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To The Point

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GS Paper 2 – Polity and Governance

Swachh Survekshan 2024–25: Ahmedabad Crowned India's Cleanest City

Context: In a remarkable turn in India's cleanliness journey, **Ahmedabad** has secured the **No. 1 position as India's cleanest city** in the prestigious **Swachh Survekshan 2024–25**, conducted by the **Ministry of Housing and Urban Affairs (MoHUA)**.

This is the **first time Ahmedabad has claimed the top spot**, marking a significant milestone in its urban sanitation journey. Meanwhile, former six-time champion **Indore** has been elevated to the newly created elite category — **Swachh Bharat Super League 1.0** — acknowledging cities that have demonstrated **sustained excellence in cleanliness and innovation** over the years.

About Swachh Survekshan: The World's Largest Urban Sanitation Survey

Launched in **2016** under the **Swachh Bharat Mission-Urban (SBM-U)**, **Swachh Survekshan** has grown into the **largest urban cleanliness assessment globally**, aimed at driving healthy competition among cities to improve sanitation standards.

The **2024–25 edition** witnessed a **record-breaking participation**:

- **4,500+ Urban Local Bodies (ULBs)** assessed
- Over **12 crore citizen feedbacks**
- Evaluation based on parameters such as:
  - **Citizen engagement and satisfaction**
  - **Waste segregation and scientific processing**
  - **ODF (Open Defecation-Free) status**
  - **Clean public spaces**
  - **Digital monitoring and municipal innovation**

Top Rankings: Who Made It to the Cleanest Cities List?

Cleanest Cities (Population over 1 lakh):

1. **Ahmedabad** *(Gujarat)*
2. **Bhopal** *(Madhya Pradesh)*
3. **Surat** *(Gujarat)*

Indore, having topped the rankings for six consecutive years, now leads the **Swachh Bharat Super League 1.0**, a new league recognizing long-term cleanliness champions.

Cleanest Ganga Towns:

- **Varanasi** *(Uttar Pradesh)* – Cleanest Ganga town for the **4th year in a row**
- **Prayagraj** and **Bijnor** also ranked among the top three

Cleanest Cities (Population under 1 lakh):

- **Sasvad** *(Maharashtra)* – Cleanest small city
- Followed by **Lonavala** and **Vita**

State Rankings: Maharashtra Leads, Gujarat and MP Close Behind

- **Maharashtra** emerged as the **best-performing state overall**
- **Madhya Pradesh** and **Chhattisgarh** took the second and third spots respectively

Gujarat's Clean Sweep: A Model of Urban Sanitation

Gujarat's urban performance was exceptional, with **Ahmedabad, Surat, and Rajkot** all securing places in the **Top 10 cleanest cities**. The state's success was powered by:

- **100% scientific waste processing**
- **Door-to-door garbage collection** in every ward
- Effective use of **citizen apps** for grievance redressal
- Strong public awareness campaigns and **community-led initiatives**

Ahmedabad's rise to the top is the result of **consistent municipal planning**, **investment in infrastructure**, and **citizen engagement platforms**.

Innovations Introduced in Swachh Survekshan 2024–25: This year's survey saw several new elements to enhance transparency and inclusivity:

- **AI-based validation tools** to assess real-time cleanliness
- Introduction of the **Swachhta League** to boost **youth participation**
- Special focus on **legacy waste management** and **urban beautification**
- Real-time data tracking through **Integrated Command and Control Centres (ICCCs)**
- Updated **Star Ratings for Garbage-Free Cities (GFC)** integrated into the rankings

Beyond Rankings: Special Recognitions

Several cities and institutions were honored for exceptional performance in specific categories:

- **Cleanest Cantonment Board**: **Mhow** *(Madhya Pradesh)*
- **Best Innovation in Sanitation**: **Navi Mumbai** *(for circular economy practices)*
- **Best Citizen Feedback Response**: **Chandigarh**
- **Cleanest State Capital**: **Bhopal**

Swachh Survekshan's Broader Impact on Urban Governance:

Beyond being a cleanliness competition, **Swachh Survekshan has become a transformative governance tool** that:

- **Institutionalizes waste segregation and recycling**

- Encourages **innovation through public-private partnerships**
- Promotes **behavioural change and civic responsibility**
- Spurs **entrepreneurship in the circular economy**
- Creates **green jobs** in sanitation and waste management sectors

India's sanitation movement is no longer about cleaning streets—it's about building smarter, healthier, and more inclusive cities.

Looking Ahead: What's Next for Urban Sanitation?

As India advances towards its goal of becoming **Garbage-Free**, initiatives like **Swachh Survekshan**, combined with **digital governance, smart infrastructure, and community participation**, are proving to be vital.

The elevation of cities like Indore to a **super league**, and Ahmedabad's rise to No.1, showcase the power of **sustained effort, innovation, and civic pride**.

With climate change and urban expansion posing new challenges, the next frontier in cleanliness will be:

- **Zero-waste cities**
- **Waste-to-energy innovation**
- **Smart landfill management**
- **Green infrastructure and circular economy models**

India is not just cleaning its cities—**it is reimagining urban living** for the 21st century.

GS Paper 3 – Science & Technology

Akash Prime Missile: India's Upgraded Air Defence Triumph in High-Altitude Warfare

Context: In a major advancement for India's air defence capabilities, the **Akash Prime missile** successfully **intercepted and destroyed two high-speed aerial targets** in the **challenging high-altitude terrain of Ladakh**. This achievement marks a critical step forward in safeguarding India's borders, especially in strategically sensitive mountainous regions.

What is Akash Prime? A Next-Gen Shield for the Skies

Akash Prime is the **enhanced variant of the original Akash surface-to-air missile system**, specifically tailored for **deployment in high-altitude and sub-zero environments**. Developed by the **Defence Research and Development Organisation (DRDO)**, Akash Prime is part of India's broader push to **modernize its indigenous air defence systems**.

Key Features of Akash Prime Missile:

- **Category**: **Medium-range surface-to-air missile (SAM)**
- **Target Range**: Capable of **engaging aerial threats at 25–30 km**
- **Altitude Readiness**: Optimized for **operations above 4,500 metres** — ideal for locations like **Ladakh, Sikkim, and Arunachal Pradesh**
- **Improved Targeting**: Equipped with an **indigenous Radio Frequency (RF) seeker** for enhanced precision during the **terminal phase of interception**
- **All-Weather Capability**: Designed to perform **efficiently in low temperatures** and harsh climatic conditions
- **Versatile Protection**: Offers a shield for **static, semi-mobile, and mobile military installations** against aircraft, drones, and other aerial threats

Why Akash Prime Matters for National Security:

The Akash Prime missile fills a crucial gap in India's air defence matrix, particularly in **high-altitude regions** where traditional systems often underperform. Key strategic benefits include:

- **Real-time responsiveness** against **fast-moving unmanned aerial vehicles (UAVs)** and fighter jets
- **Indigenous manufacturing** under the **Atmanirbhar Bharat initiative**, reducing dependence on foreign defence systems
- **Cost-effectiveness** compared to imported missile systems while retaining advanced capability
- **Quick-deployment capability** for forward bases and **critical infrastructure protection**

Feedback-Driven Innovation: Built for the Battlefield

Akash Prime's upgrades were developed **in close consultation with the Indian Armed Forces**, ensuring that **real battlefield requirements** are addressed. Its performance in Ladakh proves its readiness to **defend vital military posts, communication hubs, and airfields** located at extreme altitudes.

Did You Know?

- The **original Akash missile** has been in service since 2007, with deployment across the Indian Army and Indian Air Force.

- The Akash system can **engage multiple targets simultaneously** using its powerful **multi-target tracking radar**.
- The Akash Prime variant enhances system **reliability and lethality**, specifically against **new-age threats like loitering munitions and low-RCS (Radar Cross Section) drones**.

Looking Ahead: Fortifying India's Air Defence Layer

With emerging threats from drones, cruise missiles, and enemy aircraft, India's focus on layered air defence is more critical than ever. The success of **Akash Prime** reflects:

- A growing **emphasis on self-reliance in defence technology**
- A shift toward **terrain-specific adaptations** in military systems
- Reinforcement of **India's deterrence posture in border zones**, especially against adversaries with growing aerial capabilities

As India moves to secure its skies, systems like **Akash Prime** will play a **vital role in shielding the nation's sovereignty at the most vulnerable and high-risk frontiers**.

GS Paper 1 – Geography

Mount Kilimanjaro: Africa's Majestic Peak and the World's Tallest Free-Standing Mountain

Context: In a recent event held at **South Block, New Delhi**, the **Defence Secretary of India officially flagged off mountaineering expeditions** to both **Mount Everest** and **Mount Kilimanjaro**, highlighting the importance of high-altitude endurance missions for national pride and military readiness. This move aims to inspire adventure, resilience, and leadership among the expedition teams.

Mount Kilimanjaro: The Pride of Africa

Mount Kilimanjaro, located in **northeastern Tanzania**, stands as **Africa's highest peak** and holds the distinction of being the **world's tallest free-standing mountain**—meaning it rises alone and is not part of any mountain range.

- **Elevation**: Approximately **5,895 metres (19,341 feet)** above sea level
- **Geographical Span**: Stretches about **80 km (50 miles) east to west**
- **Location**: Close to the **Kenya-Tanzania border**, northeast of the African continent

Volcanic Structure: A Trio of Cones

Kilimanjaro is classified as a **stratovolcano** and is composed of **three distinct volcanic cones**:

- **Kibo** – the tallest and still **dormant**, home to **Uhuru Peak**, the highest point in Africa
- **Mawenzi** – rugged and deeply eroded, **extinct**
- **Shira** – the oldest cone, now **extinct and largely collapsed**

Uhuru Peak, perched atop **Kibo**, is the final summit destination for most climbers and symbolizes the **"Roof of Africa."**

Diverse Ecosystems: A Journey Through Climate Zones

One of the most fascinating aspects of Kilimanjaro is its **distinct ecological zones**, which change dramatically as one ascends:

1. **Lower Slopes** – cultivated farmland and grassland
2. **Montane Forest** – lush, tropical rainforests rich in wildlife
3. **Heath and Moorland** – dotted with unique alpine plants
4. **Alpine Desert** – dry, windy, and barren terrain
5. **Summit Zone** – icy, with **glaciers and snow-capped peaks**

This environmental variation makes Kilimanjaro a **microcosm of Earth's biodiversity**—from tropical forests to Arctic-like conditions in a single trek.

World Heritage Recognition:

In **1987**, **Kilimanjaro National Park** was designated a **UNESCO World Heritage Site** for its **natural beauty, ecological significance**, and **cultural value**. The park attracts tens of thousands of climbers and nature lovers annually and is a vital part of **Tanzania's eco-tourism economy**.

Did You Know? Fascinating Facts About Mount Kilimanjaro

- The name “Kilimanjaro” is believed to mean **"Mountain of Light" or "Shining Mountain"**, though its exact origin is debated.
- It is often referred to as **“Everyman’s Everest”** because it requires no technical climbing skills, yet is still physically demanding.
- The **glaciers at the summit** are rapidly shrinking due to climate change, and scientists warn they could disappear within decades.

A Symbol of Challenge and Triumph:

Mount Kilimanjaro is more than just a geological wonder—it is a **symbol of endurance, unity, and natural grandeur**. From scientific research to spiritual journeys, and from ecological conservation to adventure tourism, Kilimanjaro stands tall as a global icon.

GS Paper 3 – Environment, Energy, and Sustainable

India's Clean Energy Paradox: Over 50% Installed Capacity, But Less Than 30% Power Generation

Context: India has crossed a significant clean energy benchmark by achieving **over 50% of its installed electricity capacity from non-fossil fuel sources**, five years ahead of its 2030 target under its **Nationally Determined Contributions (NDCs)**. However, this success comes with a stark contrast—**renewable sources contribute less than 30% to actual electricity generation**.

