- Reduces regulatory disputes
- Clarifies compliance framework

(C) Renewable Energy Push

- Encourages industries to invest in:
  - Solar
  - Wind
  - Hybrid + storage

(D) Energy Efficiency

- Promotes **generation near consumption**
- Reduces transmission losses

(E) Investment Boost

- Attracts corporate investment in captive and green energy

6. Concerns / Criticism

- May reduce revenue of DISCOMs (loss of high-paying industrial consumers)
- Potential increase in:
  - Cross-subsidy burden on other consumers
- Complexity still remains in implementation

****

Essential Commodities Act (ECA), 1955

- The Union Government recently **invoked the Essential Commodities Act, 1955** to manage the **shortage of Liquefied Petroleum Gas (LPG)** in India.
- The crisis emerged after disruptions in **energy shipments through the Strait of Hormuz**, a key global maritime chokepoint, amid escalating geopolitical tensions in West Asia.
- Since **a large share of India's LPG imports passes through the Strait of Hormuz**, supply disruptions triggered panic buying and shortages.
- The government invoked the Act to:
  - **Boost domestic LPG production**
  - **Prioritise household consumption**
  - **Regulate natural gas allocation**
  - **Prevent hoarding and profiteering**

Core Concept: Essential Commodities Act, 1955

The **Essential Commodities Act (ECA), 1955** is a central legislation that enables the Government of India to **control the production, supply, distribution, and pricing of essential commodities** to ensure their **availability at fair prices and prevent hoarding or black marketing**.

The Act was enacted during the **post-Independence period of food scarcity** to allow the government to intervene in markets during emergencies.

Key Objective

To ensure **equitable distribution and availability of essential commodities** at fair prices while preventing:

- Hoarding
- Black marketing
- Artificial scarcity
- Price manipulation

Constitutional & Legal Basis

The Act derives authority from the **Concurrent List of the Constitution**.

- **Entry 33 of the Concurrent List (List III)** allows Parliament and State Legislatures to regulate:
  - Production
  - Supply
  - Distribution
  - Trade and commerce of essential commodities.

Thus both **Centre and States can implement orders under the Act**, although the **Centre retains overriding powers**.

Commodities Covered Under the Act

The government can declare any commodity as "essential" if necessary.

Typical commodities include:

Food & Agriculture

- Food grains
- Pulses
- Edible oils
- Sugar
- Vegetables
- Seeds

Energy & Fuel

- Petroleum products
- LPG
- Natural gas
- Coal

Other Essential Items

- Drugs and medicines
- Fertilisers

The government may **add or remove commodities depending on economic conditions**.

Key Powers Under the Act

Section 3 gives the **Central Government wide regulatory powers**.

The government can:

1. Control Production

- Direct manufacturers to **increase or prioritise production** of certain goods.

2. Regulate Supply and Distribution

- Allocate commodities to specific sectors.
- Control transportation and movement.

3. Fix Prices

- Set **maximum retail prices (MRP)**.

4. Impose Stock Limits

- Limit how much traders can store.

5. Prevent Hoarding and Black Marketing

- Enforce anti-hoarding measures.

6. Regulate Storage and Transport

- Restrict movement across states.

7. Direct Sale to Government Agencies

- Require producers to sell through government channels.

Violations can lead to **penalties including imprisonment and fines**.

Essential Commodities (Amendment) Act, 2020

The **Essential Commodities (Amendment) Act, 2020** was enacted to **liberalise the regulatory framework governing agricultural commodities** and encourage private investment in storage and supply chains.

The amendment replaced the **Essential Commodities (Amendment) Ordinance issued on 5 June 2020** and was passed by Parliament in **September 2020**.

Key Provisions of the Amendment

1. Deregulation of Certain Agricultural Commodities

The amendment **removed several food items from the list of essential commodities**, including:

- Cereals
- Pulses
- Oilseeds
- Edible oils
- Onion
- Potatoes

This means the government normally **cannot impose stock limits or movement restrictions on these commodities**.

2. Stock Limits Only Under Extraordinary Circumstances

The amendment allows regulation of these foodstuffs **only under exceptional situations**, such as:

- War
- Famine
- Extraordinary price rise
- Natural calamities of grave nature

Thus, routine regulatory interventions were reduced to **encourage market functioning**.

3. Objective of the Reform

The reform sought to:

- Remove fears of **excessive regulatory interference** for private investors.
- Encourage **private sector and foreign investment** in agricultural supply chains.
- Promote investment in **cold storage, warehousing, and logistics infrastructure**.
- Reduce **post-harvest losses and wastage of agricultural produce**.

4. Impact on Supply Chains

The amendment aimed to:

- Allow economic agents to **freely produce, store, and distribute food commodities**.
- Enable economies of scale in the **agri-food supply chain**.
- Improve farmer incomes through **better storage and supply chain efficiency**.

Significance of the 2020 Amendment

The amendment reflects a **shift in policy from strict market control to market liberalisation**, while still retaining emergency powers.

It attempts to balance:

- **Market efficiency and private investment**
- **Consumer protection during crises**

The government retains the ability to **re-regulate food commodities during extraordinary circumstances** such as wars, natural disasters, or extreme price rises.

Present Context: India's LPG and Natural Gas Dependency

According to Petroleum Ministry data:

Indicator	Data
LPG Consumption (2024–25)	~31.3 million metric tonnes
Domestic Production	~12.8 million metric tonnes
Share of Domestic Production	~41%

Thus **nearly 60% of LPG demand is met through imports**.

Import Vulnerability

- About **90% of India's LPG imports pass through the Strait of Hormuz**.
- Any geopolitical conflict in West Asia directly affects India's energy security.

Role of the Ujjwala Scheme in Demand Growth

The **Pradhan Mantri Ujjwala Yojana (PMUY)** dramatically expanded LPG access.

Coverage of LPG households:

Year	Coverage
2016	~62%
2026	~Nearly 100%

This massive increase in LPG adoption **increased national consumption significantly**, widening the **production-import gap**.

Government Measures Under the ECA

The government issued emergency orders in **March 2026**.

A. Increasing LPG Production domestically

Oil refineries were ordered to:

- Redirect **propane and butane streams** to LPG production.
- Avoid diverting them to petrochemical manufacturing.
- Convert **C3 and C4 streams** into LPG.

Affected Companies

Public sector refiners:

- Indian Oil Corporation (IOCL)
- Bharat Petroleum (BPCL)
- Hindustan Petroleum (HPCL)
- Chennai Petroleum
- ONGC
- Numaligarh Refinery

Private refiners:

- Reliance Industries
- Nayara Energy

Impact

Domestic LPG production reportedly **increased by around 25%**.

B. Distribution Controls for LPG

The government also regulated **how LPG is distributed**.

Key directives:

1. All LPG supplies routed through **IOCL, BPCL and HPCL**.
2. LPG cylinders **prioritised for households**.
3. **Commercial consumption restricted**.

Impact

- Hotels
- Restaurants
- Hostels
- Catering services

have faced shortages and reduced operations.

11. Natural Gas Allocation Framework

The government also issued orders regulating **natural gas allocation**.

A **priority-based system** has been introduced.

Priority Order

Priority Level	Sector	Allocation
Highest	Household PNG	100%
High	CNG for vehicles	100%
High	LPG production	100%
High	Pipeline compressor fuel	100%
Medium	Fertiliser sector	~70%
Lower	Industries	~80%
Lowest	Refineries & petrochemicals	~65%

This overrides **existing contractual arrangements**.

Why the Act Was Invoked Now

The current crisis stems from **energy supply disruptions due to geopolitical conflict in West Asia**.

Consequences include:

- LNG shipments disrupted through the **Strait of Hormuz**.
- Suppliers invoking **force majeure clauses**.
- Shortage of LPG and natural gas in India.

To address this, the government issued the **Natural Gas (Supply Regulation) Order, 2026**, under the ECA.

The order prioritises **essential sectors of the economy** for gas supply.

Priority Allocation of Natural Gas (2026 Order)

The government introduced a **tiered allocation system** based on importance.

Priority Category 1 (Highest Priority – 100% Supply)

These sectors receive **100% of their average gas consumption of the last six months**:

- Domestic Piped Natural Gas (PNG) for households
- Compressed Natural Gas (CNG) for transport
- Natural gas used for **LPG production**
- Pipeline compressor fuel and essential pipeline operations

These sectors are considered **critical for public welfare and transportation**.

Priority Category 2

Supply allocated:

70% of average gas consumption of the previous six months

Sector included:

- **Fertiliser manufacturing plants**

Conditions:

- Fertiliser plants must **certify that gas will not be diverted for any other use** and report compliance to the **Petroleum Planning and Analysis Cell (PPAC)**.

Priority Category 3

Supply allocation:

80% of six-month average consumption

Sectors included:

- Tea industry
- Manufacturing units
- Other industrial consumers connected to the **national gas grid**.

Priority Category 4

Supply allocation:

80% of six-month average consumption

Consumers:

- Commercial and industrial users supplied through **City Gas Distribution (CGD) networks**.

Sectors Facing Curtailment

To supply priority sectors, gas supply is curtailed for some industries.

Affected sectors include:

- Petrochemical facilities
- High-pressure gas consumers
- Power plants
- Certain refineries.

Examples of affected facilities include:

- ONGC Petro additions
- GAIL Pata Petrochemical Complex
- Reliance O2C facilities.

Additionally, **refineries may see gas supply reduced to about 65% of their past six-month consumption**.

Agencies Responsible for Implementation

Implementation of the new gas allocation order involves:

GAIL India

- Responsible for **managing supply and diversion of natural gas**.

Petroleum Planning and Analysis Cell (PPAC)

- Determines **pooled price of diverted gas**.
- Receives compliance reports from fertiliser plants.

Gas Producers and Market Participants

Entities required to comply include:

- ONGC
- Reliance Industries
- Oil India Limited (OIL)
- Vedanta
- LNG terminal operators

- Pipeline operators
- City gas distribution companies.

LPG Supply Measures

Apart from regulating natural gas, the government also took steps to **boost LPG availability**.

Measures include:

- Directing refineries to **increase LPG production for domestic consumption**.
- Prioritising LPG supply for **household consumers**.
- Introducing **25-day inter-booking period** to prevent stockpiling.

Imported LPG supplies are also prioritised for **essential non-domestic sectors such as hospitals and educational institutions**.

Impact on Commercial Consumers

Due to the prioritisation of household LPG:

Industries facing shortages include:

- Hotels
- Restaurants
- Catering businesses
- Hostels and institutional kitchens.

Commercial LPG supplies have therefore been **significantly curtailed**.

Impact on Industries

Industries Facing Supply Cuts

- Petrochemical plants
- Refineries
- Manufacturing units
- Tea industry

Some petrochemical facilities operated by:

- ONGC
- GAIL
- Reliance

may experience **partial or full LNG supply curtailment**.

<u>Energy Security Concerns for India</u>

The crisis highlights several structural vulnerabilities.

1. Import Dependence

India imports large volumes of:

- LPG
- Crude oil
- LNG

2. Geographic Concentration

A large portion of energy imports pass through a **single maritime chokepoint (Strait of Hormuz)**.

3. Growing Domestic Demand

Rising LPG adoption increases demand faster than domestic supply.

4. Limited Strategic Reserves

India has **strategic petroleum reserves**, but LPG reserves remain limited.

<u>Importance of the Strait of Hormuz</u>

The **Strait of Hormuz** is one of the world's most critical energy chokepoints.
Key facts:

- Located between **Iran and Oman**.
- Connects the **Persian Gulf to the Gulf of Oman and Arabian Sea**.
- Nearly **20% of global oil trade** passes through it.

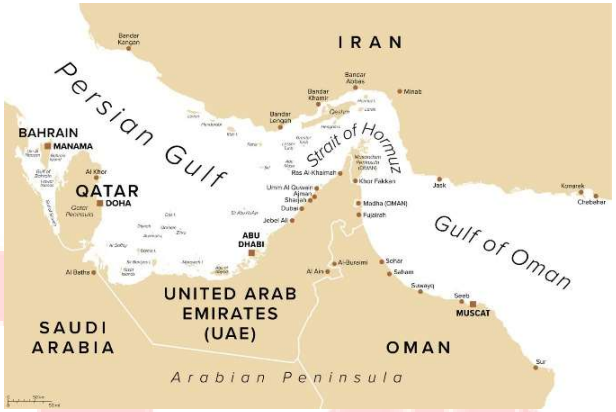
For India:

- Major energy suppliers such as **Saudi Arabia, UAE, Qatar, Kuwait, and Iran** export via this route.

Any disruption has **global energy market consequences**.

Past Uses of the Essential Commodities Act

The Act has been repeatedly invoked by the government to **address shortages, price spikes, and hoarding** of critical goods.



1. COVID-19 Pandemic (2020)

During the pandemic, the government declared **masks and hand sanitizers as essential commodities**.
Purpose:

- Prevent hoarding and black marketing
- Regulate production and distribution
- Ensure availability at reasonable prices

Authorities were empowered to **take action against speculators and price manipulation**.

Additional Measures

- Retail prices of hand sanitizers were capped at **₹100 for a 200-ml bottle**.
- Maximum prices were fixed for surgical masks to ensure affordability.

2. Control of Hoarding During Health Emergencies

The government used ECA provisions to:

- Notify **N-95 masks as essential commodities**.
- Prevent hoarding and ensure adequate supply nationwide.
- Direct states to enforce availability and monitor prices.

3. Regulation of Food Commodities During Price Surges

The Act has also been used to regulate **agricultural commodities experiencing price spikes**.
Examples include:

- Pulses (tur, urad) — stock limits imposed for traders and wholesalers to prevent hoarding.

Typical stock limits included:

- 50 metric tonnes for wholesalers
- 5 metric tonnes for retailers
- Limits based on production capacity for millers.

These measures aim to **increase market supply and stabilise prices**.

4. Stock Limits on Onions and Potatoes

The government has previously brought **onions and potatoes under stock-holding limits** during price spikes to prevent speculative hoarding and stabilize markets.

Criticism of the Essential Commodities Act

Despite its importance, the Act faces several criticisms.

1. Market Distortion

Frequent government intervention may distort market signals.

2. Discourages Private Investment

Stock limits discourage investment in:

- Warehousing
- Cold storage
- Supply chains

3. Regulatory Uncertainty

Traders face sudden policy changes.

4. Administrative Burden

Implementation requires heavy enforcement.

Significance of the Act

Despite criticisms, the Act remains a **critical emergency policy instrument**.

It enables the government to:

- Manage shortages
- Stabilise prices
- Prevent hoarding
- Protect consumers
- Ensure national supply security

Way Forward

Experts suggest several long-term solutions.

1. Diversification of Energy Imports

Reduce dependence on a single region.

2. Expanding Strategic Energy Reserves

Build reserves for LPG and LNG.

3. Increasing Domestic Production

Encourage domestic refining and gas exploration.

4. Renewable and Electric Alternatives

Promote:

- Biogas
- Electric cooking
- Solar energy

5. Strengthening Energy Diplomacy

Develop stable supply partnerships.

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Kisan Credit Card (KCC)

- The Government continues to strengthen **institutional credit access for farmers through the Kisan Credit Card (KCC) scheme**.
- According to government data, **millions of farmers receive concessional short-term loans through KCC**, supported by the **Modified Interest Subvention Scheme (MISS)**.
- The scheme is also being expanded to cover **allied activities such as animal husbandry, dairying and fisheries**, thereby improving credit access for rural livelihoods.

What is the Kisan Credit Card Scheme?

The **Kisan Credit Card (KCC) scheme** is a government initiative designed to provide **timely and affordable institutional credit to farmers** for agricultural and allied activities.

- Introduced in **1998**.
- Developed by **NABARD on the recommendations of the R.V. Gupta Committee**.

Major Objectives of the Scheme

The scheme aims to:

1. Ensure **timely availability of credit** for agricultural operations.
2. Provide **affordable institutional finance** to farmers.
3. Reduce dependence on **informal credit sources**.
4. Support **agricultural productivity and rural livelihoods**.

Activities Covered Under KCC

Loans obtained through KCC can be used for:

Agricultural Activities

- Purchase of seeds, fertilisers, pesticides.
- Cultivation and crop production.
- Post-harvest expenses.

Marketing Needs

- Financing against **warehouse receipts**.
- Bridging funds until produce is sold.

Farm Maintenance

- Repair and maintenance of farm equipment.
- Working capital for farm assets.

Allied Activities

- Dairy
- Fisheries
- Poultry
- Animal husbandry

These allied sectors were **formally included in the KCC scheme in 2019**.

Key Features of the Scheme

1. Revolving Credit Facility

Farmers receive a **credit limit based on landholding, crop pattern and scale of finance**.

- The credit facility generally operates as a **revolving cash credit system**.

2. Validity Period

- The **validity of a KCC is typically 5 years**, subject to periodic review by banks.

3. Flexible Withdrawals

Farmers can withdraw funds multiple times within the credit limit.

4. RuPay Debit Card

KCC has been converted into an **ATM-enabled RuPay debit card** allowing easy withdrawal and payments.

5. Simplified Documentation

- One-time documentation.
- Built-in credit limit enhancement.

6. Loan Limits Under KCC

- Farmers can avail **short-term agricultural loans up to ₹3 lakh through KCC at subsidised interest rates**.
- The government has also proposed **enhancing the loan limit up to ₹5 lakh** to meet farmers' increasing financial needs.

Collateral-Free Loans

- Loans **up to ₹1.6 lakh can be provided without collateral**.

7. Interest Rate and Subsidy

The government supports KCC loans through the **Modified Interest Subvention Scheme (MISS)**.

Interest Structure

- Base interest rate: **7% per annum**.

Interest Subvention

- **1.5% interest subvention** provided to lending institutions.

Prompt Repayment Incentive

- Farmers who repay loans on time receive an **additional 3% incentive**.

Effective Interest Rate

- Reduced to **4% per annum** for prompt repayment.

Types of Credit Provided

KCC provides two major types of credit:

1. Cash Credit (Working Capital)

Used for:

- Seeds
- Fertilizers
- Pesticides
- Labour expenses

2. Term Credit

Used for:

- Farm equipment
- Irrigation systems
- Dairy animals
- Plantation or land development.

Eligible Beneficiaries

The scheme covers a wide range of farmers to ensure inclusivity.

Eligible categories include:

- Individual farmers (owner cultivators)
- Tenant farmers
- Oral lessees
- Sharecroppers
- Self Help Groups (SHGs)
- Joint Liability Groups (JLGs).

This allows **even landless or informal cultivators to access credit**.

Extension to Allied Sectors

In **2019**, the scheme was extended to include:

- Animal husbandry
- Dairying

- Fisheries.

The purpose was to provide **working capital to farmers engaged in allied rural activities**.

Role of the Modified Interest Subvention Scheme (MISS)

To make credit affordable, the government introduced the **Interest Subvention Scheme (ISS)** in 2006. It was later modified as the **Modified Interest Subvention Scheme (MISS)**.

How MISS Works

Under MISS:

1. Farmers get **short-term agricultural loans through KCC at a subsidised interest rate of 7% per annum**.
2. The government provides **1.5% interest subvention to banks** to compensate for reduced interest rates.
3. Farmers who repay their loans on time receive an additional **3% Prompt Repayment Incentive (PRI)**.

Effective Interest Rate

- Base interest rate: **7%**
- Prompt repayment incentive: **3%**

Final effective interest rate for farmers:
4% per annum.

Coverage of MISS

MISS covers:

- Short-term crop loans up to **₹3 lakh** through KCC.

It also supports:

- Animal husbandry
- Dairying
- Fisheries (up to ₹2 lakh working capital within overall limit).

Institutional Framework / Nodal Agencies

The KCC scheme involves multiple institutions.

Policy Level

Ministry of Agriculture and Farmers Welfare

- Overall policy framework.
- Oversees the **Modified Interest Subvention Scheme**.

Financial Sector Institutions

Department of Financial Services (DFS)

- Coordinates agricultural credit policy.

NABARD

- Designed the original KCC model.
- Provides guidelines and monitoring support.

Reserve Bank of India (RBI)

- Regulates agricultural lending targets.

Implementing Institutions

Loans are issued through:

- Public sector banks
- Private banks

- Regional Rural Banks (RRBs)
- Cooperative banks
- Primary Agricultural Credit Societies (PACS).

Insurance and Additional Benefits

KCC holders may also receive access to:

- Crop insurance
- Personal accident insurance
- Asset insurance
- Health insurance (depending on bank products)

These benefits help **reduce financial risks associated with farming**.

Achievements of the Scheme

Coverage

- As of **March 2024**, India had **7.75 crore operational KCC accounts**.

Outstanding Loan

- Total outstanding loan amount under KCC was about **₹9.81 lakh crore**.

Inclusion of Allied Sectors

- The scheme now supports **fisheries and animal husbandry**, expanding rural credit access.

Significance of the KCC Scheme

1. Promotes Institutional Credit

Helps farmers access bank credit instead of informal lenders.

2. Improves Agricultural Productivity

Ensures availability of funds for inputs and operations.

3. Supports Rural Livelihoods

Includes allied sectors such as dairy and fisheries.

4. Enhances Financial Inclusion

Provides credit access to small and marginal farmers.

Challenges

1. **Low awareness among farmers** in some regions.
2. **Regional disparities** in credit access.
3. Rising **farmer indebtedness** in some states.
4. Limited coverage of **tenant farmers without formal documentation**.

Way Forward

Experts suggest:

- Expanding coverage of **tenant farmers and sharecroppers**.
- Increasing **credit limits and flexibility**.
- Integrating KCC with **digital agriculture platforms**.
- Strengthening linkage with **crop insurance schemes like PMFBY**.

Digital Monitoring: Kisan Rin Portal

To modernize KCC implementation, the government launched the **Kisan Rin Portal (KRP) in September 2023**.

Functions of the Portal

The portal integrates:

- Farmer profiles
- Loan disbursement data
- Interest subvention claims
- Performance monitoring.

This improves:

- Transparency
- Real-time monitoring
- Efficient subsidy disbursement.

Credit Limit and Loan Conditions

Loan Limit

- Short-term crop loan: **up to ₹3 lakh**.

Collateral Requirement

- Loans up to **₹1.6 lakh are collateral-free**.

Flexible KCC for Marginal Farmers

- Small farmers can access **Flexi KCC loans of ₹10,000–₹50,000**.

The **loan limit under the Kisan Credit Card (KCC) has been enhanced to ₹5 lakh**. This is an important **recent policy update (Union Budget 2025-26)** and should definitely be reflected in your notes.

Latest Update on KCC Loan Limit

- The Government **enhanced the loan limit under the Kisan Credit Card (KCC) scheme from ₹3 lakh to ₹5 lakh**.
- This increase applies particularly to **short-term agricultural loans covered under the Modified Interest Subvention Scheme (MISS)**.

Other Related Changes

The same reform package also introduced:

1. **Collateral-free credit limit increased**
   - From **₹1.6 lakh → ₹2 lakh per borrower**.
2. **Loan limit for fisheries and allied activities increased**
   - From **₹2 lakh → ₹5 lakh**.
3. **Interest rate structure remains unchanged**
   - Crop loans at **7% interest**.
   - **3% additional incentive for prompt repayment**.
   - Effective interest rate: **4% per annum**.

Additional Government Initiatives Linked to KCC

KCC Saturation Drive

- Launched under **Atmanirbhar Bharat Abhiyan**.
- Aim: Provide KCC to **all eligible farmers including PM-KISAN beneficiaries**.

KCC Campaign for Allied Activities

Nationwide campaigns conducted to extend KCC to:

- Animal husbandry farmers
- Dairy farmers
- Fishery farmers.

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Fiscal Health Index (FHI)

NITI Aayog has released the **second edition of the Fiscal Health Index (FHI) in 2026**, following the **first edition released in 2025**. The index evaluates the **fiscal performance and sustainability of Indian states** and aims to strengthen **fiscal transparency and policy planning**.

Fiscal Health Index 2025 (First Edition)

The **Fiscal Health Index (FHI) 2025** was released by **NITI Aayog in January 2025**.

It is a **composite index designed to assess the fiscal health of Indian states** using key fiscal indicators.

The index evaluates **18 major states**, which together account for the bulk of India's **GDP, population, and public expenditure**.

The report aims to:

- assess fiscal sustainability of states
- identify fiscal strengths and weaknesses
- support **evidence-based policymaking**
- encourage **competitive federalism in fiscal management**

Indicators Used in Fiscal Health Index

The index evaluates state finances using **five broad pillars**, each containing multiple indicators.

Pillar	Indicators Considered
Quality of Expenditure	Capital expenditure ratio, developmental expenditure ratio
Revenue Mobilisation	Own tax revenue to GSDP, non-tax revenue to GSDP
Fiscal Prudence	Fiscal deficit to GSDP, revenue deficit to GSDP, primary deficit
Debt Index	Outstanding liabilities to GSDP, interest payments to revenue receipts
Debt Sustainability	Debt stability indicators and ability to service debt

These indicators collectively capture **how states raise resources, how they spend them, and whether their borrowing is sustainable**.

Classification of States

Based on their overall score, states are grouped into four categories:

Category	Score Range
Achievers	> 50
Front Runners	40–50
Performers	25–40
Aspirational	< 25

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Key Findings of FHI 2025

Top Performing States

The states with the strongest fiscal performance were:

1. **Odisha**
2. **Chhattisgarh**
3. **Goa**
4. **Jharkhand**

Odisha ranked first due to:

- strong revenue mobilisation

- high capital expenditure
- relatively sustainable debt profile.

