
Prelims Exam Topics

IMD BLOCK-LEVEL MONSOON FORECAST

Context

The **India Meteorological Department (IMD)** unveiled a new forecast system that will, for the first time, generate “**block-level**” forecasts of the monsoon’s arrival for **3,196 blocks across 15 States and one UT** covering the “monsoon core zone” of rainfed India.

Monsoon Core Zone

- The “**monsoon core zone**” (MCZ) of India is a **critical agricultural belt extending from the northwest to the southeast across central India, characterized by high sensitivity to monsoon dynamics and a heavy reliance on rainfed agriculture**. This region is crucial because its rainfall patterns largely dictate the country's overall Kharif crop production.

Static Background

- **IMD:** India Meteorological Department under Ministry of Earth Sciences; established 1875; India’s apex weather forecasting authority.
- **Current forecast resolution:** State-level and district-level monsoon onset forecasts; Mumbai monsoon arrival June 10; Delhi ~June 29. Block-level (sub-district) is a new capability.
- **Indian Institute of Tropical Meteorology (IITM):** Under Ministry of Earth Sciences; developed the blending framework; responsible for India’s monsoon prediction systems.
- **El Niño:** Warming of central and eastern Pacific Ocean — historically associated with below-normal rainfall over India. El Niño years include 2009 (severe drought), 2015-16, 2023. A developing El Niño in 2026 adds urgency to block-level precision forecasting.
- **Agriculture advisory integration:** System specifically developed at the request of the Ministry of Agriculture and Farmers’ Welfare to feed into a weekly advisory pipeline.

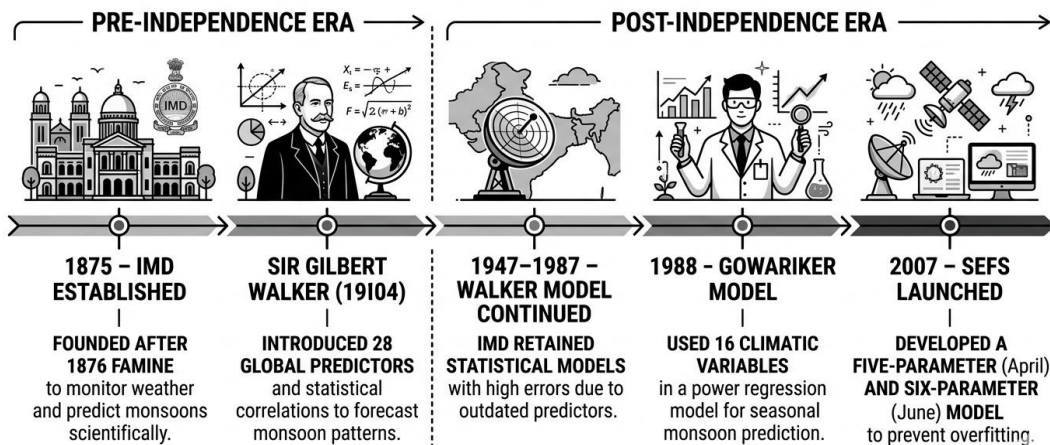
Types of Forecasts

- **Nowcasting (0–6 hrs):** Provides ultra-short-term weather updates using real-time data from radars and satellites.
- **Short-range (1–3 days):** Useful for agriculture and planning; relies on numerical weather prediction (NWP) models.
- **Medium-range (4–10 days):** Uses dynamic models to simulate atmospheric conditions; forecasts moderate-term patterns.
- **Long-range (10 days–2 years):** Focuses on seasonal trends like monsoon; involves ocean-atmosphere interactions.

- **Ensemble Forecasting:** Combines multiple models and parameters to offer more reliable and probabilistic forecasts.

About Evolution of Monsoon Forecasting in India

EVOLUTION OF MONSOON FORECASTING IN INDIA



PLFS 2025: INDIA'S LABOUR MARKET

Context

The Periodic Labour Force Survey (PLFS) 2025 (MoSPI, January–December 2025), the first revamped PLFS covering both rural and urban India monthly.

Key Findings

Overall Workforce Trends

The workforce is expanding and absorbing more people, driven by a steady recovery in economic activity since 2022.