This disparity underscores the challenge of turning installed capacity into real-world output and highlights the need to enhance the **efficiency, reliability, and grid integration** of renewable power.

India's Renewable Energy Growth: A Snapshot

Record-Breaking Expansion in 2024–25:

- **Total Renewable Energy (RE) Capacity**: Reached **220.10 GW** by March 2025 (up from 198.75 GW).
- **Annual Addition**: **29.52 GW**, the **highest ever** in a single fiscal year.

Solar Power Leads the Way:

- **Installed Capacity**: **105.65 GW**
- **New Addition**: **23.83 GW**, a sharp jump from 15.03 GW the previous year.

Steady Growth in Wind Energy:

- **Installed Capacity**: **50.04 GW**
- **New Addition**: **4.15 GW**, improving from 3.25 GW last year.

Other Sources:

- **Bioenergy**: **11.58 GW**, including **0.53 GW** from off-grid and waste-to-energy.
- **Small Hydro**: **5.10 GW**, with **0.44 GW** under construction.

Pipeline and Emerging Technologies:

- **Projects Under Implementation**: **169.40 GW**
- **Projects Tendered**: **65.06 GW**
- **Hybrid & Round-the-Clock (RTC) Projects**: **65.29 GW**, including solar-wind hybrids, peaking power, and RE-thermal bundling.

Global Standing:

According to the **REN21 Renewables 2024 Global Status Report**, India ranks:

- **4th globally in total renewable energy installed capacity**
- **4th in wind energy**
- **5th in solar power**

Top Performing States: **Rajasthan, Gujarat, Tamil Nadu, and Karnataka** continue to lead in renewable capacity deployment.

The Challenge: Why Low Output Despite High Capacity?

1. **Low Capacity Utilisation Factor (CUF):** Renewable energy sources like solar and wind are **intermittent and weather-dependent**, which limits their **actual power output** despite large installed capacities.
   - **Solar CUF**: ~20%
   - **Wind CUF**: ~25–30%
   - **Coal CUF**: ~60%
   - **Nuclear CUF**: ~80%
2. **Coal Still Dominates the Base Load:** Coal supplies **over 75% of India's electricity demand**, especially during night hours or non-sunny days, due to lack of reliable storage and RTC power from renewables.
3. **Inadequate Energy Storage & Grid Integration:**
   - **Battery storage** capacity is not yet sufficient to store excess daytime solar.
   - **Transmission systems** have not expanded at the same pace as RE deployment, leading to bottlenecks.
4. **Time-Insensitive Tariffs:** India lacks **time-of-day (ToD) pricing**, meaning there's **no incentive for consumers to use power when solar generation peaks**, making RE less effective.

5. Land and Regulatory Barriers:

- **Land acquisition delays** for large-scale projects
- **Slow clearances** for hybrid and storage-based projects

Why Boosting Clean Energy Output Is Critical:

1. **Energy Security:** India's energy demand is expected to **double by 2040**. Low RE output will **intensify reliance on coal**, affecting long-term sustainability.
2. **Climate Commitments:** India has committed to:
   - **50% installed capacity from non-fossil sources by 2030** (already met)
   - **45% reduction in emissions intensity** from 2005 levels

However, **current generation share of clean energy (~28%) is insufficient** to meet actual **carbon reduction goals**.

3. **Air Quality & Public Health:** Coal-based generation is a major contributor to air pollution—**India is home to 13 of the world's 20 most polluted cities**. Reducing coal dependency is vital for public health.
4. **Economic Efficiency:** Underperforming RE assets result in:
   - Poor **return on investment** for developers
   - Higher costs and **financial stress for DISCOMs**
   - Slower transition to **green jobs and sustainable industries**

Key Government Interventions to Improve Utilisation:

Green Energy Corridor (GEC): Expands and strengthens **transmission infrastructure** to efficiently evacuate renewable energy from generation sites to consumption centres.

PM-KUSUM Scheme: Promotes **solar-powered pumps and grid-connected solar farms** in rural areas, reducing diesel dependence and supporting **farm-based decentralised energy systems**.

National Green Hydrogen Mission: Encourages production and use of **green hydrogen**, especially in industries like **fertilisers, steel, and oil refining**, reducing their fossil fuel footprint.

PLI Schemes for Solar and Battery Storage: Provides **financial incentives** to domestic manufacturers of **solar PV modules** and **battery energy storage systems**, fostering self-reliance.

Renewable Energy Hybrid Policy: Promotes co-located **solar and wind projects**, increasing **CUF and reliability** through **hybrid generation**.

What Needs to Be Done: The Road Ahead

1. **Grid Modernisation:**
   - Invest in **smart grids** and **real-time balancing systems**
   - Implement **time-of-day pricing** to encourage solar consumption during peak generation
2. **Strengthen Energy Storage:**
   - Accelerate deployment of **Battery Energy Storage Systems (BESS)**
   - Support with **Viability Gap Funding (VGF)** and **PLI schemes**
3. **Scale Up Hybrid Projects:** Encourage **solar-wind-hydro-storage combinations** for round-the-clock green power, reducing dependence on fossil fuels.
4. **Expand Decentralised RE:** Boost **rooftop solar**, **solar water pumps**, and **mini-grids** to reduce grid dependency and enhance energy access in remote areas.
5. **Reform Tariff and Market Design:**
   - Introduce **differential tariffs** for peak and off-peak hours
   - Facilitate **green energy trading** on energy exchanges
   - Promote **open access for industries** seeking clean power
6. **Land and Transmission Reforms:**
   - Launch a **national land portal** for RE projects
   - Synchronise **transmission expansion** with RE project timelines
7. **Provide Policy Stability:** Ensure long-term **Power Purchase Agreements (PPAs)** Mitigate risks for DISCOMs through **payment security mechanisms** like **tripartite agreements**

Conclusion: The Future of Clean Energy in India

India has made **tremendous progress in renewable capacity addition**, but to truly transition to a sustainable energy future, **utilisation must match capacity**. The challenge now is not just building renewable infrastructure—but **optimising, integrating, and scaling it smartly**.

With the right mix of **policy, technology, market reform, and infrastructure investment**, India can shift from being a clean energy leader in installed capacity to a **global model in clean energy delivery and climate leadership**.

GS Paper 3 – Agriculture, Economy, and Inclusive Growth

Cabinet Clears 'Pradhan Mantri Dhan-Dhanya Krishi Yojana': A New Era for Agriculture Transformation

Context: In a major boost to India's agricultural sector, the **Union Cabinet has approved the Pradhan Mantri Dhan-Dhanya Krishi Yojana (PM-DDKY)**—a **comprehensive and first-of-its-kind national programme** exclusively targeting agriculture and allied activities. Set to run for **six years starting 2025–26**, this scheme draws inspiration from the **Aspirational Districts Programme of NITI Aayog**.

Key Highlights of PM Dhan-Dhanya Krishi Yojana

- **Total Financial Outlay**: 24,000 crore per year
- **Duration**: 6 years (2025–26 to 2030–31)
- **Coverage**: **100 identified districts**, including **at least one from every State and Union Territory**
- **Target Group**: Around **1.7 crore farmers** across India

This scheme is designed to transform underperforming agricultural regions by addressing **low productivity, low cropping intensity**, and **limited credit access**—the three main criteria for selecting the focus districts.

A Unique Model of Convergence:

The scheme will function through a **convergent approach**, pooling resources from:

- **36 existing Central Government schemes**
- **11 Union Ministries/Departments**
- **State government schemes**
- **Private sector investments**

This creates a **multi-stakeholder, mission-driven model** with cross-sectoral collaboration aimed at holistic rural development.

Core Objectives of the Scheme:

The Pradhan Mantri Dhan-Dhanya Krishi Yojana aims to:

- **Boost agricultural productivity** using modern and climate-resilient practices
- **Encourage crop diversification** to reduce monoculture dependence
- **Promote sustainable farming**, including organic and natural methods
- **Improve irrigation infrastructure**, especially in water-stressed districts
- **Enhance storage and warehousing** at block and panchayat levels to reduce post-harvest losses
- **Expand access to credit**, both long-term and short-term, to empower small and marginal farmers

Implementation Framework:

District-Level Agricultural Plan:

Each district will formulate a **District Agriculture and Allied Activities Plan (DAAAP)**, tailored to local challenges and agro-climatic conditions.

- These plans will be vetted by the **District Dhan-Dhanya Committee**.

- Guidance and evaluation will be provided by **NITI Aayog**, which will act as the central think tank for the programme.

Monitoring Mechanism:

To ensure transparency and accountability:

- A **real-time dashboard** will track progress using **117 Key Performance Indicators (KPIs)**
- **Monthly reviews** will be conducted at district, state, and national levels
- A **Central Nodal Officer** will be appointed for each district for close monitoring and reporting

Why This Scheme Is a Game Changer:

India's agriculture employs over **50% of the workforce**, yet its contribution to GDP remains around **16–18%**, highlighting productivity challenges. The **PM-DDKY** bridges this gap by:

- Focusing on **region-specific interventions**
- Combining **financial and technical support**
- Strengthening **infrastructure at grassroots levels**
- Encouraging **institutional credit and private investment**

Additional Insight: Learning from the Aspirational Districts Programme

Just like the **Aspirational Districts Programme** improved human development indicators in backward regions through targeted action and data-driven governance, **PM-DDKY** seeks to do the same for agriculture—bringing **precision governance** to farming.

Conclusion: Sowing the Seeds of Agricultural Transformation

The **Pradhan Mantri Dhan-Dhanya Krishi Yojana** represents a **paradigm shift** in how India addresses agricultural development. By **aligning government schemes**, **empowering farmers**, and **prioritising local planning**, the scheme aims to make Indian agriculture more **resilient, inclusive, and future-ready**.

If successfully implemented, PM-DDKY could **usher in a second Green Revolution**, focused not just on yield but on **sustainability, income enhancement, and rural prosperity**.

GS Paper 1 – Geography

Place in News: Bolivia – India Extends Vaccine Support Amid Measles-Rubella Outbreak

Context: In a significant act of global solidarity, **India has dispatched 3 lakh doses of the Measles-Rubella vaccine** to the **Plurinational State of Bolivia**, offering timely assistance in response to a **measles and rubella outbreak**. This humanitarian gesture highlights India's growing role as a **trusted partner in global healthcare cooperation**, particularly under its **Vaccine Maitri initiative**.

About Bolivia: A Nation of Altitudes and Diversity

The **Plurinational State of Bolivia** is a **landlocked country** located in **west-central South America**. It boasts **diverse terrains**, ranging from towering Andean peaks to expansive tropical lowlands.

Dual Capitals:

- **Sucre**: **Constitutional capital** and seat of the judiciary
- **La Paz**: **Administrative capital**, home to the executive and legislative branches; also the **highest capital city** in the world at over **3,600 metres above sea level**

Geographical Highlights:

- **Bordering Nations**: Shares frontiers with **Brazil** (north and east), **Paraguay** (southeast), **Argentina** (south), **Chile** (southwest), and **Peru** (northwest)
- **Landlocked**: Despite its rich aquatic heritage, Bolivia has **no direct access to the sea**, a result of territorial loss to Chile during the War of the Pacific in the late 19th century

Striking Physical Features:

- **Andes Mountains**: Bolivia is dominated by the **Cordillera Oriental and Cordillera Occidental**, branches of the **Andes**, which shape much of its topography and climate
- **Altiplano Plateau**: A high-altitude plain nestled between the mountain ranges, where major cities like **La Paz** and **El Alto** are located

Lake Titicaca:

- **World's Highest Navigable Lake**
- Shared with **Peru**, this majestic lake is located at an altitude of about **3,812 metres** above sea level
- It holds deep **cultural and historical significance** for Andean civilizations like the **Inca** and **Tiwanaku**

Additional Facts:

- **Population**: Over **12 million**, with a multi-ethnic society that includes **Indigenous peoples**, **Mestizos**, and people of **European and African descent**
- **Languages**: Spanish is the official language, but **36 Indigenous languages**, including **Quechua and Aymara**, are also recognized
- **Economy**: Rich in **natural gas**, **lithium reserves**, and **mineral wealth**, Bolivia plays a key role in the global clean energy supply chain

Conclusion:

Bolivia's inclusion in international news not only underscores its current public health emergency but also offers a window into a **nation of rich cultural heritage, remarkable geography, and growing geopolitical importance**. India's swift action in providing vaccines reinforces the spirit of **South-South cooperation** and highlights the role of health diplomacy in strengthening international partnerships.