Front Runner States

States such as **Maharashtra, Uttar Pradesh, Telangana, Madhya Pradesh, and Karnataka** performed well but did not reach the "Achiever" category.

Key Observations

The report highlighted several structural patterns:

- Some states demonstrate **strong fiscal prudence and debt sustainability**.
- High capital expenditure correlates with **better fiscal health**.
- A number of states face challenges such as:
  - high debt levels
  - persistent revenue deficits
  - limited own-tax revenue mobilisation.

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Fiscal Health Index 2026 (Second Edition)

The **second edition of the Fiscal Health Index (FHI) 2026** was released by **NITI Aayog in March 2026**. It continues the framework established in the 2025 edition and again evaluates **18 major states along with 10 more states** using the same fiscal indicators.

The objective of the 2026 edition is to:

- track **changes in fiscal performance of states**
- highlight emerging fiscal vulnerabilities
- provide policy guidance for improving state finances.

Difference between Fiscal Health Index 2025 and Fiscal Health Index 2026

Feature	**Fiscal Health Index 2025**	**Fiscal Health Index 2026**
Edition	**First edition** of the index	**Second annual edition**
Releasing body	NITI Aayog	Same
Coverage	**18 major states only**	**Expanded coverage**
Additional states	Not included	**10 North-Eastern and Himalayan states added**
Total states assessed	18	**28 states (18 major + 10 NE & Himalayan)**
Ranking approach	Single ranking of 18 major states	**Two separate rankings:** 1) Major states 2) North-Eastern & Himalayan states
Purpose	Establish baseline framework for evaluating state fiscal health	Make the index **more inclusive and representative of India's fiscal diversity**
Methodology	Five pillars	Same five pillars retained

The **methodology and indicators did not change** between the two editions.

Expansion in the 2026 Edition

The **2026 edition expanded the index to include the North-Eastern and Himalayan states**. These states were **ranked separately** because their fiscal structures differ significantly from larger states (smaller economies, higher central transfers, geographic constraints).

Newly included states

Examples include states such as:

- Arunachal Pradesh
- Assam
- Manipur
- Meghalaya
- Mizoram
- Nagaland
- Tripura
- Sikkim
- Himachal Pradesh
- Uttarakhand

This addition makes the index **more representative of India's fiscal diversity**.

What Stayed the Same

Despite the expanded coverage, the **analytical framework remained unchanged**.

The index continues to evaluate states using **five pillars**:

Pillar	Purpose
Quality of Expenditure	Measures efficiency of public spending
Revenue Mobilisation	Assesses states' ability to generate own revenues
Fiscal Prudence	Evaluates deficits and borrowing discipline
Debt Index	Measures debt burden
Debt Sustainability	Assesses long-term debt servicing capacity

Key Findings of FHI 2026

Top States

The best performing states were:

1. **Odisha**
2. **Goa**
3. **Jharkhand**
4. **Gujarat**
5. **Maharashtra**

Odisha retained the **top position**, indicating sustained fiscal discipline.

Findings for Newly Added States

Top Performing States

Among the newly included states, the best fiscal performers were:

Rank	State	Key Strength
1	Arunachal Pradesh	Strong expenditure quality and prudent debt management
2	Uttarakhand	Strong own-revenue mobilisation
3	Tripura	Balanced fiscal management
4	Meghalaya	Moderate fiscal discipline
5	Assam	Improving fiscal indicators

Arunachal Pradesh emerged as the **top performer among North-Eastern and Himalayan states**, reflecting improved revenue generation and responsible fiscal management.

Major Observations

1. **Capital expenditure remains a key driver of fiscal strength**, reflecting long-term investment in infrastructure.

2. **States with stronger own-tax revenue mobilisation perform better in fiscal health rankings**, highlighting the importance of fiscal autonomy.
3. **Debt sustainability remains a concern for several states**, particularly those with high revenue deficits.
4. Some states continue to experience **fiscal stress due to rising liabilities and high interest payments**.

Importance of the Fiscal Health Index

The index serves multiple policy functions.

First, it provides a **comparative framework to evaluate fiscal management across states**.

Second, it supports **better fiscal planning by identifying structural weaknesses in state finances**.

Third, it strengthens **cooperative and competitive federalism**, encouraging states to adopt better fiscal practices.

Finally, the index improves **transparency and accountability in public finance management**.

Limitations

Despite its usefulness, the index has some limitations.

Fiscal indicators do not fully capture **development outcomes or social sector impacts**. States with large welfare spending may appear fiscally weaker despite positive social outcomes.

Differences in **economic structure and revenue capacity among states** also affect comparability.

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Most Business-Friendly Countries in 2026

(StartupBlink Innovators Business Environment Index 2026)

About the Index

The **Innovators Business Environment Index (IBEI)** is published by **StartupBlink**, a global startup ecosystem research platform.

- It evaluates how favourable countries are for **entrepreneurship, startups, and innovation-driven businesses**.
- The ranking is based on multiple indicators such as:
    - regulatory environment
    - ease of starting and operating businesses
    - access to funding
    - digital infrastructure
    - taxation policies
    - innovation ecosystem support.

The index helps governments, investors and entrepreneurs identify **locations with supportive business ecosystems**.

Top 10 Most Business-Friendly Countries (2026)

According to the **StartupBlink IBEI 2026**, the top countries are:

1. **United States** – Score: 100
2. **Singapore** – 99.145
3. **United Kingdom** – 93.900
4. **Switzerland** – 86.901
5. **United Arab Emirates** – 86.222

6. **Canada** – 86.144
7. **Netherlands** – 85.715
8. **Japan** – 83.644
9. **Saudi Arabia** – 82.880
10. **Estonia** – 78.997

Key Insights from the Ranking

1. Dominance of advanced economies

The **US, Singapore, and the UK** dominate the rankings due to strong innovation ecosystems, venture capital availability, and favourable business regulations.

2. Strong presence of Europe

Several European economies feature prominently:

- United Kingdom
- Switzerland
- Netherlands
- Estonia

This reflects the region's mature regulatory frameworks and innovation support systems.

3. Rising Middle Eastern influence

Countries like:

- **UAE**
- **Saudi Arabia**

have climbed in the rankings due to aggressive policies aimed at attracting startups, foreign investment, and technology firms.

4. Asia's innovation hubs

Singapore and Japan highlight Asia's growing role in global startup ecosystems.

Why the United States ranks first

The United States remains the top business-friendly country due to:

- large domestic market
- deep venture capital ecosystem
- strong innovation culture
- world-leading tech companies and research institutions.

India's Position

The article notes that **India at 54th position, ranks ahead of China** in the Innovators Business Environment Index, reflecting improvements in its startup ecosystem and policy environment for entrepreneurs.

India has benefited from initiatives such as:

- Startup India
- Digital Public Infrastructure
- expansion of venture capital and startup ecosystems.

Factors that make a country business-friendly

The StartupBlink framework emphasises several critical factors:

Regulatory environment

- ease of starting businesses
- licensing procedures

- regulatory transparency.

Financial ecosystem

- venture capital availability
- startup funding access
- banking and credit systems.

Infrastructure

- digital infrastructure
- internet connectivity
- innovation clusters.

Talent ecosystem

- skilled workforce
- research institutions
- entrepreneurial culture.

Broader Trends

Shift towards innovation-led economies

Countries are competing to attract:

- startups
- technology companies
- digital entrepreneurs.

Startup ecosystems as growth engines

Strong startup ecosystems are now seen as key drivers of:

- economic growth
- job creation
- technological leadership.

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GCC Strategy & AI Roadmap under EASE 9.0 Reforms

Public Sector Banks (PSBs) in India are preparing to implement a **Global Capability Centre (GCC) strategy and AI-driven technology roadmap** under the **EASE 9.0 reforms agenda**.

The objective is to modernise PSBs by leveraging **advanced technology, digital infrastructure, and new business models**.

What is EASE?

EASE (Enhanced Access and Service Excellence) is a reform programme for Public Sector Banks launched by the **Department of Financial Services (DFS)** to improve governance, efficiency and customer service.

EASE 9.0 (2026)

The latest phase focuses on transforming PSBs into **globally competitive institutions** through technology integration and operational excellence.

Core Pillars of EASE 9.0 (R.I.S.E Framework)

EASE 9.0 reforms are structured around four pillars:

1. **Risk & Resilience**
    - stronger risk management frameworks
    - improved financial and operational resilience
2. **Innovation**

- adoption of AI, machine learning and cloud technologies

3. **Socio-economic Impact**
   - inclusive banking
   - financial services for underserved sectors
4. **Excellence**
   - improved governance
   - customer-centric service delivery.

Global Capability Centre (GCC) Strategy

Under EASE 9.0, PSBs will develop **Global Capability Centres (GCCs)** starting FY 2026–27.

What are GCCs?

GCCs are specialised centres that perform high-value functions such as:

- technology development
- data analytics
- risk management
- cybersecurity
- innovation and research.

They act as **strategic hubs for advanced capabilities** rather than just support centres.

Leadership

- **State Bank of India (SBI)** has already set up the first GCC among PSBs and will lead the initiative.

Technology Modernisation under EASE 9.0

PSBs will adopt several advanced technologies:

AI infrastructure

- development of **core AI stacks**
- licensing of **Large Language Models (LLMs)**
- use of **GPUs for AI computing**
- deployment of **private cloud infrastructure**.

Data management

- enterprise-wide **consent management frameworks**
- **data tokenisation and anonymisation** for secure data use.

Digital resilience

- adoption of **active-active data centre architecture** to ensure uninterrupted banking operations.

Use of AI in Banking Operations

AI will be integrated across banking functions such as:

- **fraud detection systems**
- **risk assessment models**
- **credit underwriting and analytics**
- **customer service automation**
- **transaction monitoring and compliance**.

These technologies are expected to enhance productivity and reduce operational risk.

Collaboration among PSBs

Public sector banks may collaborate to develop:

- shared banking solutions
- blockchain-enabled financial services
- advanced analytics systems for fraud detection and risk management.

This cooperative approach aims to improve **efficiency and scalability** across the banking sector.

Importance of GCCs in BFSI Sector

India is emerging as a major hub for **BFSI Global Capability Centres**.

- Around **185–190 BFSI GCCs operate in India**.
- They employ about **540,000 professionals**.
- The sector is projected to reach **$125 billion by 2032**.

These centres are important for innovation in:

- AI
- cybersecurity
- fintech
- regulatory technology.

Strategic Significance

Modernising Public Sector Banks

EASE 9.0 aims to transform PSBs into **technology-driven and globally competitive institutions**.

AI-driven banking ecosystem

Integration of AI and advanced analytics will improve:

- operational efficiency
- customer experience
- fraud detection.

Financial sector resilience

Digital infrastructure and data governance will enhance **cybersecurity and systemic stability**.

Supporting India's digital economy

Technology-enabled banking will facilitate:

- financial inclusion
- digital payments
- fintech innovation.

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16th Finance Commission (2026–31)

Constitutional Background

The **Finance Commission (FC)** is a **constitutional body under Article 280 of the Constitution**. It is constituted by the **President every five years** to recommend how financial resources should be shared between the Union and the States.

Core Functions

The FC recommends:

1. **Vertical devolution** – distribution of tax revenues between **Centre and States**.
2. **Horizontal devolution** – distribution of states' share **among individual states**.
3. **Grants-in-aid** to states from the **Consolidated Fund of India**.
4. Measures to **augment resources of Panchayats and Municipalities**.

16th Finance Commission –

Feature	Details
Chairman	Dr. Arvind Panagariya
Period covered	2026–27 to 2030–31
Report tabled	1 February 2026

Constitutional basis	Article 280

Vertical Devolution (Centre → States)

The **share of states in the divisible pool of central taxes remains 41%**, same as recommended by the 15th Finance Commission.

Divisible Pool

Divisible pool = **gross tax revenue – cesses, surcharges, cost of collection**.

Significance

- Maintains **continuity in fiscal federalism**.
- Provides **stable transfers to states**.

Horizontal Devolution – Criteria for Distribution among States

The Commission determines how the 41% share is distributed among states using a formula.

Weightage Formula (16th FC)

Criterion	Weight
Income Distance	42.5%
Population (2011)	17.5%
Demographic Performance	10%
Area	10%
Forest & Ecology	10%
Contribution to GDP	10%

Major Changes from 15th Finance Commission

1. Introduction of "Contribution to GDP"

A **new parameter** rewarding states that contribute more to national economic output.

- Replaces **"Tax and Fiscal Effort"** used earlier.
- Gives incentive for **growth-oriented states**.

2. Modified Income Distance

Income distance measures the **gap between a state's per-capita GSDP and that of richer states**.

Purpose:

- Promotes **equity by giving poorer states larger transfers**.

3. Revised Demographic Criterion

Instead of fertility rate, demographic performance now considers **population growth between 1971–2011**.

Goal:

- Reward states that managed population growth.

4. Expanded Forest Criteria

The commission considers:

- forest area share
- increase in forest cover

It also includes **open forests**, unlike the 15th FC.

Grants-in-Aid Recommendations

The Commission recommended **₹9.47 lakh crore in grants over five years**.

Types of Grants

Local Body Grants

- Rural local bodies – ₹4.4 lakh crore
- Urban local bodies – ₹3.6 lakh crore

Structure:

- **80% basic grants**
- **20% performance-linked grants**

Special grants for cities include:

- **Urban infrastructure grants**
- **Urbanisation premium grants**

Disaster Management Grants

Provided to strengthen disaster response and mitigation systems.

Grants discontinued

Compared with the 15th FC, the 16th FC **discontinued several grants**, including:

- revenue deficit grants
- sector-specific grants
- state-specific grants

Purpose: encourage **fiscal discipline and efficiency**.

Fiscal Consolidation Roadmap

Fiscal deficit targets

- **States**: deficit capped at **3% of GSDP**.
- **Centre**: reduce deficit to **3.5% of GDP by 2030-31**.

Debt projections

Combined Centre + State debt expected to decline from **77.3% to 73.1% of GDP** over the period.

Key Fiscal Discipline Measures

The Commission recommended:

1. **Ending off-budget borrowings** by states.
2. Including all such borrowings in official fiscal deficit.
3. Improving transparency in state finances.

Power Sector Reforms

States were advised to pursue **privatisation of electricity distribution companies (DISCOMs)** to improve financial sustainability.

Impact on Federalism

Positive effects

1. Promotes **cooperative fiscal federalism**.
2. Encourages **growth and efficiency in states**.
3. Supports **urbanisation and local governance**.
4. Enhances **transparency in fiscal management**.

Criticisms and Debates

Concerns of some states

- Reduction of **income distance weightage** affects poorer states.
- GDP criterion favours **economically advanced states**.

Cesses and surcharges issue

Cesses and surcharges are **not shareable**, reducing effective transfers to states.

Comparison – 15th vs 16th Finance Commission

Feature	15th FC	16th FC
Period	2021–26	2026–31
Vertical devolution	41%	41%
New criterion	None	Contribution to GDP
Revenue deficit grants	Yes	Discontinued
Fiscal discipline	Moderate	Strong emphasis

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New Series of GDP

Gross Domestic Product (GDP) refers to the total monetary value of all final goods and services produced within the domestic territory of a country during a specific accounting period. When comparing economic performance across different time periods, it is essential that the same measurement concepts, methods, and data sources are used. Without methodological consistency, comparisons of growth rates would not be meaningful.

In the context of **National Accounts Statistics**, the ***base year*** is the reference year whose prices are used to calculate real (constant price) growth**. Real GDP** estimates eliminate the effect of price changes by valuing output using prices prevailing in the base year.

The process of changing the base year is known as ***rebasing***. Rebasing involves updating the benchmark year and incorporating the latest available data, improved methodologies, and revised classifications in order to reflect the current structure of the economy. This exercise affects not only GDP and its components but also other macroeconomic indicators such as the Consumer Price Index (CPI) and the Index of Industrial Production (IIP).

At the time of base year revision, the methodology and data sources used for compiling GDP and other macroeconomic indicators are finalized. These methods remain in use until the next base year revision. Since the structure of the economy evolves over time due to technological changes, sectoral shifts, formalization, and new forms of economic activity, periodic updating of the base year becomes necessary. This ensures that national income estimates remain accurate and reflective of contemporary economic realities. It also enables the use of newer datasets and improved statistical techniques.

Under normal circumstances, the Ministry of Statistics and Programme Implementation (MoSPI) aims to **revise the base year approximately every five years,** in line with international best practices.

The current revision changes the base year from 2011–12 to 2022–23. Although MoSPI generally follows a five-year cycle, suitable conditions were not available in earlier years. Financial Year 2017–18 was affected by the introduction of the Goods and Services Tax (GST), which significantly altered the indirect tax structure and required time for data stabilization and consolidation. Financial Years 2019–20 and 2020–21 were heavily impacted by the COVID-19 pandemic, making them unsuitable as representative normal years. Financial Year 2021–22 experienced unusually high GDP growth due to the statistical base effect following the pandemic-induced contraction, and therefore did not reflect normal economic conditions. After extensive deliberations, the Advisory Committee on National Accounts Statistics recommended 2022–23 as the new base year. It determined that 2022–23 represented a relatively normal year with adequate availability of key survey data necessary for national income estimation.

With regard to the **back-series data** under the new GDP series, annual and quarterly estimates for the period 2022–23 to 2025–26 were released on 27 February 2026. The complete back-series is **expected to be released by December 2026**. In India, the standard practice is to recalculate historical GDP data using

the revised methodology up to the previous base year. Beyond that point, the data are linked at a detailed (disaggregated) level and extended backward up to 1950–51. However, the final approach for constructing the back-series will be finalized in consultation with the Advisory Committee constituted to guide MoSPI.

In terms of **international comparability**, India compiles its national accounts in accordance with the **2008 System of National Accounts (SNA 2008**), which is the globally accepted framework developed under the auspices of the United Nations. The United Nations Statistical Division is currently transitioning toward **SNA 2025, and countries are expected to adopt the new framework around 2029–30**. India intends to shift to
SNA 2025 **during its next base year revision**. Additionally, India is a participant in the International Monetary Fund's Special Data Dissemination Standard (SDDS), which signifies adherence to high standards of statistical transparency and reliability. The revised GDP series remains consistent with prevailing international statistical norms.

CHANGES IN THE NEW GDP SERIES (BASE YEAR 2022–23)

1. Measurement of the Household Sector — A Major Structural Improvement

In earlier GDP series, the household sector — especially informal economic activity — was often estimated indirectly using base-year ratios and extrapolation. This meant that real changes in informal employment, self-employment, and small enterprises were not captured dynamically.
The new GDP series fundamentally changes this approach.
Instead of extrapolating from the base year, **actual annual level estimates are now prepared using largescale national surveys**, mainly:

- Annual Survey of Unincorporated Sector Enterprises (ASUSE)
- Periodic Labour Force Survey (PLFS)

This shift is extremely important conceptually.
It means the household sector — which includes:

- small informal firms
- self-employed individuals
- household production units
- gig workers

— is now measured using **current real data each year**, rather than being statistically projected from past values.
This improves both:

- accuracy
- responsiveness to structural change

The coverage of economic activities has also become more detailed. For example, ASUSE includes **dedicated economic activity codes for gig economy workers**, such as aggregator drivers and delivery service workers.
This reflects recognition that modern economic activity is changing rapidly, and national accounts must evolve to measure platform-based employment and digital services properly.

2. Reform of Deflation Methods — Elimination of Single Deflation

To measure **real GDP**, nominal values must be adjusted for price changes. This adjustment is called **deflation**.
In the earlier GDP series, deflation was often applied in an aggregate or simplified manner, typically using a single price index for a sector. This could distort real growth measurement when input prices and output prices move differently.

The new GDP series removes this limitation.

Double deflation introduced

In sectors such as manufacturing and agriculture:

- Output is deflated separately using output price indices
- Inputs are deflated separately using input price indices

Real value added = real output − real inputs

This provides a more accurate measure of real production.

Why is this important?

Suppose:

- output prices rise slowly
- input costs rise rapidly

Under single deflation, profit changes may appear as output change.

Double deflation avoids this distortion.

This reform reflects international best practice in national accounting.

Granular deflation

Deflators are now applied at a more detailed level (item-level or sector-specific), rather than broad averages. Earlier around 180 indicators, now close to 600 indicators.

This improves:

- price adjustment accuracy
- sectoral real growth estimates

3. Continued Use of WPI and Future Introduction of PPI

The base year revision of the Wholesale Price Index (WPI) is still ongoing. Therefore, the existing WPI series continues to be used as a deflator. The old base year being used is still of controversy.

However, the method of using WPI has changed:

- Earlier → aggregate level use
- Now → item-level use
- Separate WPI for output and intermediate consumption in manufacturing This is consistent with double deflation.

In the future, India plans to incorporate the **Producer Price Index (PPI)**, which measures price changes faced by producers. This will further improve inflation adjustment accuracy.

4. Improvements in Estimation of the General Government Sector

Government services are typically non-market activities. Therefore, their output is measured using costbased methods rather than market prices.

The new GDP series improves measurement of the general government sector in several ways:

Pension adjustments

India now has coexistence of:

- Old Pension Scheme (OPS)
- National Pension System (NPS)

Government expenditure must account for this transition properly. The new series introduces adjustments to reflect pension liabilities more accurately. **Imputed government accommodation**

Government-provided housing (in lieu of House Rent Allowance) is now valued and included appropriately in output measurement.

Better coverage of local bodies and autonomous institutions

Earlier under-coverage has been corrected.

Improved subsidy estimation

Product subsidies at constant prices are now estimated using **volume extrapolation methods**, which improves real value measurement.

Overall, government activity is now captured more comprehensively and realistically.

5. Improved Estimation of Private Final Consumption Expenditure (PFCE)

A blended approach is now used to estimate PFCE, integrating expanded use of the Household Consumer Expenditure Survey with direct estimates derived from production and administrative data, along with the commodity flow method. The revised framework also adopts the updated COICOP 2018 classification. The Classification of Individual Consumption According to Purpose (COICOP) serves as the internationally accepted standard for categorizing household consumption expenditure.

6. Major Reform in Quarterly GDP Estimation

Quarterly GDP estimation is necessary for tracking short-term economic performance.

The new series introduces an important statistical reform:

replacement of Pro-Rata benchmarking with Proportional Denton benchmarking.

What was the problem earlier?

Pro-rata methods created artificial jumps between quarters — known as the "step problem".

What does Denton method do?

It smooths the quarterly path while preserving consistency with annual totals.

This produces:

- more realistic short-term trends
- elimination of artificial discontinuities
- better economic interpretation

This is a technical but highly significant improvement in time-series consistency.

7. Expanded Data Sources in Quarterly GDP Compilation

The new GDP series uses more comprehensive and high-frequency data.

A key example is **GST data**, which captures outward taxable supply across economic sectors. This provides real-time information on business activity.

In addition:

- Financial sector measured using FISIM approach
- Product taxes and subsidies estimated using improved volume indicators
- Gross Fixed Capital Formation estimation aligned with annual accounts
- Trade in services estimation improved

This means quarterly GDP is now built on a broader empirical foundation.

8. Sectoral Coverage of the Revised Framework

The updated quarterly compilation framework, along with various sector-specific improvements, has been brought into closer alignment with the Annual National Accounts methodology. This alignment covers sectoral classification, deflation methods, and estimation techniques, thereby improving consistency between quarterly and annual estimates of GDP and Gross Value Added (GVA).

In particular, price deflators such as the Consumer Price Index (CPI), Wholesale Price Index (WPI), and Unit Value Index are now applied at a more detailed level. Unlike the earlier series, which used aggregate-level deflators, the revised series applies them at the item-group level for greater precision.

9. Inclusion of Hired Domestic Workers in GDP Estimation

Services provided by hired domestic workers are categorized under "activities of households as employers of domestic personnel" and are included in GDP calculations. Their contribution is estimated using annually collected data on the number of such workers and their wages.

10. Capturing Digital, Platform, and Gig Economy Activities in the Revised GDP Series

Digital services, intermediary platforms, and related corporate-sector activities were already captured through MCA-21 filings—an e-governance system that provides company registration, document filing, and public access to corporate information through a secure interactive portal. The revised series expands coverage to include unincorporated enterprises, self-employed individuals, and informal workers, enabling a more comprehensive annual measurement of their contribution to GDP.

11. Benchmark-Indicator Method for Quarterly GDP

India follows the internationally accepted benchmark-indicator approach.

Mechanism:

- Annual GDP serves as benchmark
- High-frequency indicators distribute output across quarters This method follows SNA 2008 and IMF guidelines.

The new series improves stability through:

- more indicators
- greater granularity
- improved benchmarking

12. Revision of Previously Published Estimates

When base year and methodology change, past estimates are recalculated.

Therefore, GDP estimates from 2022–23 onward are revised under the new framework.

This ensures comparability within the new statistical system.

13. Role of MoSPI in State GDP (GSDP)

When national GDP base year is revised, States and Union Territories must also revise their GSDP base year. MoSPI provides methodological guidance so that state estimates remain consistent with national accounts. This ensures comparability across federal levels.

14. Integration of Supply and Use Tables (SUT): The SUT framework has been aligned with National Accounts to reduce discrepancies between production- and expenditure-based GDP estimates. By matching total supply with total demand, this approach improves internal consistency.

Supply and Use Tables (SUT) are a core accounting framework used in national income estimation to ensure internal consistency of the economy.