- **LFPR (Labour Force Participation Rate):** 44.9% for all age groups.
- **WPR (Worker Population Ratio):** Increased to 43.5% from 39.7% in 2022.
- **Unemployment Rate (UR):** Stands at an overall low of 3.1%.
- **General Employment Growth:** Data indicates a higher number of Indians are currently working compared to 2022 levels.

Women's Work Dynamics

While rural women are increasingly entering the workforce (often in agriculture), urban women face severe barriers to finding work, as reflected by their high unemployment rate.

- **Rural Women LFPR:** 34.6%.

- **Urban Women LFPR:** Significantly lower at 22.2%.
- **Urban Women UR:** High unemployment rate of 18.9% in cities.
- **Rural Women WPR:** Improved to 33.8% from 26.9% in previous years.

Youth Employment (Ages 15–29)

Young people face the highest hurdles in the job market, often turning to self-employment or the gig economy due to a lack of formal salaried roles.

- **Youth Unemployment Rate:** 9.9%, which is three times the national average.
- **Urban Young Women UR:** 18.9%.
- **Self-Employment:** 70.7% of rural women in this age group are self-employed.
- **Gig Economy:** Employment in gig and delivery sectors is showing marked growth.

Key Labour Market Concepts

- **LFPR (Labour Force Participation Rate):** % of the working-age population (15+) either employed or actively seeking employment.
- **WPR (Worker Population Ratio):** % of population actually employed.
- **Unemployment Rate (UR):** % of the labour force that is actively seeking work but unable to find it. UR measures active job-seekers — not those who have given up (discouraged workers).

CREDIBILITY CRISIS IN INDIA'S EXAMINATION SYSTEM

Context

The National Testing Agency (NTA) cancelled the NEET-UG 2026 examination, which was held on May 3 for more than 22 lakh candidates, after allegations of paper leaks and examination malpractices emerged.

About the National Testing Agency (NTA)

- The National Testing Agency (NTA) was set up as a society under the provisions of the Indian Societies Registration Act, 1860.
- It functions as an autonomous and financially independent body responsible for conducting entrance examinations for admissions to higher educational institutions across India.
- The agency is headed by a distinguished educationist appointed by the Ministry of Human Resource Development.
- Its administrative leadership is managed by a Chief Executive Officer (CEO), who serves as the Director-General and is appointed by the Government.
- NTA also has a Board of Governors consisting of representatives from various user institutions.

Key provisions of the Public examinations (Prevention of Unfair Means) Act, 2024

- The Act specifies the examinations and authorities covered under its scope, thereby ensuring clarity in implementation.
- The law applies to recruitment and entrance examinations conducted by central agencies such as UPSC, SSC, RRBs, IBPS, and NTA, along with examinations organised by central ministries and departments.
- Individuals involved in paper leaks or similar offences may face imprisonment ranging from three to five years. In cases linked to organised crime, the punishment can extend up to ten years along with substantial monetary penalties.
- The Act identifies around 20 forms of malpractice, including impersonation, tampering with records, and unauthorised access to examination-related materials.
- Investigations are to be carried out by officers of designated rank to ensure strict and effective enforcement.
- A specialised committee has been formed to improve IT security measures and frame protocols for computer-based examinations.
- The Act mainly covers examinations conducted at the central level and does not directly include university or state education board examinations.
- The legislation does not mandate coverage of state-level examinations, it provides a framework that states may adopt while drafting their own anti-cheating laws.

CANCER IMMUNOTHERAPY AND BLOOD-BRAIN BARRIER STUDY

Context

A recent study found that anti-PD-1 cancer immunotherapy may alter the blood-brain barrier (BBB), influencing brain metastasis and drug delivery.

About the New Findings

- **Core Discovery:** Anti-PD-1 therapy was found to increase BBB permeability (“leakiness”) by altering the brain immune environment.
 - **Immune Checkpoint Inhibitors (ICIs) are** Cancer immunotherapy drugs that block signals preventing immune cells from attacking tumours.
 - **PD-1 Inhibitors are a** type of ICI that enhances anti-tumour immune response by activating immune cells.
 - **Blood-Brain Barrier (BBB):** A tightly packed protective cellular barrier controlling movement of substances into brain tissue.
- **Observed Brain Changes:** Researchers found weaker BBB proteins, loss of blood-vessel stabilising cells and greater immune-cell entry into the brain.