GS Paper 2 – Polity and Governance

Supreme Court of India Flags Concerns Over Misuse of Free Speech on Social Media

Context: The **Supreme Court of India** has recently voiced its deep concerns over the **growing misuse of free speech**, especially across **social media platforms**. While upholding the **sanctity of Article 19(1)(a)** of the Constitution, which ensures the **right to freedom of speech and expression**, the Court emphasized that **this right is not absolute** and must be **exercised with caution, responsibility, and dignity**.

Key Observations by the Supreme Court:

- The **freedom of expression** is a **pillar of democracy**, but it must not be "trampled upon on flimsy and fanciful grounds."
- The **Court drew a line between free speech and dignity**, stating that when Article 19 (freedom of speech) comes in conflict with **Article 21 (right to life and personal dignity)**, **dignity will take precedence**.
- The Bench stressed the need for **self-restraint in online behavior**, warning that **unregulated speech is clogging the legal system** with endless litigation.
- It also noted that if people **fail to regulate themselves**, the **State may be compelled to intervene**—raising concerns over **potential restrictions** on digital freedoms.

Legal & Constitutional Safeguards: Understanding the Framework

- **Article 19(1)(a)**: Grants the **right to freedom of speech and expression** to every citizen.
- **Article 19(2)**: Permits the State to impose **"reasonable restrictions"** in the interests of **sovereignty, public order, decency, morality**, and **national security**.
- **Article 361A**: Protects journalists reporting **true proceedings** of legislative houses from legal action, unless such reporting is done **maliciously**.

Did You Know?

In the landmark case **Shreya Singhal v. Union of India (2015)**, the Supreme Court struck down **Section 66A of the IT Act**, calling it unconstitutional for restricting online speech arbitrarily.

Impact of Social Media on Freedom of Speech:

Positive Contributions:

- **Democratization of Voices**: Platforms like Twitter, Facebook, and Instagram allow **citizens and marginalized communities** to be heard, breaking traditional media monopolies.
- **Instant Information Flow**: **News and opinions spread rapidly**, increasing civic engagement and awareness.
- **Transparency & Accountability**: Social media has become a **tool for whistleblowing** and **social justice**, often pressuring institutions to act.

Rising Challenges:

- **Misinformation & Disinformation**: Fake news, hate speech, and propaganda can **incite violence** and disturb **social harmony**.

- **Inadequate Regulation**: India lacks a **dedicated legal framework** to regulate social media speech. While the **IT Act, 2000**, and other laws address cybercrimes, **implementation remains inconsistent**.
- **Threats to Privacy**: **Mass surveillance and data collection** create a chilling effect, discouraging people from expressing themselves freely.

The Way Forward: Striking a Balance Between Liberty and Responsibility

The Supreme Court has underlined that **preserving the freedom of speech** demands not just **robust legal protections** but also a **strong sense of civic responsibility**. In a digitally connected society:

- **Citizens must exercise digital etiquette** and refrain from hate speech or personal attacks.
- **Tech companies** must ensure **content moderation**, **fact-checking**, and **user safety mechanisms**.
- **Policy makers** should consider a **comprehensive social media regulation law** that upholds freedom while addressing abuse.

Extra Insight :

According to a **2024 report by UNESCO**, **over 70% of online hate speech cases worldwide go unregulated**, underscoring the urgent need for international cooperation on digital governance.

Conclusion:

The Supreme Court's observations serve as a timely reminder: **freedom of speech is not a license for online hostility or defamation**. While social media empowers voices, its unchecked misuse can **erode democratic values and individual dignity**. **Responsible digital citizenship**, supported by thoughtful regulation, is the key to ensuring that the **right to speak remains a tool for progress, not harm**.

GS Paper 3 – Economy

Periodic Labour Force Survey (PLFS) – June 2025: A Glimpse into India's Evolving Labour Market

Context: The **Periodic Labour Force Survey (PLFS)**, released by the **Ministry of Statistics and Programme Implementation (MoSPI)**, serves as a vital tool to assess **employment and unemployment trends** across India. The latest edition, covering **June 2025**, offers fresh insights into the country's labour market, particularly post-pandemic recovery patterns, rural-urban divides, and gender disparities in workforce participation.

Key Labour Market Indicators:

PLFS provides estimates based on the following critical indicators:

- **Labour Force Participation Rate (LFPR):** Proportion of people aged 15 and above who are **either employed or actively seeking employment**.
- **Worker Population Ratio (WPR):** Percentage of people who are **currently employed** out of the total population.
- **Unemployment Rate (UR):** Share of **jobless individuals actively seeking work** as a percentage of the labour force.
- **Current Weekly Status (CWS):** Employment status based on activity in the **7 days preceding the survey**.

Major Findings from June 2025:

- The **national LFPR** for individuals aged 15 and above was **54.2%**, marking a slight dip from **54.8% in May 2025**.
    - **Rural LFPR:** 56.1%
    - **Urban LFPR:** 50.4%
- The **Worker Population Ratio (WPR)** stood at:
    - **53.3% in rural areas**
    - **46.8% in urban areas**
    - **Overall national WPR:** 51.2%
- The **Unemployment Rate (UR)** was recorded at **5.6%** for individuals aged 15+, with:
    - **No change among males** compared to May
    - A **0.1 percentage point decrease in female unemployment**
    - **Rural unemployment** dipped by **0.2 percentage points**
    - **Urban unemployment** rose by **0.2 percentage points**

Interpreting the Trends: Why the Numbers Shifted

The slight reduction in **LFPR and WPR** can be attributed to:

- **Seasonal agricultural slowdown** impacting rural employment
- **Scorching summer temperatures**, limiting outdoor and manual labour

- A **shift of unpaid rural female helpers** toward domestic duties, particularly in better-off households

Interesting Insight: India witnessed **record-breaking heatwaves** in June 2025, with temperatures crossing **47°C in northern regions**, which adversely impacted physical labour, especially in agriculture and construction sectors.

Government Measures to Boost Women's Labour Force Participation:

Recognizing persistent gender gaps, the government has initiated several **targeted schemes**:

- **Pradhan Mantri Mudra Yojana (PMMY):** Offers **collateral-free microloans**, encouraging **women entrepreneurship**.
- **Beti Bachao Beti Padhao:** Works on changing **societal attitudes**, promoting **education and empowerment** of girls.
- **Maternity Benefit (Amendment) Act, 2017:** Extended maternity leave from **12 to 26 weeks**, improving **job retention** among women.
- **Women Entrepreneurship Platform (WEP):** Launched by **NITI Aayog**, provides **mentoring, networking, and funding** for women-led startups.
- **National Rural Livelihood Mission (NRLM):** Through **Self-Help Groups (SHGs)**, empowers women with **training, credit access**, and **collective marketing power**.
- **National Creche Scheme:** Eases the **childcare burden** on working mothers, especially in **unorganized sectors**.
- **Mission Shakti (2021–2025):** Aims to make women **equal stakeholders** in national development by strengthening **welfare and safety measures**.
- **WISE-KIRAN Scheme:** From 2018 to 2023, supported **1,962 women scientists**, enhancing **gender inclusion in STEM** careers.

The Road Ahead: A Call for Structural Reforms

The **marginal rise in urban unemployment**, coupled with decreasing labour engagement, indicates **persistent structural challenges**—particularly in generating **quality, non-agricultural employment**.

Moreover, **climate extremes**, such as **heatwaves and erratic rainfall**, are emerging as **significant influencers** of employment trends, especially in vulnerable sectors like **agriculture, construction**, and **informal labour**.

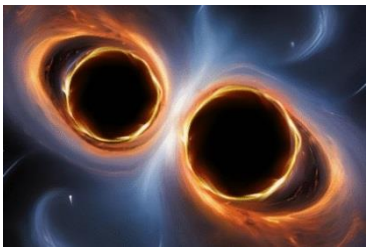
To ensure a resilient and inclusive labour market, the following steps are crucial:

- **Monthly labour data tracking** to enable timely interventions
- **Strengthening urban job creation**, especially in manufacturing and services
- **Gender-sensitive policies** to ensure **women's sustained economic participation**
- **Skill development programs** aligned with digital and green economy goals
- **Climate-adaptive employment models**, such as promoting remote work, indoor jobs, and skill-based gig work

Conclusion: The PLFS June 2025 report provides a nuanced picture of India's labour market, highlighting seasonal, **structural, and environmental dynamics**. While progress has been made, especially in improving **female unemployment rates**, challenges remain. With focused policies, inclusive planning, and climate resilience, **India can shape a future where growth and employment go hand in hand**—ensuring that **no citizen is left behind** in the journey toward economic development.

GS Paper 3 – Science & Technology

Record-Breaking Black Hole Merger Detected: A New Cosmic Milestone



Context: In a **groundbreaking discovery**, scientists have detected the **largest black hole merger ever recorded**, offering critical insights into the mysterious and powerful forces that shape our universe. The event, designated **GW231123**, represents a **monumental achievement** in astrophysics and the study of **gravitational waves**.

The Event: GW231123 – A Cosmic Collision of Titans

The merger, observed on **November 23, 2023**, was picked up by a **global network of gravitational wave observatories—LIGO (USA)**, **Virgo (Europe)**, and **KAGRA (Japan)**. It involved the collision of two black holes weighing approximately **100 and 140 times the mass of the Sun**, which coalesced into a single, colossal black hole of **225 solar masses**.

This event marks one of the **heaviest black hole mergers** ever detected and **crosses into the "intermediate-mass" black hole category**, a relatively **rare and poorly understood class** of black holes.

Did You Know?

Black holes in the **intermediate mass range (100–1,000 solar masses)** are considered the **missing link** between **stellar-mass** and **supermassive black holes**.

What Are Gravitational Waves and How Do We Detect Them?

Gravitational waves are tiny ripples in the **fabric of space-time**, first predicted by **Albert Einstein in 1916** as a consequence of his **General Theory of Relativity**.

These waves are produced when **massive celestial objects**, such as black holes or neutron stars, **accelerate or collide**. As they move, they stretch and compress space itself, traveling outward at the **speed of light**.

They are detected by instruments like **LIGO (Laser Interferometer Gravitational-Wave Observatory)** and its counterparts, which use **laser interferometry** to measure these **infinitesimal distortions**—less than a thousandth the size of a proton!

Types of Black Holes: Understanding the Monsters of the Cosmos

- **Stellar-Mass Black Holes:** Formed by the **collapse of massive stars**, usually ranging from **a few to tens of solar masses**.
- **Intermediate-Mass Black Holes:** Ranging from **hundreds to thousands of solar masses**, these are **rarely observed** but crucial to understanding black hole growth.
- **Supermassive Black Holes:** Found at the **centers of galaxies**, including the **Milky Way**, they weigh **millions to billions of solar masses**.

The detection of **GW231123** strengthens the **evidence for intermediate-mass black holes**, suggesting that **such mergers might be more common** than previously thought.

Why It Matters: Scientific and Cosmological Significance

Redefining Astrophysics:

- The GW231123 event pushes the boundaries of **current black hole formation models**.
- It raises **questions about how such massive stellar remnants form**, and whether they result from **hierarchical mergers** (i.e., black holes merging multiple times).