They present a **comprehensive and balanced picture of the flow of goods and services** in the economy by answering two fundamental questions:

1. **Where do goods and services come from? (Supply side)** 2. **Where are they used? (Use side)**

Thus, SUT is a detailed economy-wide matrix that records:

Supply of goods and services

- Domestic production (by industries)
- Imports

Use of goods and services

- Intermediate consumption (used in production)
- Final consumption (households, government)
- Capital formation (investment)

- Exports

For each product, **total supply must equal total use**.
This balancing principle is central to national accounting.

Why SUT is important in GDP estimation GDP can be measured using three approaches:

- Production approach
- Income approach
- Expenditure approach

In practice, these estimates often differ due to:

- data gaps
- timing differences
- reporting inconsistencies
- estimation methods

Supply and Use Tables act as a **reconciliation mechanism**.
They help ensure that:

- production of goods matches their use
- sectoral estimates are internally consistent
- statistical discrepancies are minimized

Thus, SUT provides the **integrated backbone of national accounts**.
In short, SUT is now used more rigorously as the **central balancing tool of GDP compilation**.

Why this change was necessary
Modern economies are complex. Several structural developments have made simple estimation methods insufficient:

- expansion of services sector
- global value chains
- digital economy
- informal-formal interlinkages
- rapid structural transformation

When data come from many sources, inconsistencies naturally arise.
Without systematic reconciliation, GDP estimates may contain hidden imbalances.
Therefore, strengthening the SUT framework helps address:

1. Fragmented data systems
2. Sectoral interdependence
3. Need for integrated macroeconomic accounting
4. International best practice requirements (SNA framework emphasises SUT)

The reform ensures that national accounts reflect the **true structure of economic flows**, not just aggregated totals.

Revised Gdp Estimates Under The New Series

Real GDP (Constant Prices)

- **FY 2025–26:** Estimated to grow at **7.6%**, which is higher than the **7.1% recorded in FY 2024–25**. This indicates that, even after adopting the new base year and revised methodology, India's economic momentum remains strong and shows a modest upward adjustment in estimated growth.

Sectoral Performance Highlights Primary, Secondary, and Tertiary Sectors

- **Manufacturing:** Recorded **double-digit growth**, emerging as a key driver of the economy in both FY 2023–24 and FY 2025–26.
- **Secondary and Tertiary Sectors:** Expanded robustly, recording growth rates above 9.0% in FY 2025–26.
- Services (Trade, Transport, Communication, etc.): The 'Trade, Repair, Hotels, Transport, Communication and Services related to Broadcasting and Storage' category alone grew by **10.1%** at constant prices.

This reflects a balanced contribution across sectors, with services and manufacturing acting as principal pillars of growth.

Quarterly Growth Dynamics

- **Q3 (October–December) of FY 2025–26:** Real GDP at constant prices is estimated at **₹84.54 lakh crore**, showing a solid **7.8% growth**.
- This quarterly performance shows an upward trajectory compared to:
  - Q3 of FY 2024–25 (**7.4%**)
  - Q3 of FY 2023–24 (**7.1%**)

The progressive strengthening of quarterly growth indicates sustained resilience in economic activity, even as global headwinds evolve.

Nominal GDP (Current Prices)

Under the new estimates:

- **Nominal GDP** (at current prices) for FY 2025–26 is projected to grow by **8.6%**.

This represents the value of output measured in market prices and suggests healthy price and output expansion combined in the economy.

INDIA–AI IMPACT SUMMIT 2026

The **India–AI Impact Summit 2026** is a major global conference on Artificial Intelligence hosted by India.

- Held **16–20 February 2026** • Venue: **Bharat Mandapam, New Delhi** • Duration: **Five-day global programme** • Covers **policy, research, industry, and public engagement**

It is the **first global AI summit to be hosted in the Global South**, marking a shift in leadership of global AI discussions beyond traditional developed economies.

Conceptual Foundation of the Summit

The summit is built around **three foundational pillars (called "Sutras")**:

1. **People** 2. **Planet** 3. **Progress**

These represent a development-oriented framework for AI, linking technological advancement with:

- human welfare
- environmental sustainability
- inclusive economic growth

Core Objective of the Summit The summit aims to bring together:

- global leaders
- policymakers
- technology companies
- innovators
- researchers to deliberate on the **transformative potential of AI** across:
- governance

- innovation
- sustainable development

The focus is not merely on technological advancement, but on **real-world developmental impact**.

India's Approach to AI — Development-Centric Model India positions AI as a tool for:

- strengthening governance
- improving public service delivery
- enabling inclusive growth at scale

AI is linked to India's long-term national vision:

Viksit Bharat by 2047

India's socio-economic diversity — linguistic, cultural, and demographic — makes it a suitable environment for:

- multilingual AI
- multimodal AI
- public-centric AI applications

This frames AI as a **public development infrastructure**, not just a private technology.

Strategic Policy Purpose

The summit is intended to translate global AI discussions into **practical development outcomes** aligned with:

- IndiaAI Mission
- Digital India Initiative

Thus, the summit is not only a dialogue platform but also a **policy implementation platform**.

Key goals include:

- advancing people-centric AI frameworks
- strengthening multilateral cooperation
- aligning global AI governance with development needs of emerging economies

Global Significance

Hosting the summit in India signals:

- increasing role of the Global South in technology governance
- shift from AI power concentration in developed countries
- broader inclusion in global digital governance

It also demonstrates India's ambition to act as a **bridge between advanced economies and developing countries** in AI governance.

Major thematic focus areas

The **Chakras** broadly address global AI cooperation across:

1. AI for economic growth and social good
2. Democratisation of AI resources and infrastructure
3. Inclusion and social empowerment
4. Safe, trusted and responsible AI governance
5. Human capital and skills development
6. Scientific research and innovation
7. Resilience, efficiency and sustainable deployment

These themes collectively structure global AI policy collaboration.

POLITY AND GOVERNANCE

Transgender Persons (Protection of Rights) Amendment Bill, 2026

Introduction

- In March 2026, the **Ministry of Social Justice and Empowerment** introduced the **Transgender Persons (Protection of Rights) Amendment Bill, 2026**, in the Lok Sabha to amend the 2019 Act.
- The Bill has since been passed by both Houses of Parliament and received the President's **assent**.

TRANSGENDER PERSONS (PROTECTION OF RIGHTS) ACT, 2019

- The act of 2019 was enacted following the judgment of **NALSA v. Union of India (2014),** which provides legal recognition and rights to transgender persons in India.
- **Definition of Transgender:**
    - The act defines a transgender person as one whose **gender** does not match the gender **assigned at birth**.
    - It inclusively covers trans men, trans women, intersex persons, and socio-cultural identities like kinner and hijra, regardless of medical interventions.
- **Identification-**
    - the act provides for the right to self- perceived gender identity
    - A **certificate of identity** is issued by the District Magistrate without any medical examination.
- **Prohibition of Discrimination:**
    - The act forbids discrimination in education, employment, healthcare, and public facilities.
- **Establishment of National Council for Transgender persons for**
    - advising the Central Government on the formulation of policies and programmes and further monitoring and evaluating the impact of such policies and programmes
    - reviewing and coordinating the activities of all the departments of Government and non-Governmental Organisations
    - redressing the grievances of transgender persons;
    - performing such other functions as may be prescribed by the Central Government.
- **Offences & Penalties:**
    - Provides for imprisonment of six months to two years and a fine for offences such as forced labour, abuse, etc.

KEY CHANGES IN THE BILL

- **Definition of Transgender person**
    - The bill removes the self perceived sexual identities from its ambit.
    - It has excluded categories like a trans-man or trans-woman, genderqueer etc.
    - The definition of transgender has narrowed down to include
        - persons with socio cultural identities such as kinner, hijra, etc
        - eunuchs,
        - persons with intersex variations,
        - persons who have been forcibly compelled to assume a transgender identity, etc
- **Introduction of medical certificate**

- The bill replaces the administrative process for identification with a medical board headed by Chief Medical Officer.
- The medical certificate is issued by a medical board certifying the individual's transgender identity.
- It is now mandatory for the District Magistrate to consider the recommendation of the board.

- **Increased Oversight:**
  - Representatives on the **National Council for Transgender Persons** from States/UTs must now hold a minimum rank of **Director** in the relevant Ministry or Department.
- **Increased Punishments:**

  The bill has introduced certain offences
  - Kidnapping an adult to force a transgender identity can lead to a minimum 10 years of rigorous imprisonment, extendable to life. The same offence against a child mandates rigorous imprisonment for life and a minimum fine of Rs 5 lakh.
  - Forcing an adult into begging or bonded labour as a transgender person invites 5-10 years of imprisonment. The same offence against a child attracts 10-14 years of imprisonment.

ARGUMENTS IN FAVOUR

- **Eliminates Ambiguity:**
  - The bill addresses the vague and overbroad definition of transgender persons in the existing law.
- **Ensures Targeted Welfare:**
  - Helps identify genuinely marginalised individuals facing severe social exclusion.
- **Prevents Misuse of Benefits:**
  - Restricts arbitrary claims based on self-identification, ensuring fair allocation of resources.
- **Focus on Objective Criteria:**
  - Emphasizes biological and verifiable factors to identify beneficiaries.
- **Improves Administrative Efficiency:**
  - Facilitates clear verification, better implementation, and accountability in welfare delivery.

ARGUMENTS AGAINST

- **Undermining the NALSA judgment:**
  - **The removal** of self-perceived gender identity contradicts the landmark judgment of the apex court.
  - It thus raises the question about the constitutional validity of the bill
- **Narrow and Exclusionary Definition**
  - Restricts recognition to limited categories (e.g., socio-cultural groups, intersex persons).
  - Excludes trans-men, trans-women, genderqueer etc
- **Medicalization of Identity**
  - Mandatory certification by a **medical board**.
  - Treats gender identity as a **medical condition rather than personal identity**.
- **Violation of Self-Identification Principle**
  - Removes the right to self-identify gender.
  - Seen as a **regressive rollback of rights**.
- **Administrative & Bureaucratic Barriers**

- Multi-layered approval (medical board + District Magistrate).
- May cause:
  - Delays
  - Harassment
  - Reduced access to welfare

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Revised Rules for the Appointment of State DGP

The **Union Public Service Commission** (UPSC) has revised the rules for the empanelment of the State Director General of Police and Head of Police Force.

Key Changes-

- No concept of an acting DGP-
  - Following the apex court's directives, the UPSC has emphasized that acting appointments to the DGP post are not permissible
- Advance Submission-
  - States must send their proposals in anticipation of the vacancies to the UPSC at least **3 months before the incumbent DGP retires**.
- Prior approval for delay
  - State Governments will now have to get the **consent of the Supreme Court for any delay** in submitting the list of DGP-rank officers to the UPSC for empanelment, except in cases of-
    - Death
    - Resignation
    - Premature relieving

Foundation for DGP Reforms

The Supreme Court of India in its landmark judgment of **Prakash Singh v. Union of India** (2006) addressed police reforms and professional autonomy-

- Fixed tenure-
  - In order to ensure no political interference, a minimum tenure was sought for the Inspector General of Police.
  - The selected DGP should have a minimum tenure of **2 years**
- Selection-
  - The process should ensure **merit-based** and transparent selection of the DGP
- Police Establishment Boards –
  - The SC further directed postings of officers to be done by Police Establishment Boards (PEB) comprising of police officers and senior bureaucrats.
- The court also recommended setting up State Police Complaints Authority, State security commission and a national security commission.

Constitutional Mandate

- Police is a **State subject under Entry 2** of the **State List** in the **Seventh Schedule** of the Constitution, however, **Article 32** read with **Article 142** empowers the apex Court to issue such directions, as may be necessary for doing complete justice in any cause or matter.
- **Article 144** mandates all authorities to act in aid of the orders passed by this Court.

Key Directives for DGP Appointment

1. **Selection from UPSC Panel:**
   - DGP must be selected from a **panel of 3 senior IPS officers** proposed by UPSC.
2. **Fixed Tenure:**
   - Minimum **2-year tenure** to prevent frequent or politically motivated changes.
3. **Merit-Based & Insulated from Politics:**
   - Selection based on **seniority, experience, and performance**.
   - Avoids last-minute appointments of officers about to retire.

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Uniform Civil Code

- Aim: To create the single legal framework to governing personal matters such as marriage, divorce, inheritance and live-in relationships regardless of religion.
- Gujarat became the **second state after Uttarakhand** to pass a UCC Bill Uttarakhand became the first state to pass the UCC Bill in February, 2024.
- **About UCC-**
  - The Uniform Civil Code (UCC) is a legal framework in India aiming to replace religion-based personal laws.
  - The idea of UCC in mentioned in Article 44 of the Directive Principles of State Policy in the Constitution of India.
  - It encourages to implement the uniform set of civil laws for all citizens.
  - However, given the non-justiciable nature of DPSPs, the adoption of a Uniform Civil Code depends on the discretion of the States.
- **UCC in Gujarat**
  - Based on the recommendations of the committee, chaired by retired Supreme Court judge Ranjana Prakash Desai on the UCC, Gujarat CM Bhupendra Patel introduced the Bill after its final report was submitted.
  - The bill mandates compulsory registration of marriages and divorces with penalties for non-compliance.
  - The bill includes the registration of live-in relationships and formal procedures for their termination. It grants the legitimacy status to children born out of this union.
  - Exemption- the provisions of UCC will not apply to Scheduled Tribes. groups protected by customary rights
- Implementation in states

  GOA
  - The **only state with a functional UCC**.
  - Follows the **Portuguese Civil Code, 1867**, retained after its integration into India in 1961.

  Uttarakhand
  - Became the **first state to enact a UCC law in independent India.**
  - Covers areas like:
    - Marriage
    - Divorce
    - Succession
    - Live-in relationships

Gujarat

- became the second state in india to approve UCC
- covers areas like:
  - Registration of marriage
  - Registration of live in relationships
  - Legitimacy of children born in live in relationships

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Status of Scheduled Caste Post Conversion

Scheduled Castes (SCs) in the Indian Constitution are historically marginalized groups, defined under Article 366(24) as such castes, races or tribes as are deemed under article 341 to be Scheduled Castes for the purposes of this Constitution.

- Under Article 341, the President of India notifies certain category of castes as Scheduled castes.
- In a Presidential Order issued in 1950, The Constitution (Scheduled Castes) Order, under Article 341 of the Constitution, via Clause 3 introduced a religious dimension stating that No person who professes a religion different from the **Hindu religion** shall be deemed to be a member of a Scheduled Caste.

WHO IS NOTIFIED AS SCHEDULED CASETE

- **Constitution (Scheduled Castes) Order, 1950:**
  - Under Clause 3 of this Order, a person must publicly profess **Hinduism, Sikhism, or Buddhism** to be legally recognized as a member of a Scheduled Caste.
    - *Hinduism* was the only religion included in the original 1950 Order.
    - *Sikhism* was added via a parliamentary amendment in **1956**.
    - *Buddhism* was added via an amendment in **1990**.
- **Strict Exclusions:** Individuals who profess religions such as Christianity, Islam, Judaism, or Zoroastrianism are barred from holding the scheduled caste status.

LATEST RULING

- **Chinthada Anand v. State of Andhra Pradesh (2026)**
  - The Supreme court held that the religious conversion results in "immediate and complete loss" of Scheduled Caste status from the moment it occurs, regardless of birth.
  - Absolute-
    Clause 3 of the 1950 Order is "categorical and absolute." Conversion to Christianity results in the immediate and complete loss of SC status.
  - Profess-
    the word "professes" means an open, public declaration of religion.
  - The Bench then ruled that christianity does not "by its very theological foundation" recognise caste.
  - The Court reasoned that the "the social and economic disabilities arising because of Hindu religion cease" once a person converts from Hinduism to Christianity.
  - It lays down seven "postulates" as general principles, as it held that professing Christinaity and claiming Scheduled Caste status are "mutually exclusive".
- **Exception-**
  religious conversion does not extinguish Scheduled Tribe status.
  However, the person must retain essential attributes of tribal identity: customary practices, social organisation and community recognition.

- **Reconversion-**
  Reclaiming SC status requires "credible and unimpeachable evidence" of reconversion, complete renunciation of Christianity, and proven assimilation back into the original caste.
- **Commissions**
  - **Kaka Kalelkar Commission-**
    officially observed that the rigidities of the caste system and the stigma of untouchability deeply infected Indian Christian and Muslim communities.

  - **Mandal Commission**
    It recognized the existence of caste-based discrimination in non hindu religions.
    It paved the way for OBC reservations for certain Christian and Muslim communities.

  - **Justice Ranganath Mishra Commission (2007):** Recommended that SC status should be completely de-linked from religion and made religion-neutral, like ST status.

  - **Justice K.G. Balakrishnan Commission (Current):** In 2022, the Union Government appointed a three-member commission to examine the sensitive issue of granting SC status to new persons who have historically belonged to the **SCs but have converted to religions other than Hinduism, Buddhism, and Sikhism.**
    The Commission is yet to submit its report.

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Euthnasia

- **INTRODUCTION**
  - The term derives from Greek roots meaning **"good death"** and is often framed as an **act of mercy** aimed at preserving dignity in the final stages of life.
  - Euthanasia is the deliberate, intentional act of ending a person's life in order to relieve them incurable illness or unbearable suffering.
- **CLASSIFICATION**
- **Active Euthanasia-**
  - In active euthanasia, a specific overt act is done to end the patient's life.
  - It remains explicitly prohibited under the Bharatiya Nyaya Sanhita (BNS),2023, where intentionally causing death is a punishable offence.
- Passive Euthanasia-
  - It fundamentally connotes absence of any overt act either by the patient or by the doctors.
  - In passive euthanasia, something is not done which is necessary for preserving a patient's life.
- **RIGHT TO SUICIDE**

The right to suicide is not recognized under Indian law.

While Attempt to suicide was earlier a punishable offence under the Indian Penal Code, it has been **effectively decriminalised** under the Bharatiya Nyaya Sanhita, which replaces the IPC

- **EVOLVING JURISPRUDENCE**

- **P. Rathinam v. Union of India**
  - The Court held that right to suicide is a part of Article 21
  - The court Struck down section 309IPC (attempt to suicide)
- **Gian Kaur v. State of Punjab (1996):**
  - The Court overruled P. Rathinam case and held that right to suicide is not a fundamental right.
  - The SC held that the **right to life** does **not include the right to die** under Article 21 of the constitution.
  - However, the court observed that the right to live with human dignity may include the right of a dying man to die with dignity.
- **Aruna Shanbaug v Union of India (2011):**
  - The court permitted the withdrawal or withholding of medical treatment in cases of patients with terminal illness.
  - Thus the court allowed **passive euthanasia** under **strict legal and medical safeguards**.
- **Common Cause v. Union of India (2018):**
  - SC recognized the **right to die with dignity** by removal of medical intervention.
  - Distinguished **active euthanasia** from **passive euthanasia**, allowing the latter.
  - legally validated living wills.
- **Harish Rana vs Union of India Case (2026):**
  - The Supreme court permitted passive euthanasia by allowing withdrawal of life support, marking the first application of the 2018 Common Cause judgment recognising the right to die with dignity.
  - It emphasized that withdrawal must be carried out in a humane manner to ensure the patient's dignity is preserved and that it does not amount to "abandonment" of the patient.
  - The Supreme Court held that Clinically Administered Nutrition (CAN) administered through PEG (percutaneous endoscopic gastrostomy) tubes constitutes "medical treatment", not merely basic care and therefore, its withdrawal falls within the scope of passive euthanasia and can be approved by the medical boards.
  - The SC strongly urged the Union Government to enact a comprehensive law on end-of-life care.

LIVING WILL

- It is a declaration determining the termination of life
- The Supreme court defined living will in the Commin Cause v. Union of India (2018) as a written document prescribing a person's wishes regarding the medical treatment the person would want if he was unable to share his wishes with the healthcare provider.

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Karnataka 'Eva Nammava' Bill

INTRODUCTION

The phrase 'Eva Nammava', translates as 'He is ours' or 'He is one among us'.

The verse is about equality and rejecting social discrimination

THE KARNATAKA FREEDOM OF CHOICE IN MARRIAGE AND PREVENTION AND PROHIBITION OF HONOUR AND TRADITION (EVA MANNAVA) BILL, 2026

Objectives of the Bill

- Aims to curb:
  - Honour killings
  - Harassment and coercion
  - Social and economic boycott
  - Caste-based violence, especially against inter-caste couples
- Seeks to:
  - Ensure freedom of choice in marriage
  - Prevent caste-based discrimination in personal decisions
  - Uphold human rights and dignity
  - Promote acceptance of inter-caste marriages

Punishments

- **Honour Killing -**Minimum **5 years imprisonment**, extendable to **life imprisonment**
- **Grievous Hurt -**Causing grievous injury to a couple (or either partner) in the name of honour is punishable with minimum **3 years imprisonment** and fine up to **₹3 lakh**
- **Simple Hurt -** Causing simple injury in the name of honour is punishable with minimum **2 years rigorous imprisonment** and fine up to **₹2 lakh**

Nature of Offences

- All offences are:
  - **Cognizable** → Police can register and investigate without prior court approval
  - **Non-bailable** → Reduces risk of:
    - Accused influencing victims
    - Witness intimidation

Helpline

Recognising that couples often face immediate danger, the bill mandates the creation of a 24×7 helpline and safe shelters for inter-caste and inter-religious couples under threat.

Exception

The provisions of the law do not extend to individuals in live-in relationships.

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The Central Armed Police Forces (General Administration) Bill, 2026

- The Central Armed Police Forces (General Administration) Bill, 2026, introduced in the Rajya Sabha on March 25, 2026, seeks to bring **administrative uniformity** across major CAPFs.

COVERAGE

- The bill Seeks to unify administration of five CAPFs and replace its statutory framework:
  - **CRPF** (Central Reserve Police Force) Act 1949
  - **BSF** (Border Security Force) Act 1968
  - **CISF** (Central Industrial Security Force) Act 1968
  - **ITBP** (Indo-Tibetan Border Police) Act 1992
  - **SSB** (Sashastra Seema Bal) Act 2007

with a single law, bringing administrative uniformity across all five forces for the first time since Independence.

SCOPE OF THE BILL

- Provides a regulatory framework and Empowers the **Central Government** to frame rules regarding
  - Recruitment
  - Promotion
  - Service conditions
- Applies to:
  - Group 'A' General Duty Officers
  - Other CAPF personnel

MANDATORY IPS DEPUTATION

- The bill reserves key leadership positions for **IPS officers**:
  - **50%** of Inspector General (IG) posts
  - Minimum **67%** of Additional Director General (ADG) posts
  - **100%** of Special Director General (SDG) and Director General (DG) posts

CONSTITUTIONAL BASIS

The Indian Police Service (IPS), constituted under **Article 312** as an All India Service, was envisaged as a vital institutional link between the Union and the States in matters of law enforcement and internal security. Accordingly, the statutory incorporation of IPS leadership within CAPFs is presented as being in consonance with this constitutional design.

CRITICISM

- The bill appears to override the recent Supreme Court directions
- The apex court in the case of **Sanjay Prakash & Ors. v. Union of India & Ors.** directed:
  - Progressive reduction of IPS deputation at IG level within 2 years
  - Cadre review by Ministry of Home Affairs within 6 months
- Bill reverses the direction by institutionalizing IPS dominance
- **A Permanent Glass Ceiling for 13,000 Officers:**
  By reserving all high posts for IPS officers by law, the Bill forecloses any possibility of a CAPF cadre officer ever leading the force.
- **Inequality in Public Employment -**
  The Constitution guarantees equality before law **(Article 14)** and equal opportunity in public employment **(Article 16)** and any law creating two permanent classes of government servants with unequal access to higher posts amounts to discrimination and infringement of the fundamental rights.

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ENVIRONMENT AND ECOLOGY

Wildlife Conservation

Context: The world observed World Wildlife Day on 3 March 2026 under the theme "Medicinal and Aromatic Plants: Conserving Health, Heritage and Livelihoods."

About Wildlife Conservation:

What it is?

- Wildlife conservation is the practice of protecting wild plant and animal species and their habitats to ensure that healthy native ecosystems are restored, protected, or maintained.
- It involves a multidisciplinary approach encompassing law enforcement, scientific research, and community participation to prevent species extinction and maintain biodiversity.

Data and Statistics on Wildlife in India:

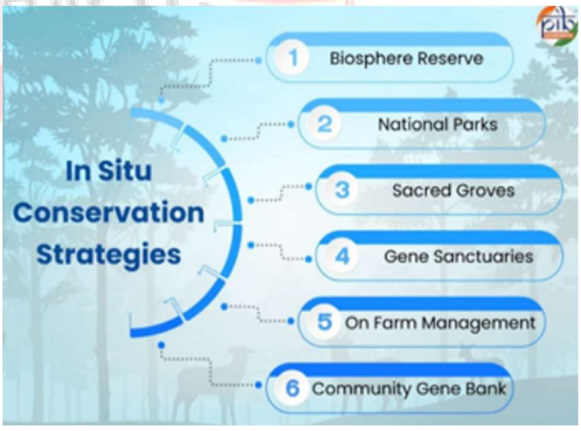
- **Mega-Biodiversity Hub:** India is one of the 17 mega-biodiversity rich countries, harboring nearly **7-8% of the world's recorded species** while occupying only 2.4% of the global land area.
- **Medicinal Wealth:** India possesses approximately **15,000 medicinal plant species**, with about 8,000 species utilized in traditional Indian systems of medicine (AYUSH).
- **Protected Area Network:** As of 2026, India has a robust network of **1,000+ Protected Areas**, including National Parks, Wildlife Sanctuaries, and Conservation Reserves.
- **Economic Scale:** The annual domestic demand for medicinal plants in India is estimated at over **5,12,000 metric tonnes**, with 242 species traded in high volumes exceeding 100 MT per annum.
- **Global Export Share:** India is the **second-largest exporter of medicinal plants** globally, significantly contributing to the multi-billion dollar traditional medicine market.