- **Role of DKK1 Protein:** DKK1 protein was identified as the major mediator causing BBB disruption; higher DKK1 levels correlated with increased brain metastasis.
 - DKK1 may serve as a biomarker to identify patients at higher risk of brain metastasis during immunotherapy.
- **Impact on Brain Metastasis:** BBB leakage may allow circulating cancer cells to enter the brain, increasing metastasis risk in resistant cancers.
- **Double-Edged Effect:** BBB opening may increase metastasis risk but can also improve delivery of chemotherapy drugs into the brain.
- **Clinical Significance:** The findings may influence future sequencing of immunotherapy and chemotherapy for brain cancers, though larger human trials are needed

POLYENDOCRINE METABOLIC OVARIAN SYNDROME (PMOS)

Context

A global medical consensus has renamed **Polycystic Ovary Syndrome (PCOS)** as **Polyendocrine Metabolic Ovarian Syndrome (PMOS)** to better reflect its multisystem hormonal and metabolic nature.

About PMOS

- It is a hormonal and metabolic disorder affecting women, associated with irregular menstruation, infertility, obesity and insulin resistance.
- **Why Renamed? :** The earlier term “PCOS” wrongly focused only on ovarian “cysts”, whereas the condition actually involves multiple hormonal and metabolic dysfunctions with arrested follicles rather than true cysts.
- **Key Hormonal Involvement:** Includes dysfunction in ovaries, insulin regulation, hypothalamus, pituitary gland and adrenal hormones.
- **Common Symptoms:** Irregular periods, infertility, acne, excess hair growth, obesity, diabetes and cardiovascular risks.
- **Global Burden:** Affects nearly **1 in 8 women globally** (about 170 million women).
- **India-Specific Concern:** Prevalence in India estimated at **16–18%**, with high association with insulin resistance and metabolic syndrome.
- **Significance of Renaming:** Aims to improve diagnosis, awareness and holistic treatment of the disorder.

ENTERPRISE AI

Context

AI companies are increasingly focusing on **enterprise AI**, moving beyond chatbot development into AI deployment and workflow integration for businesses.

About Enterprise AI and Its Implications

- **Enterprise AI:** Use of AI systems within organisations to automate workflows, analytics, customer service, finance and operational processes.
- **Push Towards Enterprise AI:** AI firms are shifting towards enterprise deployment due to rising competition in AI models and need for stable long-term revenue streams.
- **Need for Enterprise AI:** Many AI pilots fail because firms lack expertise to integrate AI into legacy software, fragmented databases and regulated workflows.
- **Implementation Layer:** Enterprise AI focuses not just on building models, but on redesigning workflows, automation and operational transformation.
- **Impact on Global IT Industry:** AI-native firms may disrupt traditional IT services by automating coding, support and enterprise transformation functions.
- **Impact on Indian IT Sector:** Indian IT companies like Tata Consultancy Services, Infosys and Wipro may face pressure to reinvent around AI integration and domain expertise.
- **Potential Benefits:** Enterprise AI can improve productivity, workflow efficiency, automation and decision-making across sectors.
- **Emerging Risks:** Raises concerns regarding job displacement, dependence on AI ecosystems, data privacy and concentration of technological power.



Mains Exam Topics

HUMAN- WILDLIFE CONFLICT

Context

A 10-year-old boy was killed in a leopard attack in Nagamale forests (near M.M. Hills, Chamarajanagar), prompting Karnataka's Environment Minister to suspend trekking in wildlife hotspots and enforce SOPs for trails.

What is Human-Wildlife Conflict?

Human-wildlife conflict occurs when encounters between humans and wildlife lead to negative results, such as loss of property, livelihoods, and even life.

Causes of Human Wildlife Conflict

- **Population pressure and encroachments:** Rising human population pushes settlements closer to protected areas, increasing encounters.
- **Habitat loss & fragmentation:** E.g. In the Kaziranga–Karbi Anglong landscape (Assam), highways and tea plantations have fragmented elephant corridors, leading to frequent crop raids and human deaths.
- **Decline in the quality of forest habitats,** largely due to the cultivation of alien plants mainly acacia, mangium and eucalyptus in forest tracts for commercial purposes.
- **Changing agri-practices** were also responsible for drawing animals, which do not find enough fodder in their habitats, out of forests.