Impact on Our Understanding of the Universe:

- Gravitational wave detections like GW231123 offer a **new way to study the cosmos**, independent of light-based observations.
- Each detection contributes to building a **census of black holes** in the universe, helping trace their **evolution over billions of years**.
- It could help uncover **new physics**, possibly offering insights into the **nature of dark matter**, **extra dimensions**, or **quantum gravity**.

Looking Ahead:

The discovery of **GW231123** is not just a record-breaking event—it's a **stepping stone to unraveling deeper cosmic mysteries**. As detectors become more sensitive and **next-generation observatories** like **LISA (Laser Interferometer Space Antenna)** launch in the coming decade, we can expect **even more dramatic discoveries**.

This monumental event is a **reminder of the universe's raw power**, and how much more there is to discover beyond the stars we see. With every ripple in space-time we detect, **we listen to the universe telling its ancient stories**—one gravitational wave at a time.

GS Paper 3 – Environment and Biodiversity

Rare Sighting of the Vibrant Grandala in Himachal's Sainj Valley

Context: In a delightful discovery for birdwatchers and nature lovers, a **rare electric-blue bird known as the *Grandala*** was recently spotted in the **picturesque Sainj Valley of Himachal Pradesh**. This striking bird is a seasonal visitor to the **high-altitude Himalayan landscapes**, and such sightings are always celebrated by the wildlife community.

Meet the Grandala: The Sky-Blue Thrush of the Mountains

- **Scientific Name:** *Grandala coelicolor*
- **Family:** Turdidae (Thrush family)
- The **Grandala** is the **sole species in its genus**, making it taxonomically unique.
- It is an **arboreal insectivore**, feeding mainly on insects it forages among trees and shrubs.

Habitat and Distribution:

The Grandala is native to the **northeastern Indian subcontinent** and surrounding regions. It thrives in **alpine and subalpine habitats**, preferring rugged mountainous terrain.

- **Geographical Range:**
  - Found in **India, Bhutan, Nepal, and Myanmar**
  - Also present in **Tibet and southwestern China**
- **Preferred Altitude:**
  - Typically seen between **3,000 to 5,000 meters** above sea level
  - During winter, it may descend to lower elevations in search of food

Striking Features of the Grandala:

- **Size:** Measures between **20.5 to 23 cm in length**
- **Weight:** Varies from **38 to 52 grams**
- **Male Plumage:**
  - Dazzling **blue-grey body**
  - Contrasting **black wings and tail**, making it highly eye-catching against snow-covered or rocky terrain
- **Female Plumage:**
  - More camouflaged with **brownish feathers marked by white stripes**
  - **Rump has a bluish-grey hue**, with **white-tipped wings**
- **Behavioral Trait:**
  - During non-breeding seasons, Grandalas are known to **form large flocks**, sometimes consisting of **up to 200 individuals**
  - This **flock-forming behavior** is quite rare among Himalayan bird species and adds to the visual spectacle

Conservation Status: No Immediate Threat

- Listed as **'Least Concern'** on the **IUCN Red List**
- Despite its rare sightings, the species is considered **stable in population** due to its **wide distribution** and **relatively undisturbed habitat**

Interesting:

Fact: The Grandala is often seen as a **symbol of pristine Himalayan ecosystems**. Their presence in an area is considered an **indicator of ecological health**, as they rely on insect-rich alpine habitats.

Why This Sighting Matters:

The spotting of a Grandala in Himachal's **Sainj Valley**, part of the **Great Himalayan National Park Conservation Area (a UNESCO World Heritage Site)**, underscores the **ecological richness of India's high-altitude regions**. It also highlights the importance of preserving these fragile environments, which continue to support a wide range of **migratory and endemic species**.

As climate change and human interference inch closer to sensitive alpine zones, such sightings serve as a **reminder of the critical need for sustainable ecotourism and conservation efforts**.

Final Note:

The **Grandala**, with its **celestial hues and elusive presence**, remains one of the **Himalayas' most stunning avian residents**. Its recent appearance in Himachal is not just a treat for the eyes, but also a **sign of nature's enduring beauty and balance**, waiting to be protected and cherished.

GS Paper 3 – Environment and Ecology

AI-Powered Warning System Launched in Tadoba-Andhari Tiger Reserve to Prevent Human-Wildlife Conflict

Context: In a forward-thinking move towards wildlife conservation and public safety, an **artificial intelligence-based alert system** has been installed in **20 villages surrounding the Tadoba-Andhari Tiger Reserve (TATR)** in **Maharashtra**. The system detects tiger movement and **issues real-time warnings via loudspeakers**, helping to **prevent human-wildlife conflict** in areas bordering the forest.

This innovation marks a major step in combining **technology with conservation**, enabling both **wildlife protection** and **community safety** in a region known for frequent tiger encounters.

About Tadoba-Andhari Tiger Reserve:

- **Location:** Situated in **Chandrapur district, Maharashtra**
- **Significance:** It is the **oldest and largest tiger reserve** in the state
- **Name Origin:**
  - **"Tadoba"** comes from the local deity **"Taru"** revered by indigenous tribes
  - **"Andhari"** is named after the **Andhari River** that flows through the reserve
- **Constituent Areas:**
  - Comprises **Tadoba National Park** and **Andhari Wildlife Sanctuary**
  - Forms part of the **Tadoba landscape**, which connects with **Nagzira-Navegaon** and **Pench Tiger Reserves** through **ecological corridors**

Landscape and Ecosystem:

- **Biogeographical Zone:** Lies within the **Central Plateau of the Deccan Peninsula**
- **Topography:** Characterized by **undulating hills**, dense forests, and valleys, making it ideal for **tiger habitation**
- **Vegetation Type:** Dominated by **Southern Tropical Dry Deciduous Forests**

Water Bodies Within the Reserve:

- **Tadoba Lake**, **Kolsa Lake**, and the **Tadoba River** are vital water sources, supporting both **wildlife and vegetation**, and acting as **natural viewpoints** for tiger sightings

Rich Flora and Fauna:

- **Teak (Tectona grandis)** is the dominant tree species
- Other notable plants include **crocodile bark (Terminalia tomentosa)**, **salai**, **tendu**, **karaya gum**, and **mahua (Madhuca indica)**—a tree that also holds cultural and economic importance for tribal communities
- Home to iconic wildlife such as:
  - **Bengal tiger** (flagship species)
  - **Indian leopard**
  - **Sloth bear**

- **Gaur (Indian bison)**
- **Wild dog (dhole)**
- **Sambar deer**, **chital**, **nilgai**, and various reptilian and avian species

Interesting Fact: Tadoba is one of the few reserves in India where **tiger sightings are frequent**, thanks to its open habitat, strategic water bodies, and thriving prey base.

Conservation with Community Involvement:

The newly implemented **AI system** aims to minimize the risk of tiger attacks on people and livestock by offering **real-time alerts**, especially in areas where **villages and forest boundaries intersect**. This initiative is part of a broader effort to encourage **coexistence between humans and wildlife**, and it reflects a model that could be replicated in other high-conflict zones across India.

Looking Forward:

The **Tadoba-Andhari Tiger Reserve** continues to be a beacon of conservation success in India, where **innovative technology**, **scientific forest management**, and **community participation** converge to protect one of the planet's most majestic predators. With initiatives like the AI alert system, the reserve not only preserves biodiversity but also **sets a benchmark for sustainable wildlife tourism and conflict mitigation**.

GS Paper 1 – Geography

Syria in Focus: Sectarian Clashes Erupt in Sweida Amid Ongoing Regional Tensions

Context: The **Middle Eastern nation of Syria** has once again made global headlines as **violent clashes erupted in the southern city of Sweida**, involving **Sunni Bedouin tribal fighters and Druze militias**. This flare-up is part of the country's broader instability, stemming from years of conflict and deep-rooted sectarian divisions.

Political Overview of Syria:

- **Capital: Damascus**
- **Region:** Situated in the **Middle East**, Syria is a part of the **historic Levant Region**, which also includes parts of modern-day Lebanon, Israel, Jordan, and Palestine.
- **Neighboring Countries:**
  - **Iraq** to the east
  - **Turkey** to the north
  - **Lebanon** and **Israel** to the west
  - **Jordan** to the south
- **Coastline:** Bordered by the **Mediterranean Sea** to the west, offering maritime access to Europe and North Africa.

Geographical Significance:

- **Major River:** The **Euphrates River** flows through eastern Syria, playing a crucial role in the region's agriculture and ancient civilizations.
- **Terrain:** The country features **mountains, deserts, and fertile plains**, with the **Anti-Lebanon mountain range** running along its western edge.
- **Strategic Location:** Syria holds a **geopolitical position** at the crossroads of Asia, Africa, and Europe, making it a long-contested territory throughout history.

Contested Territories:

- A key flashpoint in Syria's geopolitical situation is the **Golan Heights**, a plateau that has been **occupied by Israel since the Six-Day War in 1967**. While internationally recognized as Syrian territory, its control remains a subject of dispute between **Israel and Syria**, with broader implications for regional peace.

Did You Know?

Damascus, Syria's capital, is often considered one of the **oldest continuously inhabited cities in the world**, with a history stretching back over **11,000 years**.

Broader Implications of the Sweida Violence:

The recent outbreak of conflict in Sweida, a region predominantly inhabited by the **Druze minority**, reveals the **fragile ethnic and sectarian fabric** of post-war Syria. While Sweida had remained relatively calm during much of the Syrian civil war, recent tensions over **economic hardship, political marginalization, and shifting power dynamics** have triggered localized unrest.

Conclusion: With its **rich history**, **strategic location**, and **diverse population**, **Syria remains a central player in Middle Eastern geopolitics**. However, its **internal divisions, unresolved territorial disputes**, and **regional power struggles** continue to fuel instability. The recent violence in Sweida serves as a stark reminder that **peace and reconciliation in Syria are still distant goals**, and that **sectarian tensions** can easily reignite despite years of war fatigue.

GS Paper 2 – Polity and Governance

Bombay High Court Highlights Rising Misuse of Matrimonial Laws

Context: In a significant observation, the **Nagpur Bench of the Bombay High Court** recently quashed a criminal case involving **cruelty, unnatural sex, and dowry harassment**, emphasizing that **marriage is a sacred institution**, not a platform for prolonged and **vindictive legal battles**. The verdict sheds light on a growing concern in India—**the misuse of matrimonial laws** for personal gain, revenge, or coercion.

How Are Matrimonial Laws Being Exploited?

Matrimonial laws in India were originally designed to **protect vulnerable spouses**, particularly women. However, in several cases, these laws have been **misused as tools of harassment**:

- **Section 498A, IPC (Cruelty by Husband or Relatives):** Often used to **implicate entire families**, including **distant relatives**, based solely on allegations—many of which **lack substantial evidence**.
- **Section 377, IPC (Unnatural Offences):** Though decriminalized for consensual adult relationships, it is **occasionally invoked strategically** during marital conflicts to exert **pressure or shame**.
- **Dowry Prohibition Act, 1961:** Despite the **real and serious threat of dowry demands**, there are instances where **false accusations are made** to secure leverage in **divorce or property disputes**.
- **Protection of Women from Domestic Violence Act, 2005:** Includes well-intentioned provisions, but is at times **exploited to level exaggerated or baseless claims** of **mental or physical abuse**.

Committees & Commissions Raising Red Flags:

Several authoritative bodies have acknowledged these concerns:

- **Malimath Committee Report (2003):** Recommended making **Section 498A bailable and compoundable**, acknowledging its frequent misuse.
- **Law Commission of India – 243rd Report (2012):** Admitted to misuse but cautioned against weakening protections for genuine victims. Called for **balanced legislative safeguards**.
- **National Commission for Women (NCW):** While fiercely defending women's rights, the NCW has accepted that **frivolous complaints exist** and emphasized the need for **thorough investigations** before arrest.

The Cost of Misuse: Who Really Pays?