Types of Conservation Methods:

1. **In-Situ Conservation (On-site)**

Protecting species within their natural habitats where they have evolved.

- **National Parks & Sanctuaries:** Areas with strict protection for flora and fauna (e.g., Corbett, Kaziranga).
- **Biosphere Reserves:** Large areas for ecosystem conservation and sustainable development (e.g., Nilgiri).
- **MPCDAs: Medicinal Plants Conservation and Development Areas** specifically designated for medicinal flora.
- **Sacred Groves:** Community-protected forest fragments based on religious and cultural beliefs.



2. **Ex-Situ Conservation (Off-site)**

Protecting species outside their natural habitats in controlled environments.

- **Gene Banks:** Long-term preservation of genetic material (e.g., **National Seed Gene Bank** at NBPGR).
- **Botanical Gardens & Zoos:** Providing breeding grounds and educational displays for rare species.

- **Cryopreservation:** Storage of seeds, pollen, or embryos at ultra-low temperatures to maintain viability.
- **Herbal Gardens:** Institutional or school gardens (e.g., Aushadhi Vantika) used for awareness and local supply.

Key Initiatives Taken So Far:

1. **Central Sector Scheme (NMPB):** A flagship scheme for the conservation and sustainable management of medicinal plants with an outlay of **₹322.41 crores (2021-2026)**.
2. **e-CHARAK Portal:** A digital platform and mobile app to enable information exchange and market access between farmers and herbal traders.
3. **National Ayush Mission (NAM):** Promotes the integration of medicinal plant cultivation with traditional farming to enhance farmer income.
4. **GI Tagging:** Protecting the heritage of specific plants like **Nagauri Ashwagandha** (registered Nov 2025) and **Kashmir Saffron** to ensure quality and origin.

Challenges Associated:

- **Overexploitation of Wild Stocks:** High market demand leads to unsustainable harvesting, threatening the survival of rare species in the wild.

Example: In 2025, the **Himalayan Trillium** faced severe depletion in the high-altitude zones due to illegal extraction for its high-value medicinal roots.

- **Habitat Fragmentation:** Infrastructure development and agricultural expansion continue to shrink the natural corridors required for species migration.

Example: The **Western Ghats** have seen localized extinctions of endemic aromatic plants in 2026 due to land-use changes for tourism and plantations.

- **Inadequate Standardisation:** Lack of uniform quality testing and certification makes it difficult for small farmers to access premium global markets.

Example: Recent rejections of **herbal raw drug exports** in late 2025 highlighted the gap in GACP (Good Agricultural and Collection Practices) compliance.

- **Climate Change Vulnerability:** Shifting rainfall patterns and rising temperatures are altering the chemical composition (potency) and flowering cycles of medicinal plants.

Example: The **Kashmir Saffron** yields in 2025-26 were affected by erratic snowfall, directly impacting the livelihoods of thousands of farmers.

Way Ahead:

- **Mainstreaming Cultivation:** Shifting the supply chain from wild-collection to **controlled cultivation** on private lands to reduce pressure on forests.
- **Blockchain in Supply Chain:** Implementing **Traceability Systems** on platforms like e-CHARAK to ensure that herbs are sourced sustainably and ethically.
- **R&D in Bio-Prospecting:** Investing in scientific research to unlock the modern pharmaceutical potential of the 15,000 identified species.
- **Community-Led Conservation:** Empowering **Biodiversity Management Committees (BMCs)** to ensure fair benefit-sharing and protection of traditional knowledge.

Conclusion:

India's medicinal plant heritage is a unique confluence of ancient wisdom and modern economic potential. By bridging the gap between digital platforms like e-CHARAK and grassroots conservation in MPCDAs, India is securing its role as a global pharmacy. Protecting these green healers is not just an environmental duty, but a prerequisite for the health and prosperity of Viksit Bharat.

India has submitted its 7th National Report to the Convention on Biological Diversity

Context: India has officially submitted its 7th National Report (NR7) to the Convention on Biological Diversity (CBD), marking the first comprehensive assessment since the 2022 Kunming-Montreal Global Biodiversity Framework.

About

India has submitted its 7th National Report to the Convention on Biological Diversity:

What it is?

- The NR7 is a mandatory periodic submission by member nations of the Convention on Biological Diversity (CBD). It serves as a national report card to track progress toward the 23 global biodiversity targets set for 2030. In India, this report was coordinated by the MoEFCC and the National Biodiversity Authority, utilizing 142 national indicators to assess ecosystem health, species recovery, and policy alignment.

Key Achievements:

According to the report, India has shown robust progress in planning and specific ecological recoveries:

1. **Policy Alignment:** India has successfully updated its **National Biodiversity Strategy and Action Plan (NBSAP)** to fully align with global 2030 goals.
2. **Land-Use Planning (NBT1):** This target is officially **on track**, with forest and tree cover reaching **25.17%** of India's total geographical area.
3. **Ecosystem Restoration (NBT2):** Also **on track**, India has restored or put under restoration **24.1 million hectares** of land, nearing its 26-million-hectare Bonn Challenge pledge.
4. **Flagship Species Recovery:** The **tiger population** has reached **3,167**, alongside increases in Asiatic lions and stable one-horned rhino populations.
5. **Carbon Sequestration:** Forest carbon stock increased by **81.5 million tonnes**, showcasing the role of biodiversity in climate mitigation.
6. **Wetland Management:** National-level inventories of wetlands are complete, providing a baseline for the conservation of Ramsar sites and local water bodies.
7. **Digital Governance:** The launch of **PARIVESH 2.0** has streamlined environmental clearances, integrating biodiversity data into infrastructure planning.

Challenges Associated:

1. **Persistent Land Degradation:** Despite restoration efforts, **29.77%** of India's land remains degraded.

Example: Large tracts in states like **Rajasthan and Gujarat** continue to face desertification despite active afforestation programs.

1. **Data Gaps for Non-Flagship Species:** There is a severe lack of quantitative data on lesser-known taxa (insects, fungi, small mammals).

Example: While we have precise counts for **Tigers**, we lack standardized trend data for the **Great Indian Bustard** or endemic amphibians in the Western Ghats.

1. **Conservation Coverage Gaps:** Formal Protected Areas cover only about **5%** of India, far from the 30×30 global target.

Example: Expanding marine protected areas in the **Andaman and Nicobar Islands** faces hurdles due to developmental and security interests.

1. **Invasive Species and Pollution:** Monitoring protocols for invasive species and agricultural runoff are not yet standardized.

Example: The spread of **Lantana camara** in forests like Bandipur continues to displace native forage, yet a national-scale eradication map is missing.

1. **Climate Change Pressures:** Increasing frequency of extreme weather events is undoing conservation gains.

Example: Recent **forest fires in Odisha and Uttarakhand** have destroyed restored habitats, complicating long-term biodiversity stability.

Way Ahead:

- **Mainstreaming Biodiversity:** Integrate biodiversity targets into the budgets of non-environmental ministries like Agriculture and Urban Development.
- **Strengthening OECMs:** Accelerate the identification of **Other Effective Area-Based Conservation Measures** (like community forests) to meet the 30% coverage goal.
- **Standardizing Data:** Develop a unified national digital database for real-time monitoring of all 142 biodiversity indicators.
- **Incentivizing Agroforestry:** Expand the **Trees Outside Forests (TOF)** initiative to enhance connectivity between fragmented wildlife habitats.
- **Community-Led Conservation:** Empower **Biodiversity Management Committees (BMCs)** at the village level to document and protect local traditional knowledge.

Conclusion:

India's 7th National Report highlights a strong foundation in policy and success in protecting charismatic megafauna like the tiger. However, the transition from planning to outcome remains slow for over 90% of the national targets. To meet the 2030 deadline, India must bridge the gap between forest restoration and preventing new land degradation while broadening its focus to include all levels of biological diversity.

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Human-Wildlife Conflict (HWC)

Context: A recent study in Conservation Biology has revealed that Anti-Depredation Squads (ADS) in Assam, designed to reduce human-elephant conflict, are associated with a 200-300% increase in accidental elephant deaths.

About Human-Wildlife Conflict (HWC)

What it is?

- Human-Wildlife Conflict refers to negative interactions between humans and wild animals, resulting in undesirable consequences for both. This includes loss of human life, livestock predation, and crop damage on one side, and retaliatory killing, habitat destruction, or accidental deaths of wildlife on the other.

Data & Statistics on Conflicts:

- **Elephant Mortality:** India loses approximately 100 elephants annually to non-natural causes like electrocution, train hits, and poaching.
- **Human Toll:** Over 500 people are killed annually in India due to encounters with elephants, primarily in states like Odisha, West Bengal, and Assam.
- **Economic Impact:** Millions of hectares of crops are damaged every year, often pushing marginal farmers into deep debt.
- **Scale of Intervention:** In Sonitpur alone, the presence of organized squads (ADS) was linked to 14 additional elephant deaths over 14 years compared to non-ADS areas.

Need for Balancing Human-Wildlife Conflict:

- **Economic Security for Farmers:** Conflicts often destroy the entire annual livelihood of rural families.

Example: In the Sonitpur tea gardens, elephants frequently range over croplands, necessitating organized guarding to prevent total financial ruin for villagers.

- **Conservation of Keystone Species:** Elephants are ecosystem engineers; their loss disrupts forest health.

Example: The 2-3x increase in accidental deaths in ADS-active villages threatens the long-term viability of Assam's 5,000-strong elephant population.

- **Psychological Well-being and Safety:** Constant fear of wildlife attacks reduces the quality of life in fringe villages.

Example: The formation of ADSs was originally intended to give villagers safety in numbers, reducing the panic that leads to violent retaliatory killings.

- **Maintaining Ecological Corridors:** Balancing conflict ensures that traditional migratory paths remain functional.

Example: When elephants are frightened by ADS searchlights, they stray from safe corridors into dangerous linear infrastructure like railway tracks.

- **Reducing State-Community Friction:** Effective management mends the mistrust between the Forest Department and local communities.

Example: ADSs in Assam incentivized communities to cooperate with the Forest Department rather than resorting to illegal traps or poisoning.

Initiatives Taken So Far

- **Anti-Depredation Squads (ADS):** Community-led volunteer groups equipped with searchlights and firecrackers to drive away elephants.
- **Project Elephant (1992):** A central scheme providing financial and technical support to states for elephant management and corridor protection.
- **Linear Infrastructure Guidelines:** Measures like underpasses and overpasses on highways and railways to allow safe wildlife passage.
- **Early Warning Systems (EWS):** Use of SMS alerts, thermal sensors, and Elephant cells to track herd movement and alert villagers in real-time.

Challenges Associated:

- **The Landscape of Fear:** Aggressive deterrents can backfire by causing animals to lose caution.

Example: The study shows frightened elephants in Assam are more likely to fall into ditches or be hit by trains because they are distracted by pursuers.

- **Fragmented Habitats:** Developmental projects break continuous forests into small patches, forcing animals to cross human settlements.

Example: The loss of forest cover in Sonitpur over decades has forced elephants to range through tea plantations and banks of the Brahmaputra.

- **Unsystematic Responses:** Lack of training turns organized squads into local mobs.

Example: A 2019 Union Environment Ministry review noted that ADS operations often involve unsystematic firing, which reduces their effectiveness.

- **Underreporting and Data Gaps:** Actual conflict levels are often higher than official records due to poor department-community relations.

Example: The study had to adjust for underreporting bias because villagers often hide conflict details to avoid legal scrutiny.

- **Seasonality of Conflict:** Deterrents are often temporary, and animals eventually adapt to them (habituation).

Way Ahead

1. **Shift to Passive Deterrents:** Move away from firecrackers toward non-threatening barriers like bee-fencing or chili-based deterrents.
2. **Rigorous Impact Evaluation:** Adopt the study's recommendation to pause the rapid expansion of ADSs until their mortality impact is statistically cleared in other states.
3. **Community-Led Insurance:** Implement rapid crop-compensation schemes to reduce the urge to chase among farmers.
4. **Smart Infrastructure:** Install sensor-based speed restrictors for trains in identified elephant corridors to prevent accidental deaths.
5. **Habitat Restoration:** Prioritize the reforestation of lost corridors in priority landscapes like Sonitpur to keep elephants away from human habitations.

Conclusion:

The unexpected findings from Assam demonstrate that well-intentioned conservation strategies can inadvertently increase wildlife mortality if they rely on fear-based deterrence. Effective conflict management must transition from organized chasing to science-backed, passive co-existence strategies. Balancing the safety of rural communities with the preservation of India's heritage animal requires a data-driven re-evaluation of current national guidelines.

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Dumpsite Remediation Accelerator Programme (DRAP)

Context: The Government of India has launched the Dumpsite Remediation Accelerator Programme (DRAP) to fast-track the clearance of legacy waste dumpsites across urban India.

About Dumpsite Remediation Accelerator Programme (DRAP):

What it is?

- DRAP is a year-long targeted programme designed to accelerate the remediation of legacy waste dumpsites in urban areas.
- It follows a structured and fast-tracked approach to remove garbage mountains and reclaim land for productive use such as parks, community facilities, and waste-management infrastructure.

Launched in: November 2025.
Ministry: Ministry of Housing and Urban Affairs (MoHUA).
Part of Initiative:

- Implemented under Swachh Bharat Mission – Urban 2.0 (SBM-U 2.0).

Aim:

- Achieve 100% dumpsite clearance within one year of adoption.
- Accelerate the processing of legacy waste and prevent creation of new dumpsites.
- Reclaim valuable urban land and improve environmental and public health outcomes.

Key Features:

1. **Lakshya Zero Dumpsites Target:** Supports SBM-U 2.0 goal of eliminating dumpsites by **September 2026**.
2. **Focus on High-Impact Sites:** Prioritizes 214 major dumpsites across 202 urban local bodies, where about 80% of legacy waste is concentrated.
3. **Financial Support:** Central Financial Assistance (CFA) provided at **₹550 per tonne** for legacy waste remediation.
4. **5P Framework:** Implementation based on Political leadership, Public financing, Partnerships, People's participation, and Project management.
5. **Partnership Model:** Involvement of PSUs, NGOs, technical partners, and infrastructure agencies for waste utilization and disposal.
6. **Technology-based Monitoring:** Use of digital dashboards, GPS/RFID tracking, and daily reporting to ensure transparency and progress monitoring.

Significance:

- Reduces soil, air, and groundwater pollution from legacy waste.
- Converts dumpsites into usable spaces such as parks and infrastructure facilities.

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Melting Glaciers Greater Threat

Context: A new ISRO study published in NPJ Natural Hazards reveals that the August 2025 Dharali flash flood in Uttarakhand was triggered by the collapse of an exposed ice patch on the Srikanta Glacier.

- The findings shift the focus of disaster monitoring from large glacial lakes to smaller, overlooked instabilities in the cryosphere caused by rapid deglaciation.

About Melting Glaciers Greater Threat:
What it is?

- Glacier melting (deglaciation) refers to the reduction in the volume and mass of a glacier's ice due to ablation (melting and sublimation) outstripping the accumulation of new snow. As

temperatures rise, the protective layer of seasonal snow and firn (intermediate ice) thins, exposing older, unstable ice patches to the elements.

Data and Facts on Glacier Melting:

- **Accelerated Rate:** Himalayan glaciers have been losing ice at an average rate of nearly 0.5 meters of vertical height per year since 2000.
- **Global Warming Impact:** The Hindu Kush Himalaya (HKH) region is warming at a rate higher than the global average, leading to a projected loss of up to 75% of glacier volume by 2100.
- **Water Insecurity:** Over 1.3 billion people depend on the 10 major rivers originating from the Himalayas; melting glaciers initially increase flow but lead to long-term water scarcity.
- **Increased Hazard Frequency:** The frequency of Glacial Lake Outburst Floods (GLOFs) and ice-patch collapses has tripled in the last two decades.

Factors Contributing to Glacier Melting:

- **Rising Atmospheric Temperatures:** Global warming reduces the insulating snow cover, exposing the darker ice beneath.

Example: The **Srikanta Glacier** saw its firn cover thin significantly before the 2025 flood due to record summer temperatures.

- **Black Carbon Deposition:** Pollutants from biomass burning and vehicle emissions settle on glaciers, absorbing sunlight and accelerating melt.

Example: High levels of black carbon have been recorded near the **Gangotri Glacier**, leading to faster recession than in neighboring regions.

- **Changes in Precipitation Patterns:** Shift from snowfall to rainfall at high altitudes prevents the recharging of glaciers.

Example: Reduced winter snowfall in **Ladakh** has led to the drying up of several small peripheral glaciers that local farmers rely on.

- **Infrastructural Development:** Tunnelling and road construction in fragile eco-zones create localized heat islands and vibrations.

Example: The **Char Dham road project** in Uttarakhand has faced criticism for increasing slope instability near glaciated zones.

- **Nivation and Geomorphic Changes:** Alternate freezing and thawing erode the ground beneath snowbanks, creating nivation hollows that eventually collapse.

Example: The **Dharali flash flood** was specifically linked to the collapse of an ice patch within such a hollow on steep northeast-facing slopes.

Initiatives Taken:

- **National Mission for Sustaining the Himalayan Ecosystem (NMSHE):** A part of India's Climate Change Action Plan focused on monitoring forest cover and glacier health.
- **ISRO Satellite Monitoring:** Use of high-resolution imagery (like RISAT and Cartosat) to map over 9,500 Himalayan glaciers and track GLOF risks.
- **Indo-Swiss Collaboration:** Joint research programs (CAPH) aimed at improving climate resilience and glaciology expertise in the Indian Himalayas.
- **Early Warning Systems (EWS):** Installation of sensor-based EWS in high-risk zones like the Rishiganga and Dhauliganga valleys following the 2021 disaster.

Challenges Associated:

- **Remote and Rugged Terrain:** Difficulty in installing and maintaining ground-based monitoring equipment at high altitudes.

Example: Reaching the **Srikanta peak** for manual data verification is hazardous due to its avalanche-prone 6,133 m height.

- **Lack of Historical Data:** Incomplete records make it difficult to predict black swan events like ice-patch collapses.

Example: Until the **2025 Dharali event**, ice-patch collapse was an under-recognized hazard compared to GLOFs.

- **Transboundary Management:** Glaciers span borders (India, China, Pakistan), making data sharing and coordinated disaster response difficult.

Example: Tensions along the **LAC** often limit the ability of scientists to conduct comprehensive field studies on transboundary glaciers.

- **Socio-Economic Vulnerability:** Communities live in narrow valleys where even a small flood can be catastrophic.

Example: Dharali village is split by the Khir Gad stream, making its residents highly vulnerable to sudden surges from the glacier above.

- **Unpredictable Micro-Climates:** High-altitude weather can change in minutes, bypassing regional forecasts.

Example: The **2021 Chamoli rock-ice avalanche** occurred on a clear day, catching authorities off-guard as there was no heavy rain to signal danger.

Way Ahead:

1. **Integrated Monitoring:** Combine satellite data with ground-based sensors to monitor smaller nivation hollows and ice patches.
2. **Community-Led Warning:** Train local populations in high-altitude villages to recognize landscape signals, such as the sudden exposure of dark ice.
3. **Climate-Resilient Infrastructure:** Enforce strict environmental audits for all construction projects within 50 km of the glaciated line.
4. **Regional Cooperation:** Establish a Himalayan Council for real-time data sharing on glacier health across neighboring countries.
5. **Nivation Mapping:** Systematically identify and monitor north-facing steep slopes as geomorphologically sensitive zones.

Conclusion:

The Dharali disaster proves that Himalayan hazards are evolving beyond traditional glacial lake outbursts to more subtle cryospheric collapses. As deglaciation exposes unstable ice patches, the ridge-to-valley monitoring approach must become the new standard for disaster risk reduction. Protecting these fragile ecosystems is no longer just an environmental goal but a critical necessity for the safety of millions living downstream.

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India's First National Report on Implementation of the Nagoya Protocol

Context: India has submitted its First National Report (NR1) on the implementation of the Nagoya Protocol to the Convention on Biological Diversity Secretariat.

About India's First National Report on Implementation of the Nagoya Protocol:

What it is?

- India's First National Report (NR1) is an official submission to the Convention on Biological Diversity (CBD) detailing the country's implementation of the Nagoya Protocol on Access and Benefit Sharing (ABS).

- The report was prepared by **the Ministry of Environment, Forest and Climate Change** in collaboration with the National Biodiversity Authority.

Key Summary:

- **Reporting Period:** The report covers the period from 1 November 2017 to 31 December 2025.
- **Community Participation:**
    - **2,76,653 Biodiversity Management Committees** have been established across India.
- **ABS Approvals:**
    - **12,830 approvals** issued during 2017–2025.
        - **5,913 approvals** by NBA (research, commercial use, IPR etc.).
        - **6,917 approvals** by SBBs/UTBCs for commercial utilisation.
- **Benefit Sharing:**
    - **₹216.31 crore mobilised** through NBA approvals.
    - **₹139.69 crore distributed** to local communities, farmers and traditional knowledge holders.

About Nagoya Protocol:

What it is?

- The Nagoya Protocol is a supplementary agreement to the Convention on Biological Diversity (CBD).
- It provides a legal framework for access to genetic resources and fair sharing of benefits arising from their use.

Launched / Adopted in:

- **Adopted:** 29 October **2010** in **Nagoya**
- **Entered into force: 12 October 2014**

Aim:

- Ensure fair and equitable sharing of benefits arising from genetic resources.
- Promote biodiversity conservation and sustainable use.
- Protect traditional knowledge associated with genetic resources.

Key Features:

- **Access to Genetic Resources:** Countries must establish **clear rules and procedures** for accessing genetic resources.
- **Prior Informed Consent (PIC):** Users must obtain **prior informed consent** from the provider country before using genetic resources.
- **Mutually Agreed Terms (MAT):** Benefit-sharing must occur based on **mutually agreed contractual terms**.
- **Benefit Sharing Mechanism:** Benefits may be monetary (royalties, payments) or non-monetary (technology transfer, research collaboration).
- **Compliance Mechanisms:** Countries must monitor the utilisation of genetic resources across the research and commercialization chain.
- **Protection of Traditional Knowledge:** Ensures indigenous and local communities receive benefits when their knowledge is used.

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The Microplastic Problem

Context: A new study by has revealed that while microplastic abundance on Chennai's beaches is lower than global averages, the high concentration of **nylon fibers** poses a severe ecological risk.

About The Microplastic Problem:

What it is?

- Microplastics are plastic particles smaller than 5 mm in diameter. They are categorized into primary microplastics (purposely manufactured small, like microbeads in scrubs) and secondary microplastics (resulting from the breakdown of larger plastic items like bottles, nets, and synthetic clothes).

Microplastics in India – Key Facts:

1. **Airborne Exposure in Cities:** Microplastics form ~5% of PM2.5/PM10 in cities like Delhi & Kolkata (~14.2 µg/m^3), with lifetime inhalation ~3 grams per person.
2. **High Aquatic Pollution Load:** India releases ~3.9 lakh tonnes of microplastics annually into waterbodies, ranking among top global contributors.
3. **Food Chain Contamination:** 100% of sampled sea salt and most seafood contain microplastics (13–27 particles per 100g), indicating widespread ingestion risk.
4. **Human Ingestion Levels:** Urban Indians may ingest ~5–7 grams annually—equivalent to consuming a credit card worth of plastic regularly.

Sources of Microplastics in India:

- **Fishing Industry:** Abandoned or damaged nylon nets and ropes shed fragments directly into the sea.

Example: In Chennai, nylon fibers from fishing gear were identified as the most harmful persistent pollutant.

- **Synthetic Textiles:** Washing clothes like polyester and nylon releases thousands of microfibers per wash into the drainage system.

Example: Urban sewage in cities like Mumbai and Chennai serves as a direct conveyor belt for these fibers to reach the ocean.

- **Mismanaged Plastic Waste:** Improper disposal of single-use plastics leads to their fragmentation under UV radiation and wave action.

Example: Discarded PET bottles and HDPE bags on Mamallapuram beach break down into secondary microplastics over time.

- **Personal Care Products:** Microbeads in exfoliating soaps and toothpaste bypass traditional filtration systems.