Consequences of Human-Wildlife Conflict

- **Human impact:** HWC causes significant loss of life and injury. E.g. An estimated 344 people lost their lives in incidents of human-wildlife conflict across Kerala between 2021 to 2025.
- **Economic toll:** Crop loss, livestock depredation, and property damage translate to large financial losses for farmers. Farmers lose 10–15% of annual yield to crop-raiding species like elephants, nilgai, wild boars, and monkeys.
- **Wildlife at risk:** Animals are frequently killed either in accidents or retaliation undermining conservation.
- **Fiscal burden:** E.g. Kerala alone spent ₹79.3 crore in 6 years on compensation and protection measures.

Need for Balancing Human-Wildlife Conflict

- **Economic Security for Farmers:** Conflicts often destroy the entire annual livelihood of rural families.
- **Conservation of Keystone Species:** Elephants are ecosystem engineers; their loss disrupts forest health.
- **Psychological Well-being and Safety:** Constant fear of wildlife attacks reduces the quality of life in fringe villages.
- **Maintaining Ecological Corridors:** Balancing conflict ensures that traditional migratory paths remain functional.

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

Government Initiatives to Prevent Human-Wildlife Conflict

- **National Human-Wildlife Conflict Mitigation Strategy and Action Plan:** Issued by MoEFCC, focuses on early warning, preventive measures, quick response, and capacity building.
- **CAMPA Funds** are used for afforestation, waterholes, and habitat improvement to reduce pressure on human areas.
- **Centrally Sponsored Schemes:** Development of Wildlife Habitats and Project Tiger, where financial assistance to States/UTs is provided.
- **Eco-Sensitive Zones (ESZs):** Buffer areas around protected areas to regulate human activities and reduce conflict.

Way Forward

- **Strengthening habitat connectivity:** Re-developing corridors connecting habitat and sensitising people on how to deal with animals.
- **Focus on coexistence:** Promote the idea of coexistence, not the elimination of species. Integrate HWC mitigation into development planning, urban design, and smart cities.
- **Scientific Land Use Planning:** Where unavoidable, ensure mitigation structures like underpasses, overpasses, and canopy bridges.
- **Building Barriers:** E.g. Use solar-powered fencing, bio-fencing (chilli, cactus), and beehive fences to deter elephants.
- **Early Warning Systems:** Develop and implement early warning systems to alert communities about animal presence in the vicinity. Use technology like motion-sensor cameras and GPS tracking to monitor their movements.

Global Best Practices in Managing Human-Wildlife Conflict

- **Botswana & Namibia – Community-Based Conservation:** Local communities share tourism revenue and gain rights over wildlife management (*aligns conservation with livelihood incentives*).
- **Costa Rica – Ecological Corridor Planning:** Wildlife corridors integrated into national land-use planning to maintain habitat connectivity and animal movement.
- **Finland – Real-Time Monitoring & Compensation:** Use of wildlife tracking systems along with rapid compensation mechanisms reduces risk and local resentment.
- **Bhutan – Community-Managed Forests:** Local forest governance and coordinated grazing systems help reduce habitat pressure and conflict.
- **Nepal – Predator-Proof Livestock Enclosures:** Use of secure livestock shelters and community-based mitigation reduces carnivore attacks on livestock

INDIA'S DIPLOMACY IN A CHANGING WORLD ORDER

Context

Growing geopolitical instability is reshaping the global order and requiring India to recalibrate its diplomacy.

About the Changing World Order

- **Shift from Unipolarity to Multipolarity:** The post-Cold War US-dominated order is giving way to a multipolar system with rising influence of China, India and middle powers.
- **Rise of Great-Power Competition:** Strategic rivalry between the United States and China is reshaping global trade, technology and security alignments.
- **Fragmentation of Globalisation:** Supply-chain securitisation, protectionism and friend-shoring are replacing hyper-globalisation.
- **Weakening of Traditional Institutions:** Institutions like NATO, WTO and multilateral frameworks face internal divisions and declining consensus.
- **Rise of Flexible Coalitions:** Countries increasingly engage through issue-based groupings like BRICS, Quad and I2U2 instead of rigid alliances.
- **Technology & Geoeconomic Competition:** Competition over AI, semiconductors, critical minerals and green technologies is becoming central to global power politics.