- **Emotional & Psychological Toll:** Innocent individuals, especially elderly parents and siblings, suffer **trauma, stress, and social stigma**, often for years, despite **later exoneration**.
- **Straining the Judiciary:** False or exaggerated claims **clog court dockets** and **divert police resources**, delaying justice for those in **genuine distress**.
- **Undermining the Institution of Marriage:** Instead of resolving disputes through dialogue or counseling, many couples **resort to litigation**, transforming **marriage into warfare**.
- **Violation of Article 21: Unjustified arrests and prolonged trials** violate the **right to life and personal liberty**, a fundamental right enshrined in the **Indian Constitution**.

Judicial Stand: Balancing Justice with Sensitivity

Indian courts have taken crucial steps to prevent misuse:

- **Gian Singh v. State of Punjab (2012):** Courts may **quash criminal proceedings** in matrimonial disputes where **both parties reach a settlement**.
- **Narinder Singh v. State of Punjab (2014):** Encouraged quashing of **personal offences** that do not affect **public interest**.
- **Arnesh Kumar v. State of Bihar (2014):** Prevented **automatic arrests** under Section 498A; emphasized **preliminary inquiry** and **procedural safeguards**.

Government Initiatives: Steps Toward Responsible Reform

- **Ministry of Home Affairs Advisory (2015):** Directed police to avoid **mechanical arrests** under Section 498A without **due verification**.
- **CrPC Amendment (2023):** Introduced **stricter guidelines for arrests** in marital disputes.
- **Family Courts and Mediation Cells:** Established across districts to promote **conciliation and quicker resolutions**.
- **Legal Literacy Programs:** Aim to educate both **men and women** about their **rights and responsibilities** in marital relationships.

The Road Ahead: Reform with Responsibility

To ensure justice while **curbing misuse**, experts suggest a **multi-pronged approach**:

- **Make Section 498A Compoundable:** Allow settlements with **court oversight** to avoid **long-drawn criminal trials**.
- **Mandatory Pre-FIR Mediation:** Introduce **cooling-off periods** and counseling before initiating criminal cases.
- **Judicial Training and Sensitization:** Judges must be trained to **distinguish between genuine and malicious complaints**.
- **Punishment for False Allegations:** Use **IPC Section 211** to penalize **deliberate false accusations**, deterring misuse.
- **Gender-Neutral Reforms:** Consider **making relevant laws gender-neutral**, especially in cases involving **mental cruelty or domestic abuse**.

Global Perspective: Misuse Is Not Unique to India

Countries like the **UK, USA, and Canada** have also reported **abuse of protective laws** in matrimonial contexts. Many of them have **introduced mechanisms for early screening**, **pre-trial mediation**, and **penalties for false reporting**—models that India could study and adapt.

Final Thought:

While **protecting vulnerable partners remains essential**, it is equally important to **prevent misuse that weaponizes the law**. The judiciary, legislature, and society must work in tandem to ensure that laws serve as **shields for the innocent**, not **swords for the vindictive**.

GS Paper 3 – Economy

Corporate Investment in India: Still Waiting for Takeoff

Context: In a recent release by the **Ministry of Statistics and Programme Implementation (MoSPI)**, the **Index of Industrial Production (IIP)** revealed a concerning trend — industrial growth has **slowed to 1.2%**, marking a **nine-month low**. This slump in industrial output is a reflection of a deeper issue: **corporate investment remains subdued**, despite policy support and economic recovery efforts.

What Is the Index of Industrial Production?

The **IIP** is a key barometer of economic health, tracking the **physical volume of industrial production** across various sectors. It helps policymakers, economists, and businesses gauge short-term changes in the production landscape.

- **Released by**: **National Statistical Office (NSO)**
- **Ministry**: **MoSPI**
- **Frequency**: **Monthly**
- **Current Base Year**: **2011–12**

The IIP is categorized into three main sectors:

- **Manufacturing – 77.6% weight**
- **Mining – 14.4% weight**
- **Electricity – 8.0% weight**

Additionally, it classifies output by usage:

- **Primary Goods**
- **Capital Goods**
- **Intermediate Goods**
- **Infrastructure/Construction Goods**
- **Consumer Durables**
- **Consumer Non-Durables**

Why Has Private Investment Remained Tepid?

Despite numerous policy measures aimed at reviving the economy post-COVID, **corporate investment continues to lag**. Here's a closer look at the underlying reasons:

1. **Demand Uncertainty:** Even as macro indicators improve, **consumer demand remains fragile**, especially in rural and low-income segments. Without clear signs of **sustained demand**, businesses are hesitant to commit to fresh capital investments.

2. **Excess Industrial Capacity:** Several industries are still running below their **optimal production potential**. Companies are first looking to maximize the use of **existing infrastructure** before considering expansion.
3. **Global Volatility: The global environment remains** unsettled**:**
    - **Geopolitical conflicts** (Russia-Ukraine war, Middle East tensions)
    - **Trade disruptions** (Red Sea shipping bottlenecks)
    - **Persistently high global inflation**

These factors contribute to **uncertainty in global demand**, affecting India's **export-oriented industries** and dampening investor confidence.

4. **Sluggish Credit Flow to Industry:** Despite **low repo rates** in recent years, **credit growth to industry** has been modest. Banks have shown a preference for **retail loans** (housing, personal, vehicle loans) over **corporate lending**, which they view as **riskier**.
5. **Infrastructure Bottlenecks:** While schemes like **PM Gati Shakti** aim to improve logistics and infrastructure, **high logistics costs**, **project clearance delays**, and **land acquisition hurdles** continue to deter investment.
6. **Low FDI in Core Sectors:** Foreign Direct Investment (FDI) remains **skewed towards services and tech**, with **limited inflows in manufacturing and infrastructure**. Even with **Production Linked Incentive (PLI) schemes**, foreign investors cite challenges such as:
    - **Scale limitations**
    - **Regulatory red tape**
    - **Exit restrictions**
7. **Weak Public Capex Multiplier:** Though the central government has increased capital expenditure, the **'crowding-in' effect** on private investment is **yet to fully materialize**. **States**, often key players in infrastructure development, have shown **weak capex performance** due to **tight fiscal conditions**.

What Has the Government Done So Far?

To stimulate investment and industrial activity, several initiatives have been launched:

- **Corporate Tax Cut (2019)**: Reduced from **30% to 22%** for domestic companies — aimed at increasing profitability and reinvestment.
- **Infrastructure Push**: Recent Union Budgets have prioritized **high public investment in infrastructure**, including **roads, railways, and housing**.
- **Monetary Easing**: The **Reserve Bank of India (RBI)** implemented **low interest rate policies** post-COVID to reduce borrowing costs.
- **PLI Schemes**: Sector-specific incentives to encourage **manufacturing and value-added production** in areas like electronics, pharmaceuticals, and textiles.

The Core Issue: Demand First, Then Investment

At the heart of the issue is **demand-side weakness**. The private sector, facing uncertainty about **future consumption patterns**, is adopting a **wait-and-watch approach**. No amount of tax cuts or interest rate reductions can substitute for **visible and sustained demand growth**.

The Way Forward: Coordinated and Demand-Driven Strategy

For private investment to pick up meaningfully, India needs to look beyond **supply-side incentives**. Here's what could help:

- **Boost Consumption**: Strengthen demand through **targeted income support**, **rural employment schemes**, and **urban job creation**.
- **Deepen Financial Access**: Encourage **risk-based lending** to industry with appropriate **credit guarantees** and **NBFC involvement**.
- **Accelerate Logistics Reforms**: Implement **multi-modal transport systems** and **single-window clearances** under PM Gati Shakti more aggressively.
- **Enhance Investor Confidence**: Ensure **regulatory predictability**, **fast dispute resolution**, and **ease of exit** to attract more FDI in core sectors.
- **Promote Green Industrialization**: Link industrial revival with **clean energy and sustainability goals**, creating **new-age jobs and industries**.

GS Paper 3 – Science & Technology

Scientists Discover Key Pheromone Behind Locust Swarms: A Breakthrough in Eco-Friendly Pest Control

Context: In a groundbreaking study, scientists have uncovered how a specific **pheromone triggers swarming behaviour in locusts**, potentially opening the door to **environmentally safe and effective control methods**. The discovery could revolutionize how the world tackles locust outbreaks that threaten food security across continents.

The Threat of Locust Swarms:

Locusts, a type of **short-horned grasshopper**, are known for their ability to shift between two distinct phases:

- A **solitary phase**, where they behave independently
- A **gregarious phase**, where they form large, **highly mobile swarms** capable of destroying entire fields of crops within hours

Historically, **locust invasions have caused massive agricultural devastation**, particularly in regions like **East Africa, the Middle East, and South Asia**. The **2019–2020 outbreak** was the worst in 25 years, affecting **millions of hectares** of farmland and endangering the **livelihoods of millions**.

India is home to four main locust species**:**

- **Desert Locust (Schistocerca gregaria)** – the most destructive and widely distributed
- **Migratory Locust (Locusta migratoria)**
- **Bombay Locust (Nomadacris succincta)**
- **Tree Locust (Anacridium spp.)**

Among these, the **Desert Locust** poses the greatest risk due to its **cross-border migration** and **voracious appetite**.

Understanding Gregarious Behaviour:

Locusts and many other insects exhibit a social trait known as **gregariousness** — the tendency to **form groups or colonies** as a survival mechanism. When triggered, this behaviour causes locusts to **aggregate**, travel in huge swarms, and consume everything in their path.

The key lies in **chemical communication**. In 2020, scientists identified a critical pheromone called **4-vinylanisole (4VA)**. This compound is:

- **Released by locusts from their hind legs after feeding**
- **Detected by other locusts via the antennae**, prompting them to gather and initiate **swarm formation**
- Triggers the release of **serotonin**, a brain chemical that reinforces gregarious behaviour

This newly discovered **chemical chain reaction** is what turns a few locusts into a **destructive army**.

New Study Unlocks Pheromone-Based Control:

In a recent advancement, researchers found that **interrupting or manipulating the production of 4VA** could stop the swarming process **before it starts**. This could be a major alternative to **conventional pesticides**, which often cause **long-term damage to ecosystems, soil health, and biodiversity**.

The Five-Pronged Strategy to Stop Swarming:

The study proposes an innovative and **eco-friendly five-step plan** to manage locust populations:

1. **Synthetic Lures & Targeted Traps:** Use **synthetic versions or analogues of 4VA** to **attract locusts to designated areas**, where they can be eliminated using **biopesticides or fungal pathogens** — avoiding large-scale pesticide use.
2. **Disrupting Pheromone Signals**: Spray **4VA blockers or disruptors** across regions to prevent **locusts from congregating**, thereby stopping swarm formation at its roots.
3. **Real-Time Monitoring**: Track **4VA emissions** in the environment to **monitor locust activity** and anticipate potential outbreaks.
4. **Genetically Modified Locusts**: Introduce **non-gregarious, genetically altered locusts** into the population to reduce the overall tendency of swarming in future generations.
5. **Combined Molecular & Biological Approach**: Deploy **small-molecule inhibitors** alongside **bio-friendly insecticides** for a **multi-layered, sustainable control system**.

Why This Matters:

Traditional pesticide-based locust control methods are:

- **Expensive and resource-intensive**
- **Environmentally damaging**
- **Harmful to non-target species**, including pollinators and soil organisms

This new pheromone-based strategy offers:

- **Precision targeting**
- **Lower ecological impact**
- **Potential for long-term population control**

Furthermore, the approach aligns with **global goals for sustainable agriculture** and supports the **United Nations' Zero Hunger agenda**.

Final Thoughts: Turning Chemistry Into a Solution

This discovery marks a **turning point in agricultural pest control**. By harnessing the **natural behaviour of locusts**, scientists have developed a method that is **smart, targeted, and sustainable**. As the climate crisis continues to amplify the risks of locust plagues, such innovations could be key in **protecting global food supplies** without harming the environment.