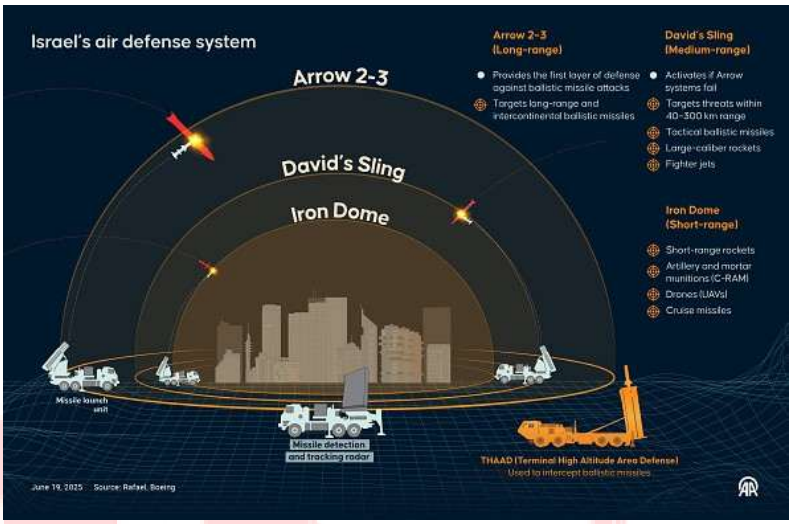
Example: These primary microplastics are frequently detected in the riverine systems of the Ganges and Yamuna before they reach the coast.

Initiatives Taken So Far:

- **Single-Use Plastic Ban (2022):** India banned 19 items of high-littering potential to reduce the source of secondary microplastics.
- **Plastic Waste Management**_____ a combination of technological upgrades and circular economy practices can prevent these microscopic toxins from permanently altering our coastal ecosystems.

SCIENCE AND TECH

Israel's Multi-Layered Defence System



Context: Fresh hostilities involving Iran, Israel, and a U.S.-led coalition have renewed global attention on Israel's multi-layered missile defence architecture amid large-scale missile and drone attacks.

About Israel's Multi-Layered Defence System:

What it is?

- Israel's multi-layered defence is an integrated air and missile defence architecture designed to intercept aerial threats at different ranges, altitudes, and flight phases.
- It combines space/long-range interception, mid-range missile defence, short-range rocket protection, and directed-energy systems, supported by advanced radar and command networks.

Key Defence Security Systems:

1. **Arrow System (Arrow-2 & Arrow-3)**
- Long-range missile defence developed by Israel with U.S. cooperation.
- **Arrow-3** intercepts missiles outside the atmosphere (exo-atmospheric), while **Arrow-2** operates within the atmosphere.
- Designed mainly against medium- and long-range ballistic missile threats.

2. **David's Sling**
- Mid-range interceptor system designed to neutralize ballistic missiles (100–200 km range), cruise missiles, and aircraft.
- Uses **Stunner interceptors** with high precision targeting.

3. **Iron Dome**
- Short-range defence system operational since 2011.
- Intercepts rockets, mortars, and drones using radar-guided Tamir interceptors.
- Selectively engages only threats projected to hit populated areas, improving efficiency.

4. **Iron Beam**
- High-energy laser defence system declared operational in late 2025.
- Uses directed energy to disable drones, rockets, and mortars at low cost compared to missile interceptors.

5. **THAAD (U.S.-supplied)**
- Terminal High Altitude Area Defense system deployed to enhance protection against ballistic missiles in their terminal phase.
- Adds an additional high-altitude interception layer.

6. **Air-to-Air Defence**
- Israeli fighter jets and helicopters use air-to-air missiles to intercept incoming drones and airborne threats.

Significance:

- Multiple interception layers increase probability of successful defence against diverse threats including ballistic missiles and drone swarms.
- Enhances national security, reduces damage from missile barrages, and provides decision-makers more response time during conflicts

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Oleum Gas

Context: A major oleum gas leak at Bhageria Industries Ltd in Boisar, Maharashtra, forced the evacuation of over 2,000 residents, including 1,600 students.

About Oleum Gas:

What it is?

- Oleum, commonly referred to as **fuming sulfuric acid**, is a highly corrosive chemical consisting of dissolved sulfur trioxide (SO_3) in concentrated sulfuric acid (H_2SO_4). It releases dense white fumes when exposed to moist air.

Chemical Name:

- **Oleum** (Fuming Sulfuric Acid)
- Chemical representation: $\mathbf{H_2SO_4 \cdot xSO_3}$
- When x = 1, the compound is **Disulfuric Acid ($\mathbf{H_2S_2O_7}$)**, also called **Pyrosulfuric Acid**

Production:

Oleum is produced through the **Contact Process**, which involves:

1. Burning sulfur to produce sulfur dioxide (SO_2).
2. Oxidizing SO_2 to sulfur trioxide (SO_3).
3. Absorbing SO_3 into concentrated sulfuric acid to form oleum.

This method avoids directly dissolving SO_3 in water, which would create an uncontrollable acid mist.

Properties of the Gas:

- **Physical Properties**:
  - **Appearance:** It appears as dense, white cloudish smoke when leaked into the air.
  - **Freezing Point:** Its freezing point varies strongly with concentration; it can be solid at room temperature or remain liquid as low as zero degree.
- **Chemical Properties:**
  - **Dehydration:** It is an extremely strong dehydrating agent, capable of pulling water elements out of sugars to leave pure carbon (the **carbon snake reaction**).
  - **Corrosivity:** It is highly corrosive but lacks free water to attack surfaces, making it less corrosive to certain metals in its pure form compared to diluted acid.
  - **Hydration:** It has a very high enthalpy of hydration; when SO_3 in oleum meets water/moisture, it forms a fine mist of sulfuric acid.

Impact on Health:

- **Acute Irritation:** Exposure can cause minor to severe **eye irritation**.
- **Respiratory Distress:** Hazardous fumes can cause irritation to the respiratory tract; emergency responders use **Self-Contained Breathing Apparatus (SCBA)** to avoid inhalation.
- **Sulfuric Acid Mist:** In large releases, it creates a mist of micrometre-sized sulfuric acid particles that are hazardous over wide areas.

Applications:

- **Sulfuric Acid Manufacture:** Used as an intermediate to produce concentrated sulfuric acid by dissolving SO_3 without creating difficult-to-manage mists.
- **Explosives:** Used in manufacturing explosives like **Trinitrotoluene (TNT)** to create anhydrous nitration mixtures.
- **Organic Chemistry:** Acts as a harsh reagent for secondary nitration of nitrobenzene.
- **Industrial Transport:** Transported in rail tank cars as a safe way to move sulfuric acid compounds between refineries and consumers.

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Shtil Missiles

Context: The Ministry of Defence signed ₹5,083-crore defence contracts to strengthen India's maritime security, including procurement of Shtil surface-to-air missile systems for frontline Indian Navy warships.

About Shtil Missiles:

What it is?

- **Shtil** is a ship-based surface-to-air missile (SAM) system designed to intercept aircraft, helicopters, anti-ship missiles, and other aerial threats targeting naval vessels.
- It is primarily deployed on frontline warships to provide medium-range air defence in maritime combat environments.

Developed by:

- The system was developed by **Russian defence industries**, with export handled by JSC Rosoboronexport.
- It is based on the **Buk missile family**, widely used in Russian air defence systems.

Aim:

- To strengthen the layered air-defence architecture of naval fleets.
- To provide rapid-reaction protection to warships against multiple aerial threats, especially in contested maritime zones.

Key features:

- **Medium-range naval SAM system** capable of engaging aircraft, UAVs, and anti-ship missiles.
- **Vertical Launch System (VLS)** allows missiles to be fired quickly in multiple directions without rotating launchers.
- **All-weather operational capability**, enabling engagements day and night in complex maritime environments.
- **Rapid reaction time** for quick interception of incoming aerial threats.
- **Integration with naval radar and fire-control systems** for improved target tracking and engagement.

Significance for India:

- Enhances survivability of frontline warships of the Indian Navy.
- Strengthens India's maritime security architecture in the Indian Ocean Region (IOR).
- Supports layered air defence strategy, complementing other naval missile systems like Barak-8.

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Moonshot Project

Context: The Indian Institute of Science has launched a Moonshot project on brain co-processors in partnership with the Pratiksha Trust.

About Moonshot Project:

What it is?

- The Moonshot Project is an advanced research initiative to develop brain co-processors—devices that interface with the human brain to decode neural signals, process them using AI, and stimulate the brain to restore lost functions.
- It combines neuromorphic computing, artificial intelligence, neuroscience, and bioelectronics to create closed-loop brain–machine systems.

Launched by:

- The project is led by the Indian Institute of Science.
- It is **funded by the Pratiksha Trust**, founded by Kris Gopalakrishnan and Sudha Gopalakrishnan.

Aim:

- To develop AI-driven brain co-processors that restore cognitive and motor functions, especially in patients affected by neurological disorders such as stroke.
- To build indigenous neurotechnology solutions suited for clinical use in India and other low-resource healthcare systems.

Key features:

1. **Neuromorphic hardware + AI algorithms** – Devices mimic brain-like computing systems to process neural signals efficiently.
2. **Closed-loop brain interface** – The system decodes brain signals, processes them using AI, and sends feedback via neural stimulation or neurofeedback.
3. **Implantable and non-invasive versions** – Development of both external devices and minimally invasive implants.
4. **Stroke rehabilitation focus** – Designed to restore sensorimotor functions such as reaching and grasping in stroke survivors.
5. **Creation of neural datasets** – Development of India-specific stereo EEG and ECoG brain-signal databases.
6. **Open digital tools** – AI tools, datasets, and visualization platforms will be developed as open digital public goods.
7. **Two-phase development plan**
    - **Phase 1:** Non-invasive neural co-processor for sensorimotor feedback.
    - **Phase 2:** Minimally invasive embedded implant to restore coordination in chronic stroke patients.

Significance:

- Positions India at the frontier of AI-driven brain-machine interface research.
- Could transform stroke rehabilitation and treatment of neurological disorders.

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Gravity Bomb

Context: U.S. Defense Secretary announced a tactical shift to using 500, 1,000, and 2,000-pound precision gravity bombs against Iran, signaling that Iranian air defenses have been sufficiently degraded to allow direct aerial bombardment.

About Gravity Bomb:

What is a Gravity Bomb?

- A **gravity bomb**, often referred to as a free-fall or dumb bomb, is an unpowered munition that does not possess an internal propulsion system or engine. Unlike a missile, which flies under its own power, a gravity bomb relies entirely on the laws of physics and the momentum of the aircraft to reach its target.

Composition:

A gravity bomb typically consists of three main components:

- **The Warhead (Body):** A streamlined steel casing filled with high explosives (such as Tritonal or Composition H6). The current U.S. campaign utilizes the **Mark 80 series** (Mk 82, Mk 83, and Mk 84).
- **The Fuse:** A device (mechanical or electronic) located in the nose or tail that triggers the explosion upon impact or at a specific altitude.
- **The Guidance Kit (JDAM):** A modern add-on tail section that includes GPS receivers and steerable tail fins to turn a dumb bomb into a smart precision weapon.

How It Works?

1. **Release:** The pilot flies the aircraft to a specific release point. Once dropped, the bomb begins a free-fall trajectory.
2. **Ballistics:** Its path is initially dictated by the speed and altitude of the aircraft, combined with gravity and aerodynamics.
3. **Guidance Correction:** In the modern precision version, the **JDAM tail kit** uses GPS coordinates to adjust the steerable fins during flight, gliding the bomb toward the target.
4. **Impact:** The bomb strikes the target, and the fuse detonates the explosive fill, creating a blast and fragmentation effect.

Key Features:

- **Cost-Efficiency:** They are significantly cheaper than missiles. A gravity bomb with a JDAM kit costs roughly **$25,000 to $30,000**, compared to millions for a Tomahawk missile.
- **Versatility:** They come in various weights for different targets:
  - **500-lb (Mk 82):** For soft targets like radar or light vehicles.
  - **1,000-lb (Mk 83):** For reinforced structures and bridges.
  - **2,000-lb (Mk 84):** Bunker-busters for deeply buried military complexes.
- **High Volume:** Because they are inexpensive and easy to transport, they allow for sustained, heavy bombardment once air supremacy is achieved.
- **Platform Compatibility:** Can be deployed by a wide range of aircraft, from tactical stealth fighters (F-35) to heavy strategic bombers (B-52).

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Very Low Earth Orbit (VLEO) Satellite Systems

Context: State-run defense major Bharat Electronics Limited (BEL) and space-tech startup Bellatrix Aerospace have signed an MoU to jointly develop Very Low Earth Orbit (VLEO) satellite systems.

About Very Low Earth Orbit (VLEO) Satellite Systems:

What it is?

- The collaboration is a strategic partnership to design, develop, and manufacture next-generation satellite platforms and payloads specifically for the **Very Low Earth Orbit (VLEO)** It combines high-end defense electronics manufacturing with innovative satellite propulsion technologies.

Organizations Involved: Bharat Electronics Limited (BEL) and Bellatrix Aerospace.

Aim:

- To build indigenous capabilities in VLEO satellite platforms.
- To develop integrated satellite solutions for both **strategic (defense)** and **civilian** applications.
- To combine PSU manufacturing depth with the agility of a deep-tech startup to accelerate space innovation.

How VLEO Systems Work?

VLEO refers to altitudes between **150 km and 450 km**, which is significantly lower than traditional Low Earth Orbit (LEO) (500 km – 2,000 km).

1. **Atmospheric Interaction:** At these altitudes, satellites encounter a thin atmosphere that creates significant **aerodynamic drag**.
2. **Advanced Propulsion:** To prevent the satellite from falling back to Earth, Bellatrix's specialized **electric/green propulsion systems** provide constant station-keeping thrust to counter the drag.
3. **Proximity:** Being closer to the surface allows for better optical resolution and faster signal transmission back to ground stations.

Key Features of the Technology:

- **Superior Imaging:** Proximity to Earth allows for sub-meter resolution imaging with smaller, less expensive optical sensors.
- **Ultra-Low Latency:** Signals have a shorter distance to travel, making it ideal for real-time strategic communication and high-speed internet.
- **Reduced Launch Costs:** Deploying to a lower altitude requires less fuel/energy, potentially lowering the cost of putting assets into space.
- **Self-Cleaning Orbit:** If a satellite fails, the atmospheric drag naturally pulls it down into the atmosphere to burn up, significantly reducing **space debris**.

Significance of the Partnership:

- Strengthens India's self-reliance in a critical emerging space domain, reducing dependence on foreign satellite platforms.
- VLEO satellites are game-changers for border surveillance and intelligence gathering due to their high-resolution capabilities.

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LNG and LPG Price Determination

Context: Amidst the ongoing West Asia conflict in March 2026, global crude oil prices have surged by nearly 30%, directly inflating the cost of LNG and LPG.

About LNG and LPG Price Determination:

What it is?

- Price determination for **Liquified Natural Gas (LNG)** and **Liquified Petroleum Gas (LPG)** refers to the global mechanisms and benchmarks used to set the cost of these energy resources.
- Unlike many commodities, these gases do not have a single global price; instead, they are influenced heavily by their relationship with **crude oil** and specific regional indices.

How it Works?

- **Crude Oil Linkage:** Globally, both LNG and LPG prices are generally indexed to or float alongside crude oil prices. When crude oil prices rise, the cost of these gases typically follows.
- **Contractual Structures:**
  - **Long-term Contracts:** Much of India's LNG (especially from Qatar) is procured through long-term agreements that provide some price stability.
  - **Spot Markets:** For immediate needs, entities use the spot market, where prices are highly volatile and measured by indices such as the **JKM (Japan Korea Marker)**.
- **Domestic Production vs. Imports:**
  - **LPG:** 60% of India's supply is imported, primarily from Saudi Arabia and Qatar. The remaining 40% is produced domestically by Oil Marketing Companies (OMCs) like IOC and BPCL.
  - **LNG:** Half of India's requirement is produced domestically, while the other half is imported via specialized cryogenic ships.

Factors Affecting Prices

- **Geopolitical Stability:** Conflicts in West Asia, such as the closure of the **Strait of Hormuz**, directly hit imports and drive up war premiums on energy.
- **Supply Gaps:** When major producers like Qatar shut down production, it creates a massive global supply gap, forcing prices higher for all other buyers.
- **Transportation and Insurance:** Because LNG must be cooled to below **–160°C** and transported in insulated tanks, rising insurance premiums during wartime significantly increase the final landed cost.
- **Storage Capacity:** Countries with limited storage, like India, are more vulnerable to immediate price shocks compared to nations with large underground reserves.

Implications for India:

- Higher LPG costs threaten the progress of the Pradhan Mantri Ujjwala Yojana, which has expanded coverage to nearly 100% of households.
- A little less than 30% of natural gas is used to make ammonia for fertilizers; price spikes can lead to higher agricultural costs, though current impacts are mitigated by the off-season for farming.
- Natural gas accounts for 13% of power generation and 21% of City Gas Distribution (CGD); high prices force industrial consumers to switch to alternative fuels like naphtha or furnace oil.

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The Sukhoi Su-30MKI

Context: An Indian Air Force (IAF) Sukhoi-30MKI fighter jet tragically crashed at Inglong Ekopi Hill in Assam during a routine training mission on March 5, 2026.

About The Sukhoi Su-30MKI:

What it is?

- The **Sukhoi Su-30MKI** (NATO reporting name: **Flanker-H**) is a heavy, all-weather, long-range, two-seater multirole air superiority fighter. It serves as the primary strike and air defense platform for the Indian Air Force, capable of performing complex missions ranging from ground attack to maritime strikes.

Developed By:

- **Design:** Originally designed by Russia's **Sukhoi Corporation**.
- **Manufacturing:** Built under license by India's **Hindustan Aeronautics Limited (HAL)** at its Nashik facility.
- **Collaboration:** It is a unique fusion aircraft, integrating Russian airframe technology with Indian avionics, and sub-systems from **France and Israel**.

Purpose:

- The primary aim of the Su-30MKI is to maintain **air dominance** over the Indian subcontinent.

Key Features:

- **Super Maneuverability:** Equipped with **thrust-vectoring nozzles** and canards, allowing the aircraft to perform extreme maneuvers (like the Cobra) that are impossible for standard fighters.
- **Advanced Avionics:** Features a hybrid of international technology, including a powerful passive electronically scanned array (PESA) radar (being upgraded to Indian **Uttam AESA** radar) and sophisticated electronic warfare suites.
- **Weaponry & Range:** It is the only aircraft in the world capable of carrying the **BrahMos-A** supersonic cruise missile.
    - It can carry a massive 8,000 kg combat payload, including Astra (BVR), R-77, and Kh-59 missiles.
- **Twin-Engine Power:** Powered by two **Al-31FP turbofans**, providing the speed and reliability needed for long-range patrols.
- **Indigenization:** As of 2026, the aircraft features over **62.6% indigenous content**, including Indian-made flight control systems and radar warning receivers.

Significance:

- With over 260 aircraft in inventory, it forms the largest component of India's fighter strength.
- Specific batches are believed to be optimized for the Strategic Forces Command for nuclear weapons delivery.

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Chile Eliminate Leprosy

Context: The World Health Organization (WHO) and the Pan American Health Organization (PAHO) officially verified Chile as the first country in the Americas—and the second globally—to have eliminated leprosy.

About Leprosy (Hansen's Disease):

What it is?

- Leprosy is a chronic infectious disease caused by the slow-growing bacterium ***Mycobacterium leprae***. It primarily affects the skin, the peripheral nerves, mucosal surfaces of the upper respiratory tract, and the eyes. If left untreated, it can cause progressive and permanent damage to the skin, nerves, limbs, and eyes.

Origin and History:

- **Ancient Disease:** Leprosy is one of the oldest recorded diseases in human history, mentioned in ancient civilizations' texts from China, Egypt, and India.
- **Chilean Context:** It was historically recorded in Chile at the end of the 19th century, specifically on **Rapa Nui (Easter Island)**. It remained localized there through strict isolation and treatment until the late 1990s.

Key Features

- **Transmission:** It is transmitted via droplets from the nose and mouth during close and frequent contact with untreated cases. It is **not** highly infectious.
- **Incubation Period:** The disease has a very long incubation period, averaging **5 years**, though symptoms can take up to 20 years to appear.
- **Symptoms:** Pale or reddish skin patches with loss of sensation, painless ulcers on the soles of feet, and muscle weakness or tingling in the hands and feet.

Treatment

- **Multi-Drug Therapy (MDT):** Since the 1980s, WHO has provided MDT (a combination of rifampicin, dapsone, and clofazimine) for free globally.
- **Curability:** Leprosy is **100% curable**. Early treatment prevents most disabilities associated with the disease.
- **Stigma:** Historically, patients were shunned or leper colonies were created. Modern public health focuses on **stigma-free, integrated care**.

About Chile:

What it is?

- Chile is a sovereign country in western South America, known for its extreme geographic diversity and highly developed economy (the first South American member of the OECD).

Geography: It occupies a long, narrow strip of land between the **Andes Mountains** to the east and the **Pacific Ocean** to the west.

Borders: Peru, Bolivia, Argentina and the Drake Passage.

Geographic Features

- **Atacama Desert:** Located in the north, it is known as the **driest non-polar place on Earth**.
- **Central Valley:** A Mediterranean-climate region that is the agricultural and population heartland of the country.
- **The South:** Characterized by alpine tundras, glaciers, fjords, and lakes.
- **Insular Territories:** Includes the famous **Rapa Nui (Easter Island)** in Polynesia and the Juan Fernández Archipelago.

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Terminal High Altitude Area Defence (THAAD)

Context: The U.S. has deployed THAAD batteries to West Asia to counter Iranian ballistic missile threats during the ongoing conflict, though reports suggest an AN/TPY-2 radar was recently destroyed at a base in Jordan.

About Terminal High Altitude Area Defence (THAAD):

What it is?

- THAAD is a highly mobile, sophisticated missile defence system designed to intercept and destroy short, medium, and limited intermediate-range ballistic missiles during their **terminal phase** (the final stage of flight as they descend toward their target).

Developed by:

- It is a key component of the United States' Ballistic Missile Defence System (BMDS), primarily developed by **Lockheed Martin** for the U.S. Missile Defence Agency.

Aim: The system aims to provide a layered defence shield, protecting population centers and critical infrastructure by neutralising incoming threats at high altitudes—both **inside and outside** the Earth's atmosphere.

Key Features:

- **Hit-to-Kill Technology:** Unlike traditional systems, THAAD does not use explosive warheads; it destroys targets through pure **kinetic energy** by colliding with them at extremely high speeds.
- **AN/TPY-2 Radar:** It uses a powerful X-band radar capable of detecting, tracking, and discriminating missile threats at long ranges.
- **Mobility:** The system is truck-mounted, allowing it to be rapidly deployed to any global flashpoint.
- **Engagement Range:** It can engage targets at ranges of **150–200 kilometers** and reach altitudes that bridge the gap between lower-tier systems (like the Patriot) and exo-atmospheric systems (like Aegis).

Significance:

- It fills a critical gap in the missile defence architecture, intercepting threats higher than the Patriot system but lower than the Aegis system.
- By using kinetic impact rather than an explosion, it reduces the risk of spreading debris or triggering the chemical/nuclear payloads of incoming missiles over populated areas.
- THAAD can talk to and integrate with other systems like the Aegis and Patriot (PAC-3), creating a seamless, multilayered defensive web.

LaBL 2.0 (Lighting a Billion Lives 2.0)

Context: The Energy and Resources Institute (TERI) launched LaBL 2.0 (Lighting a Billion Lives 2.0) in New Delhi to expand decentralized renewable energy solutions across India.

About LaBL 2.0 (Lighting a Billion Lives 2.0):

What it is?

- LaBL 2.0 is a next-generation decentralised renewable energy (DRE) programme aimed at expanding clean energy access while enabling productive rural livelihoods and climate action.

- It builds upon the earlier Lighting a Billion Lives initiative (launched in 2008) that focused on providing solar lighting solutions to off-grid communities.

Launched By: The Energy and Resources Institute (TERI)

Aim:

- To expand clean and decentralized renewable energy access in rural and underserved regions.
- To promote green livelihoods and women-led enterprises.
- To integrate climate finance, carbon markets, and sustainable development goals into grassroots energy projects.

Key Features:

1. **Decentralized Renewable Energy (DRE) Expansion** – Promotes solar and other clean energy solutions in off-grid and rural areas.
2. **Green Livelihoods Creation** – Encourages productive use of energy for small businesses and rural enterprises.
3. **Women-led Entrepreneurship** – Focuses on empowering women as clean energy entrepreneurs.
4. **Carbon Accounting & Climate Outcomes** – Integrates Monitoring, Reporting and Verification (MRV) frameworks to measure climate benefits.
5. **Finance-ready Implementation Models** – Links decentralized projects with climate finance and carbon markets to attract investment.
6. **Flagship Projects** – Includes initiatives such as Hastinapur Model City, HUDCO Model Solar Village, GCC DRE Carbon Credit Program, and solar technology partnerships.

Significance:

- Supports India's energy transition and Net Zero 2070 commitments.
- Strengthens rural economic development and employment through clean energy.

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Precision Strike Missile (PrSM)

Context: The United States reportedly used the Precision Strike Missile (PrSM) for the first time in combat during strikes on Iran amid the ongoing West Asia conflict.

About Precision Strike Missile (PrSM):

What it is?

- The Precision Strike Missile (PrSM) is a long-range, surface-to-surface precision-guided missile designed for deep-strike operations against enemy targets such as air defenses, command centers, and logistics hubs.
- It is intended to replace the Army Tactical Missile System (ATACMS) used by the United States.

Developed by: Lockheed Martin (USA) for the United States Army as part of its modernization of long-range strike capabilities.

Aim:

- To provide the US Army with enhanced long-range precision strike capability.
- To improve the range, accuracy, and firepower of ground-based missile systems while maintaining compatibility with existing launch platforms.