Five Principles to Guide Indian Diplomacy

1. Reciprocity

- **Mutual Strategic Support:** India should support partners who back its core interests (e.g. UAE's support on Kashmir and counterterrorism; India's solidarity during Gulf tensions).

2. Diversification

- **Expanding Strategic Partnerships:** India must broaden ties beyond traditional partners for trade, technology and investment (e.g. EU, EFTA agreements; stronger engagement with Nordic countries).
- **Reducing Dependency Risks:** Diversified economic and strategic linkages reduce vulnerability to geopolitical shocks (energy, technology and supply-chain diversification).

3. Strategic Flexibility

- **Multi-Alignment Approach:** India should engage competing blocs simultaneously based on interests (participation in both BRICS and Quad).
- **Avoiding Rigid Alliances:** Flexible diplomacy allows India to adapt to rapidly changing great-power equations (US-China tensions, Russia-West conflict).

4. Strategic Expansion

- **Greater Focus on Emerging Regions:** India must deepen engagement with strategically important regions (Africa for minerals, markets, connectivity and maritime security).
- **Competition for Influence:** India faces growing competition from China, Gulf countries and Western powers in the Global South.

5. Domestic Renewal

- **Internal Strength as Foreign Policy Foundation:** Economic growth, manufacturing capacity and technological capability are essential for effective diplomacy.
- **Need for Structural Reforms:** India must address bureaucratic delays, infrastructure gaps and innovation deficits to leverage global opportunities.

RISING ELECTRICAL FIRE RISKS IN INDIA

Context

Recent incidents such as the Vivek Vihar fire in Delhi have highlighted increasing vulnerabilities to electrical fires.

Rising Vulnerabilities to Electrical Fires

- **Rapid Growth in Power Consumption:** India's peak electricity demand doubled from early-2010s levels to **256 GW in 2026**, increasing stress on ageing electrical systems.
- **Surge in Air-Conditioner Usage:** India sold **15.4 million ACs in 2025**, while installed AC base may reach **240 million by 2030** (*IEA estimate*).
- **Ageing & Undersized Wiring:** Older buildings designed for low loads are now handling ACs, geysers, EV chargers and modern appliances beyond original capacity.
- **Non-Linear Electrical Loads:** Inverter ACs, LEDs, UPS systems and EV chargers generate harmonics causing overheating of neutral conductors.

Major Causes of Electrical Fires:

- **Wiring issues:** Short circuits, overloads, loose connections, arc faults, ground faults and ageing equipment are major triggers.
- **Poor Quality Electrical Components:** Use of counterfeit wires, breakers and substandard installations increases ignition risk.
- **Climate Change & Heat Stress:** Extreme heatwaves and 47°C summers are increasing cooling demand and electrical stress on grids and households.

Challenges in Prevention

- **Weak Inspection Mechanisms:** India lacks mandatory periodic electrical safety inspections unlike Japan and South Korea.
- **Shortage of Fire-Forensic Capacity:** Limited forensic investigation leads to reliance on provisional explanations rather than root-cause analysis.
- **Limited Adoption of Advanced Safety Devices:** Arc-Fault Circuit Interrupters (AFCIs), widely used in the US, are largely absent in Indian homes.
- **Data Gaps & Underreporting:** Most fire incidents fall under "other" category in NCRB data, limiting accurate assessment of electrical-fire risks.
- **Weak Consumer Awareness:** Consumers often ignore overloaded circuits, poor maintenance and warning signs like flickering or burning smells.

- **Infrastructure Deficit:** India faces a **96% shortage in fire infrastructure**, affecting emergency response and investigation.

Way Forward

- **Mandatory Periodic Electrical Inspections:** Introduce Japan/South Korea-style inspection systems for homes and buildings after major load additions.
- **Strengthen Electrical Standards:** Enforce BIS safety norms, harmonic compliance and quality certification for electrical products.
- **Promote Smart Monitoring Systems:** Encourage IoT-based sensors, thermography scans and AFCI adoption for early fire detection.
- **Improve Fire-Forensic Ecosystem:** Develop specialised forensic investigation systems and publish root-cause reports after major fires.
- **Consumer Awareness & Maintenance:** Promote safe wiring practices, annual AC servicing and avoidance of overloaded circuits.
- **Integrated Data System:** Create harmonised national datasets across fire departments, NCRB and BIS for better policy planning.