The future of locust control may no longer lie in killing indiscriminately — but in understanding how these insects think, feel, and follow the chemical signals nature has built into them.

GS Paper 3 – Environment and Biodiversity

New Gecko Species Named After Brahmaputra River Discovered in Assam

Context: A **newly discovered species of gecko**, *Cnemaspis brahmaputra*, has been recorded from **Assam**, bringing fresh insights into the biogeographical history of the Indian subcontinent. This unique lizard was found at the **Dirgheswari Temple**, located on the **northern bank** of the **Brahmaputra River**, one of India's mightiest rivers.

Belonging to a Sri Lankan Lineage:

Cnemaspis brahmaputra is a member of the **podihuna clade**, a group of **small, diurnal geckos** primarily known from **Sri Lanka**. Its presence in **Northeast India** is highly significant—it offers **strong evidence** of an **ancient faunal connection** between **Sri Lanka and Northeast India**, regions that are now geographically distant but may have once shared ecosystems due to shifting landmasses and climate patterns.

Genetically Unique and Morphologically Distinct:

Despite its evolutionary roots in Sri Lanka, *Cnemaspis brahmaputra* shows **significant genetic divergence** and **distinct morphological traits**, which firmly establish it as a **new and separate species**. Some of its **key features** include:

- **Larger body size** compared to its relatives
- **Fewer mid-body scale rows**
- **More ventral scales** across the belly
- **Absence of tubercles** on the lower flanks
- **Three enlarged rows of thigh scales** parallel to the enlarged femoral scale row

These traits make it easily distinguishable from other known members of the **Cnemaspis genus**.

A Rare Find in the Northeast:

Cnemaspis brahmaputra is only the **second species of this genus** to be discovered in **Northeast India**. The first, *Cnemaspis assamensis*, was described in **2000** and is found on the **southern bank** of the Brahmaputra. Interestingly, while both species belong to the **same clade**, they are found on **opposite sides of the river** and exhibit **considerable genetic differences**, suggesting a long period of **independent evolution**.

Why This Discovery Matters:

This find not only enriches India's **reptilian biodiversity** but also supports the theory of **ancient land and species migrations** across South Asia. It demonstrates how **natural barriers** like the **Brahmaputra River** can influence the **distribution and evolution of species** over time.

Moreover, the discovery highlights the **ecological and conservation value** of temple forests and sacred groves, which often harbor **undocumented wildlife**. The Dirgheswari Temple site, though a place of worship, is now also recognized as a hotspot for **herpetological research**.

Did You Know?

- The **genus *Cnemaspis*** includes over **180 species worldwide**, with **many endemic** to **South and Southeast Asia**.
- The **podihuna clade**, once thought restricted to Sri Lanka, is now known to extend into **India's northeast**, thanks to discoveries like this.

- Geckos in this genus are **diurnal**, meaning they are active during the **day**, unlike most of their nocturnal cousins.

Conclusion: The discovery of *Cnemaspis brahmaputra* underscores the **rich but underexplored biodiversity** of Northeast India. It also emphasizes the need for **continued field research and conservation efforts**, especially in ecologically sensitive zones like the **Brahmaputra Valley**. As scientists delve deeper into such habitats, more **hidden species** and **evolutionary stories** are sure to emerge from the folds of time and terrain.

GS Paper 3 – Biodiversity and Environment

Kaziranga National Park Unveils First-Ever Grassland Bird Survey Report

Context: In a significant development for Indian wildlife research, **Kaziranga National Park and Tiger Reserve** has released its **first Grassland Bird Survey Report**, spotlighting the diversity of avian species that thrive in the rich **Brahmaputra floodplains**. This report not only identifies key **grassland habitats** but also highlights the presence of several **threatened bird species**, marking a new chapter in the park's ongoing conservation legacy.

About Kaziranga National Park:

Located in the northeastern state of **Assam**, **Kaziranga National Park** is one of India's most celebrated natural reserves. It represents the **largest undisturbed stretch of the Brahmaputra Valley floodplain**, a landscape of immense ecological importance. The park was declared a **UNESCO World Heritage Site** in **1985** in recognition of its outstanding biodiversity.

A Landscape of Wild Beauty:

Kaziranga is characterized by a vibrant mosaic of habitats, including:

- **Tall elephant grass**
- **Dense forests**
- **Marshes and swamplands**
- **Shallow water bodies**

The **Diffalu River**, a tributary of the **Brahmaputra**, flows through the park, while the **Moradifalu River** outlines its southern edge, enriching the terrain with alluvial nutrients and supporting diverse flora and fauna.

Rich in Wildlife: A Sanctuary for the Rare and Endangered

Kaziranga is globally renowned for being the **home to the world's largest population of the Indian one-horned rhinoceros**. Apart from rhinos, the park also shelters:

- **Royal Bengal Tigers**
- **Asian Elephants**
- **Eastern Swamp Deer**
- **Wild Buffaloes**
- **Hoolock Gibbons**
- **Capped Langurs**
- **Gangetic River Dolphins**

Its **floral diversity** includes a mix of **elephant grass**, **water lilies**, **lotus**, and **water hyacinths**, supporting a delicate ecological balance.

Key Highlights from the Grassland Bird Survey:

The groundbreaking **Grassland Bird Survey**, conducted by **ornithologists, conservationists, and scientists**, recorded a total of **43 species of grassland birds** across **Kaziranga's three wildlife divisions**. Among the most notable findings:

- The **Finn's Weaver** (*Ploceus megarhynchus*), locally called **Tukura Chorai**, was found to be **breeding successfully**—a **positive indicator** of **healthy grassland ecosystems**.
- The species is listed as **Endangered** on the **IUCN Red List** and is known for its unique habit of **building elaborate nests atop trees**.
- The presence of this rare bird indicates that **Kaziranga's floodplain grasslands** are maintaining strong ecological function, crucial for both **avian life and broader biodiversity**.

Did You Know?

- **Kaziranga** is also recognized as an **Important Bird Area (IBA)** by **BirdLife International**, highlighting its role in global bird conservation.
- The **Finn's Weaver** was first described by Allan Octavian Hume in the 19th century and is now found in very **limited pockets** in India, making Kaziranga's record extremely important.
- Grassland birds are among the **most threatened bird groups** globally due to habitat loss and degradation.

Looking Ahead: The release of the **Grassland Bird Survey Report** is more than just a scientific document—it's a **wake-up call to protect fragile ecosystems** that sustain both **iconic mammals and lesser-known yet vital bird species**. It also strengthens Kaziranga's reputation as a **model for conservation**, not just for its megafauna, but for its **entire ecosystem**.

GS Paper 1 – Geography

Klyuchevskoy Volcano Erupts with Fiery Intensity: A Spectacle from the Ring of Fire

Context: In a dramatic display of volcanic power, the **Klyuchevskoy Volcano** in **Russia's Kamchatka Peninsula** was recently captured in a striking **false-color satellite image** from 2023. The photo shows a **pair of lava flows** glowing red-hot alongside a massive **plume of smoke**—a vivid reminder of the volatile forces at work beneath the Earth's surface.

About Klyuchevskoy: The Tallest Active Volcano in Eurasia

Standing at a height of **4,750 meters (15,584 feet)**, **Klyuchevskoy** is not only the **highest point on the Kamchatka Peninsula**, but also the **tallest active volcano in both Europe and Asia**. This imposing **stratovolcano**, located in **far eastern Russia**, is a part of the **Pacific Ring of Fire**—the world's most seismically active region.

Klyuchevskoy features:

- A **truncated conical summit** with a central crater
- Around **70 lateral craters and parasitic cones** on its lower slopes
- Almost **continuous emission of smoke and gas** from its summit
- A history of over **50 eruptions since the year 1700**

At its base sits the **Kamchatka Volcanological Station**, founded in **1935**, one of the oldest volcano research centers in the world.

Kamchatka Peninsula: Land of Fire and Ice

The **Kamchatka Peninsula** is one of the most geologically active regions on Earth. It lies between the **Sea of Okhotsk** to the west and the **Pacific Ocean** and **Bering Sea** to the east. Two prominent mountain ranges—the **Sredinny Range** (Central) and the **Vostochny Range** (Eastern)—define its rugged terrain.

Key highlights of the peninsula include:

- **68 active volcanoes**, accounting for **over 10% of all land volcanoes worldwide**
- Severe **subarctic climate** with **long, snowy winters** and **cool, wet summers**
- Located along the **Kuril-Kamchatka arc**, part of the **2000-kilometer-long volcanic belt**
- A crucial segment of the **Pacific Ring of Fire**, known for frequent earthquakes and eruptions

Why Klyuchevskoy Matters:

Klyuchevskoy's activity offers vital data for understanding **volcanic behavior**, tectonic movements, and the **Earth's geothermal dynamics**. It is not only a **natural laboratory for geologists** but also a **symbol of nature's power**—rising from the icy Russian wilderness as a sentinel of fire.

The volcano is **monitored constantly** for potential hazards, and its frequent eruptions pose risks to **air traffic**, **local ecosystems**, and **nearby communities**, though it remains largely isolated due to Kamchatka's low population density.

Did You Know?

- Klyuchevskoy was first documented by European explorers in the **17th century**.
- The volcano's name is derived from **"Klyuchi,"** a nearby settlement meaning "springs" in Russian.
- Some of Klyuchevskoy's **lava fountains** can reach over **1 kilometer high**, making it one of the most visually spectacular volcanoes on Earth.
- The **UNESCO-listed "Volcanoes of Kamchatka"** World Heritage Site includes Klyuchevskoy and its neighboring peaks.

A Fiery Future:

As part of the **ever-shifting Pacific Rim**, **Klyuchevskoy Volcano** will continue to erupt, reshape the landscape, and contribute to our understanding of Earth's inner workings. Each fiery outburst is both a **geological marvel** and a **reminder of the raw power of nature**, deep in the heart of the Russian Far East.

GS Paper 2 – Polity and Governance

Centre Seeks Review of Supreme Court Verdict on IPS Deputation in CAPFs

Context: In a significant development, the **Union Government has filed a review petition** against a landmark **Supreme Court ruling** that mandated a **"progressive reduction"** in the deputation of **Indian Police Service (IPS)** officers to senior positions within the **Central Armed Police Forces (CAPFs)**. The move comes in the wake of a growing demand from CAPF officers for **structural reforms** and **fair promotional opportunities** within their own cadres.

The controversy traces back to **2015**, when **Group A officers of the CAPFs** approached the court demanding:

- Recognition as **Organised Group A Services**
- Implementation of **Non-Functional Financial Upgradation (NFFU)**
- A complete **cadre restructuring**
- Revisions in **recruitment rules** to **end the dominance of IPS deputation**

These concerns culminated in the 2025 Supreme Court case: **Sanjay Prakash & Others vs Union of India**, where the Court ruled decisively in favor of the CAPF officers.

Supreme Court's Key Directions:

In its historic judgment, the apex court declared:

- **CAPF Group A officers are to be treated as Organised Services** for all purposes, aligning them with other prestigious All India Services.
- The **deputation of IPS officers to posts up to the rank of Inspector General (IG)** should be **progressively phased out**, with a final outer limit of **two years** for implementation.

This ruling was hailed as a major step toward ensuring **institutional autonomy**, **professional growth**, and **organizational integrity** for CAPF officers.

Current Setup: IPS Influence in CAPFs

The CAPFs, comprising:

- **Border Security Force (BSF)**
- **Central Industrial Security Force (CISF)**
- **Central Reserve Police Force (CRPF)**
- **Sashastra Seema Bal (SSB)**
- **Indo-Tibetan Border Police (ITBP)**

operate under the **Ministry of Home Affairs**, which also controls the IPS cadre.

Currently, **20% of Deputy Inspector General (DIG)** posts and **50% of IG posts** in CAPFs are **reserved for IPS officers**. This has led to:

- **Career stagnation**: CAPF officers often **wait over 25 years** to become **Commandants**, a rank they should ideally attain within **13 years**.