Key Features

1. **Long Range Capability** – Can strike targets **from about 60 km to over 499 km**, significantly farther than ATACMS (~300 km).
2. **Launcher Compatibility** – Can be launched from M270 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS).
3. **Higher Firepower** – A launcher can carry **two PrSM missiles per pod**, compared to only **one ATACMS missile**, effectively doubling strike capacity.
4. **Precision Targeting** – Uses advanced guidance systems for accurate strikes on strategic targets.
5. **Open Systems Architecture** – Modular design allowing easier upgrades and integration of new technologies.
6. **Insensitive Munitions (IM) Warhead** – Uses safer explosives that reduce the risk of accidental detonation during handling or transport.

Significance

- Represents the next generation of US long-range missile systems following the US withdrawal from the Intermediate-Range Nuclear Forces (INF) Treaty (2019).
- Enhances the deep-strike capability of HIMARS and MLRS platforms, widely used in modern conflicts.

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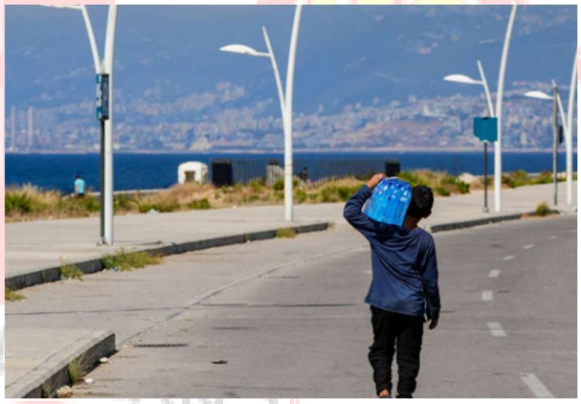
Desalination Plants

Context: Recent military strikes in the escalating US–Israel–Iran conflict in West Asia have targeted desalination plants, raising concerns over water security and humanitarian crises in the region.



About Desalination Plants:

What it is?

- A desalination plant is a facility that converts saline seawater or brackish water into potable freshwater by removing dissolved salts and minerals.
- The most common technology used is Reverse Osmosis (RO), where high pressure pushes seawater through semi-permeable membranes to separate salt from water.

Where they are located:

Desalination plants are primarily concentrated in **arid and water-scarce coastal regions**, especially:

- **West Asia / Gulf Region** – Saudi Arabia, UAE, Kuwait, Qatar, Oman, Bahrain
- **North Africa** – Libya, Algeria
- **Other regions** – Israel, Spain, Australia, United States, and China

West Asia alone accounts for nearly 70% of global desalination capacity, making it the global hub of desalinated water production.

Aim:

The primary objectives of desalination plants are:

1. Ensure freshwater supply in regions with scarce natural water resources.
2. Support urban populations and industrial development in arid coastal countries.
3. Provide water security during droughts and climate variability.
4. Reduce dependence on groundwater and rivers in water-stressed regions.

Key Features:

- **Reverse Osmosis Technology** – Uses semi-permeable membranes to remove salts and impurities from seawater.

- **Energy Intensive Process** – Requires significant electricity, often integrated with **thermal or gas-based power plants**.
- **Large-scale Infrastructure** – Many plants are **co-located with power plants** to share energy and reduce costs.
- **Brine Discharge** – Produces concentrated saltwater (brine) that is typically released back into the ocean.
- **Growing Global Sector** – Over **21,000 desalination plants operate worldwide**, with capacity growing **6–12% annually**.

Significance:

- Provides drinking water where natural freshwater sources are scarce.
- In Gulf countries, desalination supplies **40–90% of drinking water**, making it critical for survival.
- Supports megacities and industrial zones in desert regions.

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GPS Jamming and Electronic Interference

Context: The ongoing conflict in the Middle East has led to a 55% surge in electronic warfare incidents, with over 1,650 vessels experiencing GPS jamming and spoofing near the Strait of Hormuz.

About GPS Jamming and Electronic Interference**:**

What it is?

- GPS Jamming is a form of electronic warfare where a terrestrial device emits high-power radio frequency signals to overpower or drown out the relatively weak signals coming from GNSS satellites (like GPS, GLONASS, or NavIC).

How it Works?

- Satellite signals travel thousands of kilometers and are extremely faint by the time they reach Earth. A jammer works by broadcasting noise on the same frequency as the GPS signal (L1 and L2 bands). This creates a high signal-to-noise ratio that prevents the receiver on a ship or aircraft from locking onto the satellite data, effectively blinding the navigation system.

Types of GNSS Interference:

- **Jamming (Denial of Service):** Complete loss of signal. The receiver shows No Signal or Searching, forcing the operator to use manual navigation.
- **Spoofing (Deception):** A more sophisticated attack where the jammer sends a fake signal that mimics a real one. The receiver believes it is in a different location (e.g., a ship in the Strait of Hormuz might suddenly appear to be at an inland airport).

About Electronic interference**:**

What it is?

- Electronic interference, commonly known as Electromagnetic Interference **(EMI)**, is the invisible pollution of the digital age. It occurs when an unwanted electromagnetic field disrupts the normal operation of an electronic device or communication system.

How Electronic Interference Works?

EMI operates through a three-part chain:

1. **The Source:** An object that generates electromagnetic energy (e.g., a motor, lightning, or a smartphone).
2. **The Path (Coupling):** The medium through which the energy travels to reach the victim device.
3. **The Victim:** An electronic device whose performance is degraded by the incoming energy.

The Four Coupling Mechanisms?

- **Radiated:** The interference travels through the air as radio waves. This is common with cell phones, Wi-Fi routers, and radio stations.
- **Conducted:** The interference travels through physical wires, such as power cables or signal lines. A common example is mains hum in speakers.
- **Inductive (Magnetic):** Occurs when a magnetic field from one wire leaks into a nearby wire without touching it.
- **Capacitive (Electric):** Occurs when two nearby conductors store an electric charge between them, causing voltage noise to transfer across.

Types of Interference:

- **Narrowband:** Affects only a specific, small frequency range. This is usually man-made noise from radio transmitters or mobile phones.
- **Broadband:** Affects a wide range of the radio spectrum. This is often caused by malfunctioning equipment, sunspots, or natural phenomena like lightning.
- **Continuous:** Interference that is constantly emitted (e.g., background radiation from a power line).
- **Impulse/Transient:** A short-duration burst of energy, such as a lightning strike or an electrostatic discharge (ESD) from your finger.

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Asteroid 2024 YR4

Context: NASA has officially ruled out the possibility of asteroid 2024 YR4 colliding with the Moon on December 22, 2032. Refined calculations using the James Webb Space Telescope (JWST) have confirmed the object will pass at a safe distance of 21,200 km.

About Asteroid 2024 YR4**:**

What it is?

- **2024 YR4** is a Near-Earth Object (NEO) classified as an **Apollo-type asteroid** (Earth-crossing). Discovered in December 2024 by the ATLAS survey in Chile, it briefly gained international attention as one of the most hazardous objects found in recent decades, reaching a **Torino Scale rating of 3**—the highest since the infamous asteroid Apophis in 2004.

Origin and Formation

- **Main Belt Suburb:** Recent studies link its origin to the central region of the **Main Asteroid Belt** between Mars and Jupiter.
- **The** Yarkovsky Effect**:** Scientists believe it was nudged toward Earth by the Yarkovsky effect, where uneven heating from the Sun acts as a mini-thruster, gradually shifting its orbit over millions of years.
- **Former Boulder:** Its size and solid composition suggest it may have once been a large boulder perched on the surface of a much larger rubble-pile asteroid before being chipped off by a collision.

Characteristics:

- **Size:** Estimated to be between **53 and 67 meters** in diameter (roughly the size of a 15-story building).
- **Shape:** Observations indicate a distinctly **flattened, oblate shape**, often described as a hockey puck.
- **Composition:** It is a stony S-type asteroid, composed primarily of silicates and nickel-iron.
- **Rapid Spin:** It has an exceptionally fast rotation period of approximately **19.5 to 20 minutes**.

Significance:

- It was the first asteroid to trigger a coordinated international response from the International Asteroid Warning Network (IAWN) and the Space Mission Planning Advisory Group (SMPAG).

- Tracking the asteroid in early 2026 while it was extremely faint demonstrated the James Webb Space Telescope's capability to assist in planetary defence, a role for which it wasn't originally designed.

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Kavach 4.0 System

Context: Union Railway Minister informed the Lok Sabha that Kavach 4.0 has been successfully commissioned across 1,452 route kilometers on the high-density Delhi-Mumbai and Delhi-Howrah corridors.

About Kavach 4.0 System:

What it is?

- Kavach is an indigenous **Automatic Train Protection (ATP)** It is a state-of-the-art electronic safety system that prevents train collisions by automatically managing speed and braking if the loco pilot fails to do so.

Developed by: It was developed by the **Research Design and Standards Organisation (RDSO)** in collaboration with the Indian industry.

Aim: The primary goal is to achieve **Zero Accidents** by preventing Signal Passing at Danger (SPAD), controlling overspeeding, and ensuring safe train operations during adverse weather conditions like dense fog.

How it Works?

- The system operates through a network of **RFID tags** on tracks, **on-board equipment** in locomotives, and **radio towers** at stations.
- These components communicate in real-time to monitor the train's location and speed. If the system detects a potential collision or a violation of speed limits, it automatically triggers the brakes without manual intervention.

Key Features of Kavach 4.0:

- **Enhanced Precision:** Improved location accuracy and better signal information handling, especially in complex and crowded railway yards.
- **Direct Integration:** Seamlessly integrates with **Electronic Interlocking** systems to receive real-time updates on track occupancy and signal status.
- **Advanced Communication:** Utilizes station-to-station communication via **Optical Fibre Networks** and UHF radio for uninterrupted connectivity.
- **Automatic Braking:** Automatically applies brakes if the loco pilot fails to respond to a red signal or exceeds the permitted speed limit.
- **SOSR (Save Our Souls) Feature:** Allows for the broadcast of emergency messages to all trains within a specific radius to prevent large-scale accidents during a crisis.

Significance:

- Contributes to the sharp decline in consequential train accidents (down nearly 90% since 2014) by eliminating human error.
- Enables trains to maintain higher speeds safely during low-visibility conditions (fog), reducing delays during winters.

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Nutrient Transporter Protein

Context: Scientists from ETH Zurich and the Technical University of Munich have engineered bacteria to produce designer proteins using artificial amino acids, enabling precise drug delivery and multifunctional therapeutic proteins.

About Nutrient Transporter Protein:

What it is?

- A **nutrient transporter protein** is a membrane protein that helps cells import nutrients such as peptides and amino acids across the cell membrane.
- In this research, scientists engineered an **ABC transporter in bacteria (E. coli)** to import peptides carrying **artificial amino acids** so that cells can build customised proteins.

Aim:

- To enable cells to efficiently incorporate artificial amino acids into proteins, allowing the creation of designer proteins with new biological or chemical functions.
- This helps overcome the difficulty of transporting synthetic amino acids across the cell membrane.

How it Works?

- Scientists engineered an **ABC transporter protein**, which normally imports small peptides as nutrients.
- Artificial amino acids are hidden inside **tripeptides or tetrapeptides** (short chains of natural amino acids).
- The transporter carries these peptides into the cell.
- Once inside, cellular enzymes break the peptides apart, releasing the **artificial amino acids**.
- The ribosome then uses these amino acids to produce **custom-designed proteins**.

Key Features:

- **Trojan Horse Strategy:** Artificial amino acids are hidden inside natural peptide chains to bypass membrane barriers.
- **Engineered ABC Transporter:** Modified transporter can import **up to 10× more artificial amino acids** than natural versions.
- **Directed Evolution:** Scientists evolved the transporter protein to improve efficiency in crowded nutrient environments.
- **Multi-functional Proteins:** The system can insert **two different artificial amino acids** into a single protein.
- **Compatibility with Standard Lab Conditions:** Works efficiently even in common laboratory growth media.

Significance:

- **Advanced Drug Delivery:** Designer proteins can carry drugs to precise locations inside the body.
- **Biotechnology Applications:** Enables creation of proteins with **novel chemical properties** not found in nature.
- **Synthetic Biology Breakthrough:** Expands the genetic code beyond the natural 20 amino acids.

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The Centre for Development of Telematics (C-DOT)

Context: India's Centre for Development of Telematics (C-DOT) received global recognition at the Mobile World Congress 2026 in Barcelona for its AI-driven fraud detection solution Fraud Pro.

About The Centre for Development of Telematics (C-DOT):

What it is?

- **C-DOT** is India's premier telecom research and development (R&D) organization working on indigenous telecom technologies and digital network solutions.
- It functions as an autonomous telecom technology centre under the Department of Telecommunications (DoT).

Established in:

- Established in **August 1984** by the Government of India.
- Registered as a **society under the Societies Registration Act, 1860** and recognized as a Public Funded Research Institution by the Department of Scientific and Industrial Research (DSIR).

Aim:

- To design, develop, and deploy indigenous telecom technologies suited to India's diverse and large-scale communication needs.
- To strengthen self-reliance in telecom infrastructure and digital communication technologies.

Key Functions:

- **Telecom Technology R&D:** Develops indigenous solutions in areas such as optical communication, switching systems, wireless networks, and cybersecurity.
- **Rural connectivity solutions:** Historically developed **rural telecom exchanges** that expanded telecommunication access across rural India.
- **Technology transfer model:** Transfers developed technologies to **domestic manufacturers**, creating a telecom manufacturing ecosystem.
- **Advanced technology development:** Works on 5G, AI-based network management, IoT/M2M solutions, and next-generation digital infrastructure.
- **Support for national digital programmes:** Contributes to initiatives such as Digital India, BharatNet, Smart Cities, and Make in India.

Significance:

- Reduces dependence on foreign telecom technologies and promotes technological sovereignty.
- Played a major role in expanding telecommunication infrastructure in rural India during the early years of telecom expansion.

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HALEU-Thorium Fuel

Context: Nuclear scientists are divided over a study published in *Current Science* by BARC researchers questioning the viability of HALEU-Thorium (HALEU-Th) fuel for India's reactors.

About HALEU-Thorium Fuel:

What It Is?

- HALEU-Th is an advanced nuclear fuel mix combining High Assay Low Enriched Uranium (HALEU) with Thorium. A specific commercial version of this fuel is called 'ANEEL' (Advanced Nuclear Energy for Enriched Life), developed by the U.S.-based company Clean Core Thorium Energy (CCTE).

How Fuel is Developed?

- **Enrichment:** Natural uranium is processed to increase the concentration of the fissile isotope **U-235**.
- **Mixing:** To create HALEU-Th, uranium is enriched to between **5% and 20%** (HALEU) and then mixed with Thorium.
- **Fission Process:** While Thorium itself is not fissile (cannot sustain a chain reaction), the U-235 in the HALEU act as the driver to initiate and maintain the nuclear reaction, eventually converting Thorium into fissile U-233.

Types of Uranium in the Mix:

1. **Low Enriched Uranium (LEU):** Contains less than 5% U-235 (used in most global reactors).
2. **HALEU:** Contains 5% to 20% U-235 (used in ANEEL/HALEU-Th).
3. **Highly Enriched Uranium (HEU):** Over 20% U-235 (restricted as it can be weapons-grade).

Key Features:

- **High Burn-up:** It offers a significantly higher energy output (up to **50–60 GWd/t**) compared to natural uranium.
- **Reduced Waste:** The fuel produces significantly less spent fuel (radioactive waste)—only about **14%** of what current reactors generate.
- **Non-Proliferation:** By keeping enrichment below 20%, the fuel remains unsuitable for nuclear weapons.
- **Thorium Utilization:** It allows for the immediate use of Thorium in existing Pressurised Heavy Water Reactors (PHWRs) without waiting for the third stage of India's nuclear program.

Limitations:

- **Reactor Design Changes:** BARC scientists claim it is not a drop-in fuel; it may reduce the effectiveness of **shutdown rods** by 26%, requiring structural modifications to reactors.
- **Cost & Availability:** HALEU is commercially limited and expensive to produce or import.
- **Reprocessing Issues:** Unlike India's traditional closed fuel cycle (which extracts plutonium from waste), HALEU-Th is not primarily designed for easy reprocessing.

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NavIC's Atomic Clock Failure

Context: ISRO recently reported that the atomic clock on the IRNSS-1F satellite has failed, reducing the number of functional positioning satellites in the NavIC constellation.

About NavIC's Atomic Clock Failure:

What is an Atomic Clock?

- An atomic clock is an ultra-precise timekeeping device that uses the vibrations of atoms (usually Rubidium or Cesium) to measure time. In navigation satellites, these clocks are essential because even a billionth of a second of error can lead to a location inaccuracy of several meters on the ground.

How it Works?

- **Atomic Resonance:** The clock measures the precise frequency of electromagnetic radiation emitted or absorbed by electrons when they change energy levels within an atom.
- **Ultra-Stability:** Unlike mechanical or quartz clocks, atoms vibrate at a perfectly constant rate, providing a stable frequency that does not drift over time.
- **Time-of-Flight Measurement:** The satellite sends a signal with a timestamp. By comparing when the signal was sent to when it was received, the receiver calculates the distance.
- **Trilateration:** By calculating distances from at least four different satellites simultaneously, a receiver can pin-point a user's exact latitude, longitude, and altitude.

Features:

- **Precision:** They are accurate to within one second every few million years.
- **Redundancy:** Satellites usually carry multiple clocks (often three or four) in case one fails.
- **Indigenization:** While earlier NavIC clocks were imported, the new generation (**NVS series**) features India-developed Rubidium atomic clocks.

About The NavIC Satellite System:

What it is?

- NavIC (Navigation with Indian Constellation), originally called the IRNSS (Indian Regional Navigation Satellite System), is India's independent, regional satellite navigation system.

Launched In:

- The first satellite, IRNSS-1A, was launched in July 2013. The constellation was intended to be completed with seven satellites by 2016, though replenishment launches (like NVS-01 in 2023) continue to sustain the system.

Aim: The primary goal is to provide reliable position, navigation, and timing services over India and a region extending approximately 1,500 km around its borders, ensuring strategic independence from foreign systems like the American GPS.

Features:

- **Dual Service:** Provides Standard Positioning Service (SPS) for civilians and Restricted Service (RS)—an encrypted signal for military use.
- **Geosynchronous Orbit:** Unlike GPS satellites that move around the Earth, NavIC satellites are placed in higher orbits (36,000 km) that keep them permanently visible over the Indian region.
- **Superior Accuracy:** Because the satellites are always overhead for India, they provide better accuracy (approx. 10 meters) in dense forests and mountainous terrain compared to GPS.
- **Frequency Bands:** It operates in the L5 and S bands. Newer satellites (NVS series) have added the L1 band, making them compatible with common wearable devices like smartwatches.

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The Pinaka Multi-Barrel Rocket Launcher (MBRL) System

Context: The Indian Army has operationalized its seventh Pinaka regiment and is currently raising an eighth, with plans to reach ten regiments by next year.

About The Pinaka Multi-Barrel Rocket Launcher (MBRL) System:

What it is?

- Pinaka is an indigenous, multi-barrel rocket launcher (MBRL) system capable of firing a salvo of 12 rockets in under 44 seconds. It is a high-volume, area-saturation weapon designed to neutralize enemy troop concentrations and infrastructure over large areas.

Developed By: the Armament Research and Development Establishment (ARDE).

Aim:

- The primary objective of the Pinaka system is to provide the Indian Army with deep-strike capability, allowing it to destroy enemy communication hubs, logistics depots, and artillery gun positions well behind the front lines.

Key Features of the System:

- **Rapid Fire Capability:** A single battery of six launchers can fire 72 rockets in just 44 seconds, covering an area of roughly 1,000 by 800 meters.
- **Range Variants:** The system is versatile, featuring Mk-I (38 km), Mk-II Extended Range (60 km), and Guided variants (75–90 km).
- **High Precision:** Guided Pinaka rockets utilize an Integrated Navigation System (INS) combined with GPS/NavIC for pinpoint accuracy.
- **Mobility:** The launchers are mounted on high-mobility Tatra trucks, allowing for shoot-and-scoot tactics to avoid enemy counter-fire.
- **Automation:** Equipped with an Automated Gun Aiming and Positioning System (AGAPS) and a computerized fire control system for quick deployment.
- **Extreme Weather Resilience:** The system is designed to operate in diverse Indian terrains, from the high-altitude cold of Ladakh to the intense heat of the Thar Desert.

Significance:

- The Pinaka system is strategically vital as it reduces India's dependence on Russian Smerch and Grad systems.
- With the development of the Long-Range Guided Rocket (LRGR), which recently hit targets at 120 km, India is building a formidable Rocket Force capable of matching the integrated artillery networks of the PLA along the Line of Actual Control (LAC).

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The Sejjil Ballistic Missile

Context: Iran officially deployed the Sejjil ballistic missile for the first time in active combat during Wave 54 of its military operations against US and Israeli positions.

- The missile, nicknamed the **dancing missile** for its evasive maneuvers, reportedly struck strategic infrastructure.

About The Sejjil Ballistic Missile:

What it is?

- The Sejjil (also known as Sajjil or Ashura) is an indigenous, two-stage, medium-range ballistic missile (MRBM). It represents a major leap in Iranian missile technology, moving away from older liquid-fueled designs to more reliable and faster-launching solid-fuel systems.

Developed By: The missile was indigenously developed by Iran's aerospace industries.

Aim:

- The primary objective of the Sejjil is to provide Iran with a **rapid-response deterrent** capable of striking targets across the Middle East and Southeastern Europe, specifically designed to bypass sophisticated missile defense shields like Israel's Iron Dome and Arrow systems.

Key Features:

- **Solid-Fuel Propellant:** Unlike liquid-fueled missiles, it can be stored fully fueled for long periods, allowing for near-instant launches.
- **Two-Stage Design:** Uses two separate solid-propellant motors to achieve high altitudes and high speeds during its flight path.
- **Extended Range:** It has an operational strike range of approximately **2,000 kilometers**, putting the entire Levant region within reach.
- **High Payload Capacity:** Capable of carrying a warhead weighing roughly **700 kilograms**.
- **Evasive Maneuverability:** Known as the **dancing missile** because it can maneuver at high altitudes, making its trajectory difficult for radar and interceptors to track.
- **Advanced Guidance:** The Sejjil-2 variant used in the current conflict features integrated GPS and inertial guidance systems for improved terminal accuracy.

Significance:

- The use of the Sejjil signifies that Iran is now utilizing its most survivable assets—weapons that are hard to detect on the ground and difficult to intercept in the air.
- While some experts view its deployment as a sign of desperation following the death of Ayatollah Ali Khamenei, it proves that Iran's missile force has transitioned from a theoretical threat to a functional, high-tech combat tool.

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Floating LiDAR Buoy System

Context: The National Institute of Ocean Technology (NIOT) has successfully tested an indigenous Floating LiDAR Buoy System off the Muttom coast in Tamil Nadu.

About Floating LiDAR Buoy System:

What it is?

- The Floating LiDAR (Light Detection and Ranging) Buoy is a sophisticated oceanic platform designed to provide high-resolution vertical wind profiles and meteorological data from the sea surface.

Developed By: The **National Institute of Ocean Technology (NIOT)**, an autonomous body under the **Ministry of Earth Sciences**, Government of India.

Aim: To accurately map offshore wind energy potential, enhance cyclone tracking, and provide real-time data for Blue Economy initiatives.

Science Behind Working:

The system operates on the principle of **Optical Remote Sensing**.

1. The buoy remains stable on the ocean surface while its integrated LiDAR unit emits infrared laser pulses into the atmosphere.
2. These pulses hit aerosols, dust, and water droplets in the air and reflect back (Backscattering).
3. The system measures the **Doppler Shift** in the frequency of the returned light to calculate wind speed and direction at various altitudes simultaneously.

Key Functions:

- **Vertical Profiling:** Unlike traditional anemometers, it can measure wind conditions at multiple heights up to **300 metres above sea level**.
- **Real-time Monitoring:** It continuously tracks wind speed, direction, turbulence, and atmospheric pressure.
- **Ocean-Atmosphere Interaction:** It gathers data on how sea surface conditions influence air movement, which is critical for climate modeling.
- **Data Transmission:** Equipped with satellite or cellular telemetry to transmit live data to shore-based research stations.

Significance:

- Crucial for identifying the best locations for offshore wind farms, supporting India's renewable energy targets.
- Provides more accurate data for predicting the intensity and landfall of cyclones and storms.
- Reduces India's dependence on expensive imported buoy technologies and foreign consultancy for marine surveys.

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Space Reactor 1 (SR-1) Freedom Spacecraft

Context: NASA has revamped the Artemis programme, scrapping the Lunar Gateway plan and prioritizing a moon base and Mars missions.

- It also announced **Space Reactor 1 Freedom**, a nuclear-powered spacecraft to be launched by **2028**.

About Space Reactor 1 (SR-1) Freedom Spacecraft:

What it is?

- **Space Reactor 1 Freedom** is set to be the first interplanetary spacecraft powered by a nuclear fission reactor, marking a transition from experimental laboratory research to active deep-space operations. It is a pathfinder spacecraft utilizing **Nuclear Electric Propulsion (NEP)**.

Announced By: The mission was officially announced by NASA.

Aim:

- To prove the viability of advanced nuclear electric propulsion for long-duration, deep-space travel.
- To deliver the **Skyfall** payload—a fleet of robotic helicopters—to the Martian surface to scout for water ice and human landing sites.
- To retire flight risks and activate the industrial supply chain for future nuclear-powered missions to the outer solar system.