- **Organizational inconsistency**: The **influx of IPS officers** at senior levels affects the **professional growth** and **institutional cohesion** of CAPFs.
- **Legal and administrative contradiction**: The government's **continued deputation** of IPS officers contradicts the Supreme Court's recognition of CAPFs as Organised Services.

Why the Centre Is Pushing Back:

The government argues that **IPS deputation** is crucial for:

- Maintaining **operational readiness**
- Ensuring **Centre-State coordination**
- Providing **strategic leadership experience** at the national level

However, critics highlight that **long-term reliance on IPS deputation** undermines the **core capability** and **morale** of the CAPF officer cadre.

Legal and Constitutional Concerns:

The continuation of IPS appointments **without implementing cadre reforms** is not only **administratively questionable** but may also violate **constitutional rights** under:

- **Article 14** – Right to Equality
- **Article 16** – Equal Opportunity in Public Employment

CAPF officers are essentially **denied fair competition** and **equal access** to leadership roles, despite years of service.

Recommendations for Reform: Towards a More Professional CAPF

To address the structural imbalance and modernize CAPF leadership, the following reforms are essential:

1. **Comprehensive Cadre Review:** A full-scale **cadre restructuring** must be undertaken to establish a **merit-based and time-bound promotion system**, eliminating IPS-dominated bottlenecks.
2. **Transparent and Timely Promotions:** Introduce a **uniform promotion policy** across all CAPFs, ensuring officers progress based on service tenure and performance, not cadre bias.
3. **Tailored Leadership Training:** Develop **mid-career leadership programs** for CAPF officers, similar to those at **LBSNAA** or the **National Police Academy (NPA)**, to build capacity for strategic roles.
4. **Exposure to Inter-Governmental Coordination:** Enable CAPF officers to gain experience in **Centre-State coordination roles**, thereby bridging the expertise gap often cited to justify IPS deputation.
5. **Legislative and Parliamentary Oversight:** Place **CAPF cadre reform under the purview of a Parliamentary Standing Committee**, ensuring transparency, accountability, and timely implementation.

Additional Insights: Global Best Practices

Globally, most elite paramilitary and border security forces — such as the **U.S. Border Patrol** or **France's Gendarmerie** — are led by **career officers** promoted from within. This model ensures **institutional loyalty**, **domain expertise**, and **operational efficiency** — elements India's CAPFs have long sought to emulate.

The Road Ahead:

The Supreme Court's ruling offers an opportunity to **reshape the leadership framework** of India's CAPFs, transforming them into **autonomous, professionally managed forces**. While the Centre's review petition signals institutional resistance, the broader goal remains clear: to create **equitable, efficient, and modern paramilitary services** free from **external dominance**.

GS Paper 1 – Geography

Mhadei Wildlife Sanctuary: Goa's Biodiversity Hotspot Faces Conservation Concerns

Context: Environmentalists have raised strong objections to the recent approval of an **eco-tourism resort** on the **Surla Plateau**, which lies within the **Mhadei Wildlife Sanctuary** — a zone recognized as a **critical tiger habitat**. Experts warn that this development could disrupt fragile ecosystems and further endanger the region's vulnerable wildlife, including the elusive **Bengal tiger**.

Overview of Mhadei Wildlife Sanctuary:

Nestled in the **northern part of Goa** along the **Western Ghats**, the **Mhadei Wildlife Sanctuary** covers approximately **208 square kilometers**. It is named after the **Mhadei River**, a life-giving watercourse that flows through the sanctuary, supporting both biodiversity and the livelihoods of communities downstream.

The sanctuary is part of the **Western Ghats Biodiversity Hotspot**, recognized by UNESCO for its rich ecological value and high levels of **endemism**.

Geography and Natural Landmarks:

- **Waterfalls**: The sanctuary is home to several **scenic waterfalls**, with the **Vazra Sakla Falls** and **Virdi Falls** being the most prominent.
- **Mountain Peaks**: Goa's **three tallest peaks — Sonsogod (1,027 m)**, **Talvche Sada (812 m)**, and **Vagheri (725 m)** — all lie within the sanctuary's boundaries.
- The **Surla Plateau**, now the center of controversy, is a crucial part of this elevated forest landscape.

Floral Richness: Lush and Sacred Forests

The sanctuary's vegetation is dominated by **semi-evergreen and moist deciduous forests**, teeming with:

- **Teak**, **Sal**, and **Bamboo**
- A variety of **medicinal plants** and **native orchids**
- **Sacred groves**, which are traditional forest patches preserved by local communities, often acting as **refuges for rare species**

These forests not only support biodiversity but also play a critical role in **carbon sequestration** and **watershed protection**.

Faunal Diversity: A Haven for Wildlife

Mhadei is among the few places in Goa where the **Bengal tiger** has been officially documented. Its varied terrain and forest types make it a perfect refuge for a wide range of species, including:

- **Mammals**: **Leopards**, **Black Panthers**, **Sloth Bears**, **Gaurs** (Indian bison), and several species of **deer**
- **Birds**: Over **250 species**, such as the **Malabar Trogon**, **Great Pied Hornbill**, and the **Nilgiri Wood Pigeon** — many of which are **endemic to the Western Ghats**
- **Reptiles**: A herpetologist's paradise, the sanctuary is home to all of India's **"Big Four" venomous snakes**:
    - **Indian Krait**

- **Russell's Viper**
- **Saw-scaled Viper**
- **Spectacled Cobra**

A unique feature of the sanctuary is the **cliff near Vazra Falls**, which serves as a **nesting site for the critically endangered Long-billed Vulture** — a species battling extinction due to habitat loss and diclofenac poisoning.

Ecological Importance and Threats:

The **Mhadei Sanctuary** forms a key corridor in the **Tiger Conservation Landscape** that stretches across **Goa, Karnataka, and Maharashtra**. This corridor facilitates **tiger dispersal** and **genetic exchange**, which is essential for the survival of the species.

However, **human encroachment**, **unsustainable tourism**, and **infrastructure projects** threaten to fragment this delicate habitat. Conservationists stress the need for careful planning and a **moratorium on intrusive development** in ecologically sensitive zones.

Additional Insight: Why Mhadei Matters Globally

- Part of the **Western Ghats**, one of the **eight "hottest hotspots" of biological diversity** in the world
- Contributes significantly to **monsoon regulation** and **climate stability** in peninsular India
- The **Mhadei River** is the subject of inter-state water disputes, highlighting its strategic importance for water security in Goa, Karnataka, and Maharashtra

The Road Ahead: Balancing Development with Conservation

As pressure mounts to exploit eco-sensitive zones for tourism and economic gain, experts emphasize the need to adopt **low-impact, community-based ecotourism models** that prioritize **ecological sustainability**.

Protecting **Mhadei Wildlife Sanctuary** is not just about saving a forest — it's about preserving an **ecological legacy**, a **water source**, and a **living classroom** of biodiversity that benefits both present and future generations.

GS Paper 3 – Environment and Ecology

Zographetus mathewi: New Butterfly Species Discovered in the Western Ghats

Context: In a significant breakthrough for Indian biodiversity, a team of **lepidopterists** has discovered a **new butterfly species** in the **Western Ghats** — one of the world's most important biodiversity hotspots. The newly identified species has been named ***Zographetus mathewi***, adding a fresh name to the butterfly records of India.

About *Zographetus mathewi*: A New Jewel in the Skipper Family

Belonging to the **Hesperiidae family**, *Zographetus mathewi* is a **skipper butterfly**, known for its quick, darting flight. It becomes the **15th species** in the oriental group of the **genus Zographetus Watson**, and only the **fifth** to be recorded in **India**.

The suggested **common name** for this vibrant species is the **"Sahyadri Spotted Flitter"**, a tribute to the **Sahyadri Hills**, the local name for the **Western Ghats**, where it was found.

Habitat and Distribution:

- **Endemic Region**: *Zographetus mathewi* is found **only in the low-elevation forests of Kerala**, emphasizing the rich but fragile biodiversity of the **southern Western Ghats**.
- These forests are part of a unique **ecological corridor**, home to a variety of rare flora and fauna, many of which are **endemic** and **critically endangered**.

Distinctive Features of the Species:

This butterfly belongs to the ***Zographetus satwa* species group**, which is known for **specialized traits** such as:

- **Unique wing venation patterns**
- **Secondary sexual characteristics**, such as **swollen forewing veins in males**
- A **hair tuft** at the base of the **underside of the forewing**
- **Yellow-ochre scaling** on the **underside of the hindwing**
- **Genitalia structure** in both sexes that sets it apart from its close relatives

These anatomical distinctions make it **clearly identifiable** among other closely related species.

Ecological Role of Butterflies:

Butterflies, including species like *Zographetus mathewi*, play a **crucial role** in the ecosystem:

- Act as **pollinators**, contributing to **plant reproduction**
- Serve as **prey** for birds, reptiles, and small mammals
- Aid in **biological pest control**
- Encourage **genetic diversity** in flowering plants
- Serve as **indicators of ecosystem health**

Their **presence, population trends, and diversity** often reflect the overall **environmental well-being** of their habitat.

Why This Discovery Matters:

The discovery of *Zographetus mathewi*:

- Highlights the **immense but underexplored biodiversity** of the Western Ghats
- Underlines the **need for habitat conservation** in low-elevation forests, which are often overlooked
- Reinforces the value of **taxonomic research** in understanding and preserving India's **natural heritage**
- Offers new data that can support **ecological monitoring** and **biodiversity indexing**

A Call for Conservation:

With habitat loss and climate change threatening numerous species, findings like these remind us of the importance of **preserving forest ecosystems**. The Western Ghats, despite their recognition as a **UNESCO World Heritage Site**, face constant pressure from **developmental activities**, making such discoveries both **valuable and urgent**.

Fun Fact: What Are Skipper Butterflies?

Skippers are a distinct group of butterflies known for their **fast and erratic flight**, often resembling moths. Their antennae are typically **hooked**, and they have **muscular bodies** and **strong wings**. Skippers form an evolutionary link between **butterflies and moths**, making them especially intriguing to entomologists.

GS Paper 3 – Environment and Biodiversity

RhoDIS India: DNA Mapping of Rhino Horns Begins for Stronger Wildlife Protection

Context: A **dedicated scientific team** has launched the **DNA analysis** of **2,573 rhino horns**, aiming to integrate their genetic information into the **RhoDIS India DNA database**. This marks a significant milestone in India's efforts to combat **wildlife trafficking** and enhance **rhino conservation** using advanced forensic tools.

What is the RhoDIS India Programme?

Launched in **2016**, the **RhoDIS India Programme** is a collaborative initiative between the **Ministry of Environment, Forest and Climate Change (MoEFCC)**, the **Wildlife Institute of India (WII)**, **WWF India**, and the **forest departments** of **Assam**, **West Bengal**, and **Uttar Pradesh**.

Inspired by South Africa's successful **Rhino DNA Index System (RhoDIS)**, this Indian version aims to bring **scientific precision** to rhino conservation and law enforcement.

Core Objectives of RhoDIS India:

- **Combat Wildlife Crime**: By generating **unique genetic fingerprints** for each rhino, the system helps track horns recovered from **poaching or illegal trade**.
- **Aid in Legal Investigations**: DNA evidence provides **reliable forensic data** that strengthens the **prosecution of poachers and traffickers** in court.
- **Enhance Rhino Management**: Supports better **tracking, monitoring, and population management** of rhinos across national parks and reserves.

How Does RhoDIS Work?

RhoDIS uses **DNA sequencing technology** to create a **distinct genetic identity** for every individual rhino. The process involves:

- Extracting DNA from rhino horn samples
- Creating a **genetic profile** based on unique **DNA markers**
- Storing these profiles in a **centralized forensic database**

The protocol being followed in India has been **standardized and approved by MoEFCC**, ensuring consistency and accuracy across all samples.