Key Features:

- **Repurposed Hardware:** It will utilize the **Power and Propulsion Element (PPE)** originally designed for the now-paused Lunar Gateway station.
- **Fission Reactor:** Features an onboard reactor that splits uranium atoms to provide a continuous, high-output power source independent of sunlight.
- **Skyfall Payload:** Carries three (or up to six, per some reports) **Ingenuity-class helicopters** equipped with ground-penetrating radar and high-resolution cameras.
- **Launch Date:** Scheduled for launch in **December 2028**.

Significance:

- This will be the first U.S. space reactor since SNAP-10A in 1965, and the first ever used for propulsion beyond Earth orbit.
- Nuclear power allows for missions to the outer planets and through Martian dust storms where solar panels fail.

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Understanding LPG and LNG

Context: India is facing a significant energy crisis as the West Asia war has disrupted 54% of its LPG and 30% of its LNG supplies through the Strait of Hormuz.

About Understanding LPG and LNG:

What is LPG?

- **Liquefied Petroleum Gas (LPG)** is a flammable mixture of hydrocarbon gases, primarily **propane and butane**. It is produced as a byproduct of crude oil refining and natural gas processing. It turns into a liquid under moderate pressure, making it highly portable in cylinders.

What is LNG?

- **Liquefied Natural Gas (LNG)** is primarily **methane** that has been cooled to extremely low temperatures (below -160°C) through a cryogenic process. It is liquefied mainly for long-distance transport across oceans where pipelines are not feasible, as its liquid volume is 600 times smaller than its gaseous form.

Difference Between LPG and LNG:

Feature	LPG (Liquefied Petroleum Gas)	LNG (Liquefied Natural Gas)
Composition	Primarily Propane and Butane.	Primarily Methane.
Production	Derived from oil refining & gas stripping.	Purified natural gas cooled cryogenically.
Storage	Stored in pressurized cylinders at room temp.	Stored in specialized **cryogenic tanks**.
Density	**Heavier than air** (sinks to the ground).	**Lighter than air** (disperses quickly).
Transport	Mostly by road/trucks in cylinders/tankers.	Mostly by specialized cryogenic ships.
Safety	Higher risk of fire if leaked (accumulates).	Generally safer (evaporates into the air).

Applications of LPG

- **Domestic:** Used extensively as cooking fuel in households (cylinders).
- **Heating:** Used for space heating and water heating in areas without gas grids.
- **Industrial:** Used for high-heat processes like metal cutting, welding, and food processing.
- **Autogas:** Used as a cleaner alternative to petrol/diesel in specially converted vehicles.

Applications of LNG:

- **Energy Transport:** The primary bridge to move natural gas from producing countries to consuming countries.
- **Power Generation:** Once regasified, it fuels gas-based power plants.
- **Industrial Feedstock:** Used in manufacturing fertilizers, petrochemicals, and steel.
- **Heavy Transport:** Emerging as a fuel for long-haul trucks, ships (as bunker fuel), and locomotives.

- **City Gas:** Converted back to gas for **PNG** (households) and **CNG** (transport).

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Biologics

Context: The Union Budget 2026 announced the **Biopharma SHAKTI strategy** to boost domestic production of biologics and biosimilars, alongside a shift toward non-animal testing models.

About Biologicals:

What are Biologicals?

- **Biologicals** are a class of advanced medicines produced using living organisms. Unlike traditional small molecule drugs (like aspirin) which are synthesized through chemical processes, biologics are large, complex proteins derived from biological sources.

Aim:

- The primary goal of biologics is to provide highly targeted therapy for chronic and life-threatening diseases—such as cancer, rheumatoid arthritis, and diabetes—by interacting specifically with human receptors and immune pathways that traditional chemicals cannot reach.

How They are Produced?

- **Host Cell Selection:** Scientists select living cells (bacteria, yeast, or mammalian cells) to act as factories.
- **Genetic Engineering:** The specific DNA sequence for the desired protein is inserted into these cells.
- **Large-Scale Culture:** The cells are grown in massive bioreactors under strictly controlled conditions.
- **Purification:** The protein is extracted and purified from the cell culture to ensure it is free from contaminants.
- **Batch Testing:** Because they are grown rather than made, every single batch must undergo extensive testing to ensure consistency and safety.

Key Features:

- **Molecular Complexity:** They are significantly larger and more structurally complex than chemically synthesized drugs.
- **Living Sources:** Derived from living systems such as microorganisms, plant cells, or animal/human cells and plasma.
- **High Specificity:** They bind to specific cell receptors, which allows for precision medicine with fewer off-target effects.
- **Sensitivity:** Extremely sensitive to environmental factors like temperature and light; they usually require a cold chain for storage.
- **Immunogenicity:** Because they are proteins, they have the potential to trigger an immune response in the human body, requiring rigorous safety monitoring.

Significance:

- Biologics have turned once-fatal conditions, like certain types of leukemia and autoimmune disorders, into manageable chronic conditions.
- Through initiatives like **Biopharma SHAKTI**, India aims to become a global hub for **biosimilars** (generic biologics), making expensive treatments affordable.

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SOCIETY

Breaking the Cycle of Violence Against Women

Context: The recent murder of a 27-year-old pregnant Delhi Police commando by her husband has reignited a national debate on the cycle of violence and trauma bonding.

- The case highlights that even women in positions of institutional power are not immune to domestic abuse, financial coercion, and the deadly grip of patriarchal expectations.

About Breaking the Cycle of Violence Against Women:

What it is?

- Breaking the cycle involves disrupting the predictable phases of domestic abuse—**tension building, explosion, and the honeymoon period** (reconciliation).
- It requires a multi-pronged approach that addresses psychological trauma bonding, financial debt traps, and the social normalization of harm, ensuring that a woman's career or financial independence actually translates into bodily autonomy and safety.

Data/Stats on Violence Against Women in India:

- **Prevalence:** According to NFHS-5, nearly **one in three women** in India has experienced physical or sexual violence.
- **Domestic Abuse:** Over **30% of ever-married women** (ages 18-49) have experienced spousal violence.
- **Reporting Gap:** Less than **14% of women** who experience violence ever seek help from the police or institutional mechanisms.
- **Dowry Deaths:** Despite being banned for decades, India still records nearly **20 cases of dowry deaths every single day** (NCRB data).
- **Cyber Violence:** Recent trends show a sharp rise in digital harassment, with a **25% increase** in reported cases of stalking and bullying against women in 2024-25.

Causes of Violence Against Women:

- **Trauma Bonding & Stockholm Syndrome:** Victims develop a psychological attachment to their abuser as a survival mechanism.

E.g. The Delhi Police commando reportedly spent nights crying due to her partner's abuse but refused to leave him, citing love as the primary reason.

- **Patriarchal Social Obligations:** Society expects women, even those in high-ranking jobs, to be obedient and subservient followers of family elders.

E.g. Research shows women police officers often face greater suspicion from matrimonial families who fear their professional domineering attitude.

- **Financial Coercion and Debt Traps:** Abusers force women to take loans or relinquish salaries, making them financially incapable of leaving.

E.g. In the 2026 Delhi case, the victim was buried under loan installments taken in her name, leaving her with insufficient funds to survive independently.

- **The Dowry Menace:** Relationships are still viewed as financial transactions, where unmet demands lead to physical and emotional torture.

E.g. Testimonies from the commando's brother confirmed that persistent expectations of marital gifts (obligatory dowry) eroded the relationship before the murder.

- **Lack of Institutional Support for Saviors:** Women in uniform feel a cost of vulnerability, fearing that reporting abuse will damage their professional image of strength.

Initiatives Taken:

- **One Stop Centres (Sakhi):** Established to provide integrated support, including medical, legal, and psychological help under one roof.
- **Fast Track Special Courts (FTSCs):** Launched for the swift disposal of cases related to rape and the POCSO Act to ensure timely justice.
- **Mission Shakti:** An umbrella scheme aimed at strengthening interventions for women's safety, security, and empowerment.
- **181 Women Helpline:** A 24/7 emergency response system specifically for women facing violence or distress.

Challenges Associated:

- **Normalization of Private Harm:** Domestic violence is often treated as a family matter rather than a criminal act.

E.g. The persistent focus on saving the marriage in 2025 mediation centers often forces women back into dangerous environments.

- **Legal Hurdles in Proving Emotional Abuse:** Law enforcement often prioritizes physical marks, ignoring the coercive control that precedes violence.

E.g. Victims who report trauma bonding or narcissistic abuse often find their complaints dismissed by police as minor domestic tiffs.

- **Ineffective Pre-Marriage Counseling:** Most marital preparation focuses on wedding ceremonies rather than conflict resolution or identifying red flags.

E.g. Despite red flags during the courtship period, the 2026 victim proceeded with the marriage due to a lack of professional psychological guidance.

- **Occupational Stressors:** Professional women face a double burden of high-stress jobs and traditional domestic expectations.

E.g. Police officers working erratic hours are often accused by families of neglecting familial needs, leading to increased domestic friction.

- **Slow Judicial Redressal:** High pendency of cases in courts discourages victims from pursuing legal battles against their abusers.

Way Ahead:

- **Sensitization on Trauma Bonding:** Police and social workers must be trained to recognize psychological entrapment, not just physical injury.
- **Occupational Social Work:** Integrate specialized mental health support within high-stress departments like the Police to address domestic stressors.
- **Mandatory Pre-Marital Counseling:** Implement community-level programs focusing on well-being, reciprocity, and identifying abusive personality traits.
- **Safe Exit Pathways:** Provide anonymous, state-sponsored halfway houses where women can stay safely while detaching from an abuser.
- **Digital Financial Audits:** Create awareness about financial coercion and provide legal protection for women against forced loans taken by spouses.

Conclusion:

Violence against women is a systemic failure, not a private tragedy, that persists even when women achieve financial and professional heights. True empowerment requires a society that values a woman's life over marital sanctity and a legal system that recognizes emotional terror as a precursor to physical death. Until we provide psychologically safe spaces to listen, the flowers of today will continue to be the flowers for a funeral tomorrow.

Transforming Representation into Real Change by 2029

Context: The discussion around the Women's Reservation Act has intensified as India prepares for the 2029 Lok Sabha elections, which will see the first-ever implementation of 33% seat reservation for women.

About Transforming Representation into Real Change by 2029:

What it is?

- The core of this movement is to ensure that the 2029 Parliament—the most gender-diverse in India's history—addresses the invisible crises affecting women, such as the lack of a gendered framework for India's rapidly ageing population and the disproportionate burden of unpaid caregiving.

Data/Facts on Representation of Women in India:

- **Current Parliament:** In the 18th Lok Sabha (2024), women constitute only about **13.6%** of the total members, far below the global average.
- **The 2029 Shift:** The **Nari Shakti Vandan Adhiniyam** (Women's Reservation Act) will mandate **33%** reservation in the Lok Sabha and State Assemblies.
- **Panchayati Raj Success:** At the local level, India already has over **1.4 million** elected women representatives due to the 73rd and 74th Amendments.
- **State-Level Variance:** Some states like Chhattisgarh have higher female representation in assemblies, while others remain in the single digits.
- **Ageing Invisibility:** Parliamentary records show a near-total absence of Private Member Bills or Committee reports specifically addressing the needs of **ageing women**.

Need for More Women Representation in India:

- **Prioritizing the Care Economy:** Women are more likely to advocate for public infrastructure in elder care and childcare.

Example: Advocacy in **Maharashtra** led to the launch of menopause clinics across 580 facilities in 2026, serving 31,000 women in weeks.

- **Addressing Gender-Specific Health:** Issues like maternal health, menstruation, and menopause require female perspectives for effective legislation.

Example: Women legislators were instrumental in pushing for the **Maternity Benefit (Amendment) Act**, increasing paid leave to 26 weeks.

- **Legislating for Safety:** Increased representation leads to stricter implementation of laws against gender-based violence.

Example: Post-2012, increased female political pressure led to the **Criminal Law (Amendment) Act**, broadening the definition of sexual assault.

- **Economic Empowerment:** Women leaders often focus on self-help groups (SHGs) and female labor force participation (FLFP).

Example: The expansion of the **Lakhpati Didi scheme** has been a major focus of women leaders to make 3 crore women financially independent.

- **Inclusive Urban Planning:** Female representatives ensure that public spaces are designed with the safety of women and the elderly in mind.

Example: The **Pink Toilets** and Pink Bus initiatives in cities like Delhi and Noida were driven by local female political mandates.

Measures Taken So Far:

- **Nari Shakti Vandan Adhiniyam (2023):** The landmark constitutional amendment providing 33% reservation for women in the Lok Sabha and Assemblies.
- **73rd & 74th Amendments:** Provided 33% (and in many states 50%) reservation for women in rural and urban local bodies.
- **Candidate Pipelines:** Political parties have begun internal grooming of female candidates to prepare for the 2029 delimitation exercise.
- **Lakhpati Didi & Drone Didi:** Schemes targeting rural women to build leadership and technical skills at the grassroots level.
- **Gender Budgeting:** India has institutionalized Gender Budget Statements since 2005 to ensure funds specifically benefit women's development.

Challenges Associated:

- **The Sarpanch-Pati Syndrome:** Men often exercise actual power while the elected woman remains a figurehead.

Example: In many **rural blocks of MP and UP**, male relatives are frequently seen attending official meetings on behalf of elected women.

- **Internal Party Barriers:** Patriarchal structures within parties often deny women tickets for winnable unreserved seats.

Example: Historically, even major parties have struggled to cross **10-12%** female candidacy without legal compulsion.

- **The Double Burden:** Women politicians face the second shift, balancing intense political work with traditional domestic care roles.

Example: Reports indicate that **female MPs** have significantly lower socializing time with constituents compared to males due to domestic duties.

- **Lack of Disaggregated Data:** Policy cannot be made for what is not measured, especially regarding elderly women.

Example: The **National Policy for Older Persons (1999)** fails to provide specific financial safety nets for women who have no assets in their names.

- **Online Harassment and Violence:** Female leaders face disproportionate character assassination and cyber-bullying.

Example: High-profile **women Ministers and MPs** frequently report coordinated trolling campaigns intended to silence their legislative interventions.

Way Ahead:

- **Capacity Building:** Training programs for potential 2029 candidates on legislative procedures, budgeting, and gendered policy-making.
- **Gendered Elder Care Policy:** Drafting a specific national framework for ageing women, accounting for their longer life expectancy and lower savings.
- **Transparent Budgets:** Implementing mandatory gender-disaggregated reporting for all state spending on elder care and social security.
- **Manifesto Commitments:** Forcing political parties to include specific, measurable goals for women's life-arc (from childhood to dignified ageing) in manifestos.
- **Digital Data Census:** Conducting a specialized census to capture data on women's unpaid care work and their specific health needs in old age.

Conclusion:

Representation is the first step, but true empowerment lies in utilizing that seat to voice the concerns of the most vulnerable, especially India's rapidly growing population of elderly women. By 2029, the focus must shift from simply counting women in Parliament to ensuring those women hold the power to redesign the state's care infrastructure. If done right, India can transform a demographic shift into a legacy of dignity for all its citizens.

India and Research

Context: Despite India producing the world's highest percentage of female STEM graduates (43%), a recent report highlights a leaky pipeline where women constitute only 18% of the R&D workforce.

About India and Research:

What it is?

Research in India is the backbone of its Viksit Bharat @ 2047 vision, shifting from traditional academic inquiry to an innovation-driven ecosystem. It encompasses basic sciences, frontier technologies like AI and Quantum computing, and indigenization in defense and space, aimed at making India a global knowledge superpower.

Status of Research in India:

- **Global Standing:** India ranks **3rd globally** in the total number of Ph.Ds. awarded annually and in the number of scientific publications.
- **STEM Graduation Rates:** India leads the world in female STEM graduates at **43%**, significantly higher than many developed nations.
- **Workforce Disparity:** Women occupy less than **30% of positions** in national research agencies (e.g., only 14% in DRDO and 8% faculty at IISc Bangalore).
- **R&D Investment:** While increasing, India's Gross Expenditure on R&D (GERD) stays around **0.64% to 0.7% of GDP**, with a push to increase private sector participation.

Opportunities for Research in India:

1. **Space and Satellite Technology:** The liberalization of the space sector has opened doors for private startups and deep-tech research.

Example: The success of **Chandrayaan-3** and the upcoming **Gaganyaan** mission have spurred massive R&D in aerospace engineering.

1. **Green Energy & Sustainability**: India's commitment to Net Zero by 2070 creates a massive need for research in hydrogen and solar efficiency.

Example: The **National Green Hydrogen Mission** is funding indigenous electrolyzer research to reduce import dependency.

1. **Digital Public Infrastructure (DPI) & AI:** India's unique data scale provides a sandbox for AI research in vernacular languages and fintech.

Example: The **Bhashini AI project** is leading research in real-time Indian language translation through crowdsourced data.

1. **Biotechnology & Pharmaceuticals:** Transitioning from the Pharmacy of the World (generics) to a Research Hub (new drug discovery).

Example: The development of **iNCOVACC** (world's first intranasal COVID-19 vaccine) showcases India's clinical research prowess.

Initiatives to Promote Research:

- **Anusandhan National Research Foundation (ANRF):** Established to provide high-level strategic direction and significantly increase R&D funding with private sector tie-ups.
- **Vigyan Jyoti Scheme:** A Department of Science & Technology (DST) initiative to encourage high school girls to pursue STEM and address the gender imbalance.

- **GATI (Gender Advancement for Transforming Institutions):** A framework to assess and improve gender equality in STEM institutions.
- **KIRAN Scheme:** Provides career opportunities, including fellowship for women scientists with a break in career to return to mainstream research.

Challenges Associated with Research:

1. **The Position Gap for Women:** Women are often stuck in precarious, short-term contractual roles without benefits or tenure.

Example: At **IITs and IISc**, women constitute only **8–13%** of permanent faculty, despite equal doctoral representation.

1. **Low Private Sector Funding:** Unlike the US or Korea, India's R&D is primarily government-funded (over 60%), leading to bureaucratic bottlenecks.

Example: Many **Deep-tech startups** in Bengaluru struggle to find long-term patient capital for lab-to-market transitions.

1. **Strict Age Cut-offs:** Recruitment for government labs has rigid age limits that clash with women's biological and familial timelines.

Example: Entry-level scientist positions in **national labs** often have a 30-35 year age cap, penalizing those who take maternity breaks.

1. **Inadequate Lab-to-Market Linkage:** High-quality academic papers often fail to translate into patents or commercial products.

Example: While **India ranks 3rd in publications**, it is lower in the **Global Innovation Index (GII)** rankings due to poor commercialization of university research.

Way Ahead:

- **Flexible Recruitment:** Remove rigid age cut-offs for women scientists and introduce re-entry tenures for those returning from career breaks.
- **Corporate R&D Incentives:** Mandate or incentivize private firms to allocate a percentage of profits specifically toward university-collaborated R&D.
- **Institutional Accountability:** Link institutional funding to Gender Parity Scores through the GATI framework to ensure permanent hiring of women.
- **Hybrid Research Models:** Encourage remote data analysis and computational roles to allow for geographic flexibility.
- **Strengthening ANRF:** Ensure the National Research Foundation effectively bridges the gap between state-funded universities and industrial requirements.

Conclusion:

India stands at a unique crossroads where its educational success for women is not yet translating into professional scientific leadership. By addressing the position gap and dismantling rigid structural barriers like age cut-offs, India can transform its leaky pipeline into a powerful engine for innovation. Investing in gender-equitable research is not just a social imperative but a strategic necessity for India to become a global R&D powerhouse by 2047.

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Gender, Agriculture, and Climate Change

Context: The discussion around gender, agriculture, and climate change is in focus, marks International Women's Day, and 2026 has been officially declared the 'International Year of the Woman Farmer' by the UN.

About Gender, Agriculture, and Climate Change:

What it is?

- Gender-responsive agriculture recognizes that climate change does not impact everyone equally. In rural India, women form the backbone of the primary sector but face a **triple burden**: performing back-breaking farm labor, managing unpaid domestic care, and navigating climate-induced shocks (like droughts or floods) with fewer resources, land titles, or decision-making powers than men.

Data/Facts on Women in Climate Change and Agriculture:

- **Workforce Dominance:** Around **80% of rural women** in India are engaged in agriculture, handling nearly **70% of all farm tasks**.
- **Sector-Specific Participation:** Women contribute to **75% of crop production**, **79% of horticulture**, and a staggering **95% in animal husbandry** and fisheries.
- **Land Ownership Gap:** Only about **13.9% of agricultural landholdings** are registered in the name of women, limiting their access to credit and government subsidies.
- **Feminization of Agriculture:** Increasing male migration to cities has left women to manage farms independently, yet without formal farmer status.
- **Climate Vulnerability:** Female-led households in low-income countries lose significantly more income (est. **billion globally to heat stress**) because they lack the technology to adapt.

The Role of Women in Agriculture:

- **Primary Cultivators:** Women perform the most labor-intensive tasks like sowing, weeding, and manual harvesting.

Example: In the **paddy fields of Chhattisgarh and Odisha**, women are the primary workforce for manual transplantation and post-harvest processing.

- **Livestock Managers:** They are the chief architects of the dairy and poultry sectors, which provide critical income during crop failures.

Example: The **Pashu Sakhis** under the DAY-NRLM initiative provide doorstep veterinary services and manage livestock health in states like Rajasthan.

- **Seed Guardians and Biodiversity Experts:** Women traditionally preserve indigenous seeds that are often more climate-resilient.

Example: Women in the **Deccan Development Society (Telangana)** maintain community seed banks to preserve drought-resistant millets.

- **Natural Resource Managers:** They lead community efforts in water conservation and forest produce collection.

Example: Jeevika SHGs in Bihar have successfully adopted water-efficient techniques like drip irrigation and rainwater harvesting to tackle local water scarcity.

- **Extension and Knowledge Disseminators:** Women serve as community resource persons to train others in sustainable practices.

Example: Over **2 lakh Krishi Sakhis** are currently being utilized by the Ministry of Agriculture to promote Natural Farming across rural India.

Initiatives Taken:

- **Deendayal Antyodaya Yojana (DAY-NRLM):** Has mobilized **10 crore women** into 91 lakh SHGs to provide financial inclusion and livelihood support.
- **Namo Drone Didi Scheme:** Equipping 15,000 women SHGs with drones for precision agriculture (spraying pesticides/fertilizers) to reduce drudgery and increase income.

- **Mahila Kisan Sashaktikaran Pariyojana (MKSP):** A sub-component of NRLM specifically designed to empower women farmers through sustainable climate-resilient practices.
- **Lakhpati Didi Scheme:** Aiming to scale up the annual income of 3 crore (recently updated to 6 crore) women SHG members through entrepreneurship and market linkages like **SHE-Mart**.

Challenges Associated:

- **Lack of Legal Recognition:** Without land titles, women are often not recognized as farmers, excluding them from schemes like PM-KISAN.

Example: A **2021 Landesa study** showed only 13% of women in UP and Odisha had legal documents despite doing the bulk of the farm work.

- **Digital and Technology Divide:** Modern tools and digital market platforms are often inaccessible due to lower literacy or lack of mobile ownership.

Example: Only **22% of rural women** in India access the internet independently, hindering their use of real-time weather apps or e-NAM.

- **Gendered Drudgery:** Most farm machinery is designed for men (ergonomically and weight-wise), increasing the physical strain on women.

Example: The manual weeding process in **paddy cultivation** remains one of the most physically exhausting tasks for women due to the lack of small-scale weeders.

- **Limited Decision-Making Power:** While women do the work, the choice of crops and financial decisions often rest with the male members.

Example: In **Maharashtra's cotton belt**, men typically decide on chemical inputs, while women manage the manual picking, often ignoring the health risks involved.

- **Climate-Induced Migration Stress:** As men migrate due to climate distress, women face an overload of domestic and farm work without extra labor.

Example: In **Bundelkhand**, recurrent droughts have forced massive male migration, leaving women to travel longer distances for water while also managing dried-up farms.

Way Ahead:

- **Recognize 'Farmer' by Activity:** Shift the legal definition of a farmer from landowner to tiller to ensure landless women get insurance and credit.
- **Climate-Smart Drudgery Reduction:** Promote gender-sensitive tools like cono-weeders and solar dryers through **Custom Hiring Centres (CHCs)**.
- **Hyper-Local Value Addition:** Encourage processing units (e.g., flour mills, spice grinding) within villages to accommodate women's limited mobility.
- **Strengthen Land Rights:** Implement reduced stamp duties for women and promote joint land titling as a mandatory requirement for housing schemes.
- **Advanced Financial Products:** Introduce parametric (weather-based) insurance and dedicated credit lines for women-led Farmer Producer Organisations (FPOs).

Conclusion:

Empowering women farmers is no longer just a social welfare goal but a strategic economic necessity to achieve a trillion economy. By shifting women from drudgery to decision-making, India can build a resilient agricultural system capable of withstanding the climate crisis. 2026 must be the year we finally recognize the woman in the field not just as a laborer, but as an entrepreneur and a leader.

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The Commission on the Status of Women (CSW)

Context: The Commission on the Status of Women (CSW) is holding its annual session at the United Nations Headquarters in New York, bringing together governments, UN agencies, and civil society to review global progress on gender equality.

About The Commission on the Status of Women (CSW):

What it is?

- The Commission on the Status of Women (CSW) is the principal global intergovernmental body dedicated to promoting gender equality and the empowerment of women.
- It operates as a functional commission of the United Nations Economic and Social Council (ECOSOC) and serves as the largest annual UN forum on women's rights and gender equality.

Established in:

- **1946**, through **ECOSOC Resolution 11(II) of 21 June 1946**.
- Its secretariat support is provided by **UN Women**, the UN entity for gender equality and women's empowerment.

Aim:

- To promote gender equality and protect the rights of women and girls worldwide.
- To develop international policy frameworks and recommendations that advance women's empowerment in political, economic, and social spheres.

Key Functions

1. **Policy Formulation** – Develops global policy recommendations and agreed conclusions to promote gender equality.
2. **Monitoring Implementation** – Reviews progress in implementing the Beijing Declaration and Platform for Action (1995) and other gender commitments.
3. **Standard Setting** – Contributes to international norms such as the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW).
4. **Global Dialogue Platform** – Provides a forum for member states, UN agencies, NGOs, and civil society to discuss gender equality issues.
5. **Mainstreaming Gender Perspective** – Integrates gender considerations into broader UN programmes and policies.

Significance:

- Acts as the central UN platform for advancing women's rights globally.
- Helps shape international legal and policy frameworks on gender equality.

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Deepening Inequality: The Crisis in India's Education and Employment

Context: The State of Working India (SWI) 2026 report highlights a severe graduate paradox, where nearly 40% of graduates aged 15–25 are unemployed despite rising educational attainment.

About Deepening Inequality: The Crisis in India's Education and Employment

What it is?

- **Inequality** in this context refers to the widening gap in access to quality education, formal employment, and economic mobility across different social and regional groups.
- It manifests as a human development deficit where a university degree no longer guarantees a stable career, particularly for those from marginalized backgrounds.

Data & Facts on Education and Unemployment:

- **The 7% Club:** Less than **7% of male graduates** manage to secure a permanent salaried job within one year of finishing their studies.
- **Youth Joblessness:** Unemployment for the 15–29 age group is approximately **14.8%**, nearly three times the national average of 4.9%.
- **Degree Inflation:** Over two-thirds (**67%**) of unemployed Indians aged 20–29 were graduates in 2023, up from 46% in 2017.
- **Enrolment Reversal:** The share of young men in education fell from **38% in 2017 to 34% in late 2024**, with 72% citing the need to support household income.
- **Social Divide:** Only **7% of ST and 10% of SC youth** are graduates, compared to over 18% in other social groups, highlighting persistent barriers.

Reasons for the Crisis:

- **Structural Mismatch:** The economy is underproducing high-quality jobs while the education system overproduces general degrees.

Example: Every year, 5 million graduates enter the workforce, but only about **2.8 million** find any form of employment, often in the informal sector.

- **Quality Concentration:** Elite educational institutions are concentrated in Southern India, leaving Northern states with general degree programs of limited depth.

Example: Graduates in Northern states often focus on **public service exam prep** due to a lack of local technical or vocational training hubs.

- **The STEM Vicious Cycle:** A shortage of qualified STEM teachers leads to fewer students opting for technical subjects, reducing the pool of employable tech talent.

Example: Faculty growth has not matched student numbers, with student-teacher ratios in public colleges reaching **47:1**, far above the 15:20 norm.

- **Dependence on Government Jobs:** Public sector roles are seen as a lottery that offers protection against social discrimination, leading to waiting unemployment.

Example: Youths spend years in their prime preparing for limited government vacancies instead of entering the private workforce.

- **Technological Displacement:** AI and automation are eliminating entry-level knowledge work tasks that general graduates were traditionally hired for.

Example: NASSCOM projects a need for **1 million AI professionals**, yet only 55% of Indian graduates are considered industry-ready for such roles.

Challenges Associated to Counter:

- **Financial Barriers:** Professional degrees like Medicine or Engineering cost more than the annual per capita expenditure of poor households.

Example: This reinforces inequality as high-paying tech and medical roles remain a gated corridor for the wealthy.

- **Institutional Quality:** While private ITIs have grown by 300%, their training quality is often poor and lacks links to actual manufacturing.

Example: Only **15% of youth** trained under the PM Kaushal Vikas Yojana (PMKVY) actually transition into formal employment.

- **The Missing Middle:** India's economy skipped a robust manufacturing phase, moving straight to services which require high-skilled labor.

Example: Agricultural workers cannot easily transition to IT services, leading to **disguised unemployment** in the farm sector.

- **Regional Disparities:** Migration is the only outlet for youth in poorer states, but this often leads to precarious and distress migration.

Example: States like Karnataka and Tamil Nadu absorb talent, but Northern states continue to face an **aspirational vacuum.**

- **Employer Reluctance:** Industries are hesitant to invest in on-the-job training for unemployable graduates due to high costs.

Example: Only **16% of organizations** convert internships into full-time roles, leaving interns on the margins of the workforce.

Way Ahead:

1. **Apprenticeship Mandate:** Shift from unemployment doles to a massive, employer-led apprenticeship program in organized manufacturing.
2. **Curriculum Overhaul:** Align university syllabi with the digital economy's weekly evolution, focusing on **Proof of Work** (GitHub, portfolios) over degrees.
3. **Decentralized Industry Hubs:** Create MSME clusters in Northern India to provide local non-farm jobs and reduce the pressure on Southern metros.
4. **STEM Teacher Mission:** Launch a national program to recruit and train STEM faculty to break the generational cycle of low technical literacy.
5. **Universal Social Security:** Establish portable social security for gig and informal workers to reduce the desperation for government jobs.

Conclusion:

India is currently at a critical juncture where its demographic dividend could either power a Viksit Bharat or become a massive social burden. The SWI 2026 report serves as a final warning: after 2030, the demographic window begins to close. To succeed, India must pivot from a degree-producing machine to a skill-validating economy that bridges the gap between learning and earning.

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SPECIES IN NEWS

The Ruddy Shelduck

Context: Residents of Mudh village in Ladakh have been protecting the Ruddy Shelduck for over two decades, escorting fledglings safely to the Indus River during breeding season.

About The Ruddy Shelduck:

What it is?

- The **Ruddy Shelduck** (*Tadorna ferruginea*), also known as the **Brahminy duck**, is a large migratory waterfowl species found across Europe, Central Asia, and parts of Africa, wintering in South Asia.
- In India, Ladakh is its **only breeding site**, where it nests in high-altitude wetlands between June and August.

Habitat:

- Occupies diverse ecosystems: **rivers, lakes, marshes, ponds, deltas**, and even **man-made reservoirs**.
- Found from **sea level to elevations up to 4,800 metres**, including deserts, steppes, and Himalayan plateaus.
- In Ladakh, it breeds in high-altitude valleys before moving broods to the **Indus River**.

IUCN Status:

- Classified as Least Concern by the International Union for Conservation of Nature (IUCN).

Key Characteristics:

1. **Physical Features:**

- Distinctive **orange-brown (ruddy) plumage** with a creamy white head.
- Males have a **dark neck ring** during breeding season.
- Wings show striking contrast of **white coverts and black flight feathers**.

2. **Biological Traits:**

- Highly adaptable to varied climates and altitudes.
- Can be sedentary, migratory, or semi-nomadic depending on region.
- Migratory populations traverse extreme terrains like the **Himalayas and Gobi Desert**.

3. **Reproductive Behaviour:**

- Generally **monogamous**, with long-term pair bonds.
- Clutch size ranges from **8–13 eggs**.
- Nests in unconventional sites such as **tree hollows, rock crevices, fox dens, or building attics**.

4. **Social Behaviour:**

- Adults often **cooperatively monitor multiple broods**.
- Known for strong pair fidelity, symbolizing **marital loyalty in Buddhist culture**.

Significance:

- Contributes to wetland biodiversity and acts as an indicator of ecosystem health in fragile Himalayan habitats.
- Revered in Buddhism; considered sacred and a symbol of fidelity, encouraging community protection.

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The Striped Hyena

Context: Tajikistan and Uzbekistan have formally proposed including the striped hyena in Appendix I and II of the Convention on Migratory Species (CMS) at the upcoming CMS COP15 in Brazil.

About The Striped Hyena:

What it is?

- The striped hyena is a medium-sized, nocturnal carnivore and the only hyena species found in the Indian subcontinent. While often misunderstood as a pure scavenger, it is a vital sanitary worker of the ecosystem, primarily feeding on carrion but also capable of hunting small prey.

Habitat and Distribution

- **Global Range:** Found across North and Sub-Saharan Africa, the Middle East, Caucasus, Central Asia, and the Indian Subcontinent.
- **Preferred Environments:** They thrive in arid and semi-arid regions, including savannas, grasslands, semi-deserts, open woodlands, and rocky mountainous terrain.

Protection Status:

- **IUCN Red List: Near Threatened** (Global); Vulnerable (Mediterranean region).
- **CMS Proposal:** Proposed for **Appendix I** (Endangered migratory species) and **Appendix II** (Species requiring international cooperation).
- **Indian Law:** Protected under **Schedule I** of the Wildlife (Protection) Act, 1972, providing it the highest level of legal protection in India.

Key Characteristics:

Physical Traits:

- **Appearance:** Distinctive vertical black stripes on a grey or yellowish-brown coat.
- **Mane:** A prominent dorsal crest of long hair that it can erect to appear larger when threatened.
- **Physiology:** Possesses extremely powerful jaws capable of crushing the largest bones of a carcass to access the marrow.

Biological & Behavioral Traits:

- **Nocturnal:** Almost exclusively active at night, making them elusive and difficult to study.
- **Diet:** Primarily a scavenger; it plays a critical role in preventing the spread of diseases by consuming decaying carcasses.
- **Movement:** Known for long-distance dispersal and nomadic movements, often crossing international borders in search of food and water.

Social Structure:

- **Solitary Nature:** Unlike the social Spotted Hyena, the striped variety is generally solitary or lives in small family units (a pair and their offspring).
- **Communication:** They communicate through vocalizations, though they do not possess the famous laugh of the Spotted Hyena.

India and the Striped Hyena:

- India is a major stronghold for the species, particularly in states like **Rajasthan, Gujarat, Maharashtra, and Madhya Pradesh**.
- **Ecological Niche:** In India, they often inhabit the fringes of human settlements and Open Natural Ecosystems (ONEs) like the **Kadbanwadi Grasslands** in Maharashtra.

New Moth Species in the Eastern Himalayas

Context: Scientists from the Zoological Survey of India (ZSI) have discovered two new species of lichen moths, *Caulocera hollowayi* and *Asura buxa*, in the Eastern Himalayas.

About New moth species in eastern Himalayas:

What it is?

- Researchers from the Zoological Survey of India (ZSI) discovered two previously unknown species of lichen moths (order: Lepidoptera) in the Eastern Himalayan biodiversity hotspot.
- The species were identified through detailed morphological analysis, wing pattern studies, and microscopic reproductive structures used in insect taxonomy.

About *Caulocera hollowayi*:

- **What it is**
  - A newly identified lichen moth species belonging to the genus *Caulocera*.
  - Discovered from Golitar region of Sikkim.
- **Key Features:**
  - Distinct wing colour patterns and band structures.
  - Unique microscopic reproductive structures used in insect classification.
  - Identified through chaetotaxy (arrangement of body scales and bristles) and morphological characteristics.

About *Asura buxa*:

- **What it is?**
  - Another newly described lichen moth species belonging to the genus *Asura*.
  - Discovered from Panijhora in West Bengal (Eastern Himalayas).
- **Key Features:**
  - Characterised by distinct wing markings and structural differences in genital morphology, a key taxonomic feature in Lepidoptera identification.
  - Shows unique body scale arrangement, confirming it as a species new to science.

Significance of the Discovery:

- The discovery expands scientific knowledge of India's moth diversity, especially in the Himalayan biodiversity hotspot.
- Lichen moths help researchers understand ecosystem functioning and species interactions in mountain habitats.

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Project Great Indian Bustard Captive Breeding Programme

Context: Project Great Indian Bustard (GIB) Captive Breeding Programme has entered its fourth year with the hatching of two new chicks at the Conservation Breeding Centre in Rajasthan.

About Project Great Indian Bustard Captive Breeding Programme:

What it is?

- The captive breeding initiative is a critical insurance policy against the extinction of the GIB, managed through a partnership between the **Ministry of Environment, Forest and Climate Change (MoEFCC)**, the Rajasthan Forest Department, and the Wildlife Institute of India (WII).

Launched In: The broader Project Great Indian Bustard was launched by the Rajasthan government in **2013**, while the dedicated conservation breeding facilities became fully operational around **2019–2022**.

Aim: To build a self-sustaining captive population of GIBs and eventually reintroduce them into the wild to bolster their dwindling numbers.

Key Features:

- **Scientific Breeding:** Utilizes both natural mating and advanced techniques like **artificial insemination**.
- **In-situ & Ex-situ Conservation:** Combines habitat protection (In-situ) with breeding in controlled environments (Ex-situ).
- **Soft Release Strategy:** This year marks a shift toward soft releasing captive-bred birds—a process where birds are gradually acclimated to the wild in protected enclosures before full release.
- **International Collaboration:** Receives technical support from the **International Fund for Houbara Conservation (Abu Dhabi)**.

About the Great Indian Bustard (GIB):

What it is?

- The Great Indian Bustard is a majestic bird, often called the flagship species of India's grassland ecosystems. It is one of the heaviest flying birds in the world and serves as an umbrella species, meaning its protection ensures the survival of many other grassland creatures.

Conservation Status:

- **IUCN Red List:** Critically Endangered (one step away from extinction in the wild).
- **Wildlife Protection Act (1972):** Schedule I (highest level of legal protection).
- **CITES:** Appendix I.

Habitat and Distribution:

- **Habitat:** Prefers dry, open **grasslands and scrublands** with low-intensity agriculture. It avoids irrigated and heavily forested areas.
- **Distribution:** Once found across the Indian subcontinent, it is now restricted to fragmented pockets in **Rajasthan** (specifically Desert National Park), **Gujarat**, **Maharashtra**, **Karnataka**, and **Andhra Pradesh**.
- Rajasthan holds over 90% of the remaining wild population.

Key Characteristics:

- **Physical Appearance:** Large, ground-dwelling bird standing about **1 meter** tall. It is distinguished by a **black crown** on its forehead, a pale neck, and a brownish body.
- **Behavior:** It is an **omnivore**, feeding on insects (like grasshoppers and beetles), rodents, reptiles, and seeds. It is a slow breeder, typically laying only **one egg** per year.
- **State Bird:** It is the official state bird of **Rajasthan**, where it is locally known as **Godawan**.

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ART AND CULTURE

Jahan-e-Khusrau Festival

Recently, the Jahan-e-Khusrau Festival 2026 was organized in New Delhi, celebrating Sufi music, poetry, and spiritual traditions.

About Jahan-e-Khusrau Festival

- It is an international festival dedicated to Sufi music and poetry.
- Founded by filmmaker and artist Muzaffar Ali.
- Named after the famous Sufi poet Amir Khusrau.
- It brings together artists from different countries, promoting cultural exchange.
- Focuses on themes of love, peace, and spiritual unity.

Significance

- Promotes India's syncretic culture.
- Strengthens cultural diplomacy (soft power).
- Preserves and popularizes Sufi traditions.

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Yadava Dynasty

Recently, a 12th-century temple-style stone pillar belonging to the Seuna (Yadava) dynasty was discovered near the Vena River in Hinganghat, Wardha district of Maharashtra.

About Yadava Dynasty (Seuna Dynasty)

- The Yadavas (Seuna dynasty) ruled a Hindu kingdom in central India from the 12th to 14th century.
- At their peak, their empire extended from the Tungabhadra River (south) to the Narmada River (north), covering present-day Maharashtra, northern Karnataka, and parts of Madhya Pradesh.
- Initially, they were feudatories of the Western Chalukyas of Kalyani, but later gained independence.
- Bhillama V (c. 1187–1191) established their rule as an independent power and founded Devagiri (Daulatabad) as the capital.
- Under Singhana (c. 1210–1247), the dynasty reached its golden phase, expanding against the Hoysalas, Kakatiyas, Paramaras, and Chalukyas.
- The last ruler, Ramachandra (1271–1309), faced invasion by Alauddin Khilji (1294) and accepted tributary status under the Delhi Sultanate.
- After further conflicts, the Yadava kingdom was finally annexed by the Khalji Empire in 1317.

Cultural Contributions

- The Yadavas played a key role in shaping Marathi culture and society.
- The Hemadpanti architectural style (stone construction without mortar) is a major legacy of this period.

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Kochi-Muziris Biennale

The Kochi-Muziris Biennale continues to be held in Kerala as one of Asia's largest contemporary art exhibitions.

About Kochi-Muziris Biennale

- It is a contemporary art exhibition held in Kochi, Kerala.
- Started in 2012.

- Organized by the Kochi Biennale Foundation.
- Brings together artists from across the world.
- Held once every two years (biennale).

Significance

- Positions India as a global art hub.
- Encourages modern artistic expression.
- Boosts tourism and local economy.

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Tribes India Art Festival

Recently, the Tribes India Art Festival 2026 showcased artworks of tribal artists across India.

About Tribes India Art Festival

- Organized under the Ministry of Tribal Affairs / TRIFED.
- Promotes tribal art, crafts, and culture.
- Provides a platform to indigenous artists.
- Showcases traditional forms like paintings, handicrafts, etc.

Significance

- Preserves tribal identity and heritage.
- Provides livelihood opportunities.
- Promotes inclusive cultural growth.

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Gajapati Empire

Recently, a Telugu medieval inscription associated with the Gajapati rulers of Odisha was discovered on a stone pillar at the historic Lakshmi Narasimha Swamy Temple in Ramachandrapuram Agraharam, Guntur district.

About Gajapati Empire

- The Gajapati Empire was a powerful medieval Hindu dynasty that ruled mainly in Odisha during the 15th–16th century (c. 1434–1541).
- It emerged after the decline of the Eastern Ganga dynasty.
- The empire was founded by Kapilendra Deva, belonging to the Suryavamsa lineage.
- It became one of the most dominant powers in eastern and southern India during its peak.

Key Features

- The empire reached its zenith in the 15th century, extending from the Ganga (north) to the Kaveri (south).
- The initial capital was Cuttack (Kataka).
- Under Prataparudra Deva (1497–1540), the empire maintained strong political and cultural influence.

Cultural Contributions

- The Gajapati rulers were great patrons of art, architecture, and literature.
- The Sun Temple at Konark stands as a prime example of their architectural excellence and is now a UNESCO World Heritage Site.

- They significantly contributed to the growth of Odia language and culture, leading to a cultural renaissance in the region.

Decline

- The empire faced continuous conflicts with the Vijayanagara Empire, leading to territorial losses in the south.
- Internal instability and external invasions weakened the dynasty.
- Eventually, the region came under Mughal control in the late 16th century.

Significance of Discovery

- The newly discovered inscription highlights the historical importance of the Gajapati Empire.
- It provides valuable insights into the political and cultural history of medieval Odisha.
- The finding also underlines the richness of India's epigraphic and temple heritage.

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Chandra Shekhar Azad

Why in News?

India paid tribute to revolutionary freedom fighter Chandra Shekhar Azad on his 95th martyrdom day (27 February 2026).

Early Life and Name

- Chandra Shekhar Azad was born as Chandra Shekhar Tiwari in 1906 at Alirajpur (Madhya Pradesh).
- He actively participated in Non-Cooperation Movement (1921).
- After being arrested, he famously declared his name as 'Azad' (Free), symbolizing his lifelong commitment to independence.

Ideological Shift

- The sudden withdrawal of the Non-Cooperation Movement in 1922 deeply influenced him.
- He moved away from Gandhian non-violence and adopted a path of revolutionary nationalism and armed struggle.

Association with Revolutionary Groups

- Azad joined the Hindustan Republican Army (HRA), led by revolutionaries like Ram Prasad Bismil and Sachindranath Sanyal.
- He played a crucial role in organizing revolutionary activities and strengthening the movement.

Role in Kakori Conspiracy (1925)

- Azad contributed significantly to raising funds for revolutionary activities through political dacoities.
- He was associated with the famous Kakori Train Robbery, aimed at challenging British authority.

Formation of HSRA (1928)

- In 1928, Azad, along with Bhagat Singh, reorganized the revolutionary movement and formed the Hindustan Socialist Republican Association (HSRA).
- Under this, the movement adopted a socialist ideology, with Azad acting as a key strategist and military leader.

Saunders Assassination (1928)

- Azad played a central role in the assassination of British officer John Saunders in Lahore.
- The act was carried out to avenge the death of Lala Lajpat Rai.
- The HSRA later issued pamphlets under Azad's pseudonym 'Balraj'.

Final Sacrifice (1931)

- After the Central Assembly Bombing (1929), Azad went underground.

- On 27 February 1931, he was surrounded by police in Alfred Park, Allahabad.
- He fought bravely, ensured the escape of his associate Sukhdev Raj, and ultimately ended his life with his last bullet, staying true to his vow of never being captured alive.

Significance

- Azad remains a symbol of fearlessness, sacrifice, and revolutionary spirit.
- His life reflects the militant phase of India's freedom struggle, complementing the broader national movement.

****

Sri Guru Tegh Bahadur

Why in News?

The Prime Minister addressed the 350th Martyrdom Year (Shaheedi Samagam) of Guru Tegh Bahadur.

Early Life

- Guru Tegh Bahadur was born in 1621 in Amritsar (Punjab) to Guru Hargobind.
- He was originally named Tyag Mal, reflecting his ascetic and spiritual inclination.
- He received training in Sikh scriptures as well as martial arts.
- At a young age, he displayed exceptional bravery in battle and earned the title "Tegh Bahadur".

Becoming the Ninth Guru

- After years of meditation at Bakala, he was recognized as the ninth Sikh Guru in 1664.
- His identity as Guru was confirmed by a devotee, Makhan Shah.
- Later, Guru Gobind Singh honored him with the title "Hind di Chadar".

Spiritual Contributions

- Guru Tegh Bahadur established Chak Nanki, later known as Anandpur Sahib.
- He traveled widely across North and East India, spreading spiritual teachings.
- His message emphasized fearlessness, equality, and devotion to one God.
- His teachings gained special relevance during the reign of Aurangzeb.

Defense of Religious Freedom

- When Kashmiri Brahmins faced persecution, they sought his support.
- Guru Tegh Bahadur stood firmly for their right to practice their religion freely.
- He openly challenged oppressive policies and upheld the principle of religious liberty for all.

Martyrdom (1675)

- In 1675, he was arrested and brought to Delhi.
- Refusing to convert to Islam, he was executed publicly at Chandni Chowk along with his companions.

Significance

- Guru Tegh Bahadur symbolizes sacrifice, tolerance, and moral courage.
- His martyrdom represents the defense of freedom of belief and pluralism in India.

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Kurumba Painting

Why in News?

The Kurumba painting tradition is currently facing the threat of extinction.

About Kurumba Painting

- Kurumba painting is an ancient prehistoric art form, believed to be over 3,000 years old.
- It originates from the Kurumba tribe, found in regions of Tamil Nadu, Kerala, and Karnataka.

- Traditionally, these paintings were created on rocks and cave walls.

Materials and Techniques

- Uses natural pigments derived from forest resources.
- Tools: twigs, bamboo sticks, natural fiber brushes.

Design and Themes

- Minimalistic and linear designs.
- Includes dots, lines, geometric patterns.
- Depicts huts, animals, daily life.

Significance

- Represents tribal identity and heritage.
- Reflects deep connection with nature.
- Important for preserving indigenous culture.

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Megalithic Laterite Rock-Cut Chamber (Kerala)

Why in News?

A Megalithic burial chamber was discovered in Kasaragod district, Kerala.

Megalithic Culture

- Refers to prehistoric large stone burial structures.
- Time frame: 1000 BCE to 100 CE.
- Peak: 600 BCE – 100 CE.

Geographical Spread

- Deccan region (south of Godavari).

Significance

- Helps understand burial customs.
- Evidence of Iron Age culture.

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India's 1st Manuscript Mapping Drive

Why in News?

The Ministry of Culture launched a nationwide manuscript survey.

Objectives

- Preserve and digitise manuscripts.
- Create national database.
- Promote research.

Technology Use

- Geo-tagging manuscripts.
- Gyan Bharatam App for data collection.

Significance

- Protects cultural heritage.
- Strengthens knowledge systems.
- Enhances global recognition.

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ANURAG BACHAN'S
DROANACHARYA-IAS

SOME OF SUCCESSFUL GEMS WITH ANURAG SIR

AASTHA SINGH
Rank 61st (IAS)

ANJALI GARG
Rank 79th (IAS)

ANKUR
Rank 37th (IAS)

SANYA
Rank 84th (IAS)

SAWAN
Rank 89th (IAS)

JYOTINDER BAJWA
Rank 256th (IAS) / 20th (PCS)

ASHOK
Rank 325th (IAS)

AFTAAB RASOOL
Rank 412nd (IAS)

MANISH YADAV
(IAS)

KHUSHDIL SANDHU
Rank 5th (PCS)

AMAN CHAWLA
Rank 6th (PCS)

HARPREET SINGH SIDHU
(PCS)

PRIYA KHERA
Rank 45th (DSP)

JASPREET
(INDUSTRY OFFICER)

SANKALP GAUTAM
Rank 2nd (HAS)

TEHSEEN
(IPS)

SAMAY SINGH
(IPS)

AREEBA
Rank 109th (IPS)

MAYANK MISHRA
Rank 228th (IPS)

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