Scientific Composition of Rhino Horns:

Contrary to popular myths, **rhino horns are not made of bone**. They are composed of **keratin**, the same protein found in **human hair and nails**, as well as:

- **Sulphur-rich amino acids** like **cysteine**
- Other amino acids: **tyrosine**, **histidine**, **lysine**, and **arginine**
- Mineral content: **calcium carbonate** and **calcium phosphate**

This makes their structure similar to **horse hooves**, **turtle beaks**, and **cockatoo bills**, rather than ivory tusks.

India's Rhino Species and Horn Characteristics: India is home to the **Greater One-Horned Rhinoceros (Rhinoceros unicornis)**, also known as the **Indian Rhino**, primarily found in **Kaziranga National Park**,

Manas, and **Pobitora** in Assam. This species is one of the two rhino species that have **a single horn**, unlike African species like the **White** and **Black Rhino**, which have two.

Globally, out of the **five rhino species**, three have **two horns**, while the **Indian** and **Javan rhinos** possess only **one**.

Why RhoDIS Matters: A Model for Global Wildlife Protection

RhoDIS India represents a **landmark move** towards modernizing **wildlife law enforcement**. It enables:

- **Tracking of seized horns** back to specific individuals or protected areas
- **Identification of poaching hotspots** using forensic evidence
- Establishment of a **deterrent** effect through higher conviction rates

With **rhino poaching driven by illegal trade**, primarily for use in **traditional medicine and luxury items** in parts of Asia, this initiative serves as a **critical tool in conservation diplomacy**.

Global Context and Future Vision:

Similar systems are now being considered for other endangered species such as **elephants**, **tigers**, and even **pangolins**. India's leadership in this space could contribute to creating a **pan-Asian wildlife forensics network**.

As more samples are added and technology improves, **RhoDIS India** could become a **global model** for blending **science and policy** in wildlife conservation.

India's rhino conservation success story, marked by population recovery in Assam and West Bengal, can now be reinforced with the **cutting-edge science** of DNA forensics — safeguarding one of Earth's most iconic species for generations to come.

GS Paper 3 – Economy

Finance Minister Calls for Accelerated Growth of Global Capability Centres in India

Context: The **Finance Minister** has urged both the **industry and government** to join forces in **boosting the setup rate of Global Capability Centres (GCCs)** in India. The call aims to attract more **Fortune 500 companies** that have yet to establish their footprint in the country. Notably, in **2024 alone**, India witnessed the launch of **one new GCC every week**, underscoring the sector's rapid expansion.

India's GCC Landscape: A Global Leader in the Making

India is currently a **global powerhouse** in the GCC ecosystem, hosting **over 1,800 centres**, which accounts for **nearly 50% of all GCCs worldwide**.

Economic and Employment Impact:

- **Direct Gross Value Addition (GVA)**: Approximately **$68 billion**, projected to rise to **$150–200 billion by 2030**
- **Employment Generation**: Employs around **2.16 million professionals**, with expectations to reach **2.5–2.8 million by 2030**
- **Growth Momentum**: Operating at a **compound annual growth rate (CAGR) of 11%**, contributing about **1.6% to India's GDP**

What Are Global Capability Centres (GCCs)?

Also referred to as **Global In-House Centres (GICs)** or **Captives**, **GCCs** are **offshore delivery centres** set up by multinational corporations to handle **critical operations and services** such as:

- **Information Technology (IT) services**
- **Research & Development (R&D)**
- **Finance and accounting**
- **Customer experience and support**
- **Product development and analytics**

These centres operate within the **internal organisational framework** of the parent company, providing **strategic value and operational efficiency**.

Why India? Key Drivers Behind GCC Growth

India has emerged as the **destination of choice** for GCCs due to a combination of unique advantages:

- **Cost Efficiency**: Competitive operational costs compared to Western economies
- **Talent Pool**: A **highly skilled, English-speaking workforce**, including top-tier STEM graduates
- **Digital and Policy Readiness**: National initiatives like **Digital India**, **Smart Cities Mission**, and **Make in India** have created a conducive environment
- **Expansive Consumer Market**: An ideal testing ground for global products and services
- **Time Zone Advantage**: Perfectly positioned to provide **round-the-clock support** for global operations

Roadblocks Hindering Expansion:

Despite its strengths, several challenges continue to **limit the full potential of GCC growth** in India:

- **Talent Constraints in Tier-II and Tier-III Cities**: While metro cities flourish, smaller cities face a **shortage of industry-ready talent**
- **Infrastructure Gaps**: Issues in **physical and digital connectivity** hinder seamless operations
- **Regulatory Complexities**: **Cumbersome approval processes and compliance hurdles** discourage new entrants
- **Cybersecurity Risks**: As digital operations scale, **data privacy and cyber threats** remain a significant concern

Strategic Priorities for a Future-Ready GCC Ecosystem:

To retain its edge and attract **next-generation GCCs**, India needs to implement targeted interventions:

1. Embrace Advanced Technologies:

- **Artificial Intelligence**, **cloud computing**, **robotic process automation**, and **blockchain** must be integrated across functions to future-proof operations.

2. Reskill and Redefine Talent Strategy:

- Establish **nationwide upskilling programmes** in AI, cybersecurity, data science, and **emerging digital tools**
- Promote **hybrid and flexible work models** to attract global talent

3. Simplify Regulatory Frameworks:

- Create a **single-window clearance system** for setting up and operating GCCs
- Strengthen **data protection laws** and promote **ease of doing business**

4. Address Geopolitical and Market Volatility:

- Encourage **agile governance models** to help companies navigate **global trade shifts** and **regulatory changes**

5. Drive Sustainability:

- Align GCC operations with **Environmental, Social, and Governance (ESG)** norms to meet global sustainability benchmarks and investor expectations

Looking Ahead: India as the World's GCC Superpower

With the right mix of **policy support, digital infrastructure, and talent readiness**, India has the potential to become the **undisputed global leader** in the GCC space. Tapping into this potential not only strengthens the nation's **economic growth trajectory** but also reinforces its position as a **technology and innovation powerhouse** on the world stage.

GS Paper 1 – Geography

Australia in Focus: Strengthening Ties with India Through Maitri Grants 2025

Context: Australia and **India** are set to expand their strategic and cultural collaboration under the **2025 Maitri Grants** initiative. This program, overseen by the **Centre for Australia-India Relations**, aims to **enhance exchanges in education, research, and culture**, reinforcing the growing partnership between the two Indo-Pacific democracies.

About Maitri Grants:

The **Maitri Grants** program is designed to **promote mutual understanding** and strengthen people-to-people connections. It supports joint projects in:

- **Academic Research**
- **Artistic and Cultural Exchange**
- **Higher Education Partnerships**
- **Innovation and Technological Cooperation**

The initiative reflects both nations' commitment to building a **resilient and future-ready alliance**.

Australia: A Snapshot of the Nation

Political and Geographical Identity:

- Located in the **Southern Hemisphere**, Australia is both a **continent and a sovereign country**.
- It holds the distinction of being the **smallest continent** yet the **sixth-largest country** in the world by land area.
- Bordered by two major oceans:
  - **Indian Ocean** to the west
  - **South Pacific Ocean** to the east

Strategic Significance:

Australia plays a vital role in **Indo-Pacific geopolitics** and is a member of several international alliances, including:

- **QUAD** (Quadrilateral Security Dialogue with India, USA, and Japan)
- **CPTPP** (Comprehensive and Progressive Agreement for Trans-Pacific Partnership)
- **OECD**, **G20**, and **Commonwealth of Nations**

Geographical Marvels of Australia:

- **Highest Peak**: **Mount Kosciuszko**, located in **The Great Dividing Range** (also known as the Eastern Highlands), stands as the highest point on mainland Australia.
- **The Great Barrier Reef**: Situated off the **coast of Queensland**, this is the **largest coral reef system** in the world.
  - Spanning over **2,300 km**, it is home to a staggering variety of marine life.

- Recognized as a **UNESCO World Heritage Site in 1981**, it is a global treasure facing serious threats from **climate change and coral bleaching**.

Natural Wealth and Resources:

Australia is a **resource-rich country**, known for its vast mineral reserves, including:

- **Gold**, **iron ore**, **nickel**, and **zinc**
- **Uranium**, crucial for nuclear energy
- **Rutile** and **zircon**, important for industrial applications
- One of the world's largest exporters of **coal and liquefied natural gas (LNG)**

These resources have played a major role in Australia's **economic resilience** and **global trade significance**, especially with partners in **Asia**.

Cultural & Educational Ties with India:

- Australia is home to a **vibrant Indian diaspora**, with over **700,000 people of Indian origin**, making it one of the largest immigrant communities in the country.
- It is a top destination for **Indian students**, contributing to the growing **educational and cultural exchange**.
- Joint research projects and university collaborations are increasing across fields like **climate science**, **AI**, **clean energy**, and **public health**.

Looking Ahead: A Stronger Indo-Australian Bond

The Maitri Grants and initiatives like the **Australia-India Economic Cooperation and Trade Agreement (AI-ECTA)** are paving the way for a **multi-dimensional partnership**. From **defence and trade** to **climate action and education**, both nations are committed to shaping a **stable, inclusive, and innovative Indo-Pacific region**.

GS Paper 1 – Geography

Jarawa Tribe: Guardians of an Ancient Legacy

Context: Amid growing discussions around the upcoming **16th Census of India**, experts have highlighted that **reaching the Jarawa Tribe** of the **Andaman Islands** will not be as challenging as presumed. This is due to the **existing contact points and welfare initiatives** already in place, which ensure minimal disruption to their secluded lifestyle while enabling essential communication.

Who Are the Jarawas?

The **Jarawa Tribe** is one of the **world's oldest surviving indigenous communities**, classified by the Indian Government as a **Particularly Vulnerable Tribal Group (PVTG)**. Their estimated population ranges from **250 to 400 individuals**, making their protection both crucial and sensitive.

They inhabit the **Middle and South Andaman Islands**, living in **nomadic bands of 40–50 members**, deep within **tropical rainforests, coastal stretches**, and **mangrove ecosystems**.

A Glimpse into Their Origins:

Anthropologists believe the Jarawas may be **descendants of the now-extinct Jangil tribe**. Genetic and archaeological evidence suggests they are linked to the **first human migrations out of Africa**, potentially making them among the **earliest settlers in Asia**, dating back **over 50,000 years**.

They have withstood waves of external pressures, including **British colonization (since 1789)** and the turbulence of **World War II**, though not without a **sharp decline in population**.

Lifestyle and Culture:

The Jarawas follow a **hunter-gatherer lifestyle**, subsisting on **forest produce**, **wild game**, and **coastal fishing**. Their **minimalist attire** is practical for the **humid and warm climate** of the islands. Known for their **strong physiques** and **good health**, their nutrition-rich, natural diet plays a major role in their wellbeing.

The tribe is also fiercely **protective of their territory**, historically resisting outsiders and preserving their unique way of life. They maintain **oral traditions**, and their language is **unrelated to any other known linguistic family**, making it a subject of interest for anthropologists.

Upcoming 16th Census of India and Its Impact:

India's next census will be conducted in two phases:

- **October 1, 2026** – for **snow-bound regions and the Andaman & Nicobar Islands**
- **March 1, 2027** – for **the rest of the country**

This census is historically significant as it will include **caste-based enumeration** across the nation for the first time since **1931**. It also raises questions about **how to ethically and accurately enumerate indigenous tribes** like the Jarawas without violating their autonomy or disrupting their lives.

Additional Facts:

- **Contact with outsiders** is strictly regulated by the **Andaman & Nicobar Islands Protection of Aboriginal Tribes Regulation (ANPATR), 1956**.
- The **Jarawa Reserve Area** is off-limits to non-tribal people without special permission.
- Despite modern pressures, the tribe has **resisted assimilation**, maintaining a **self-reliant existence**.
- The **Andaman Trunk Road**, which cuts through Jarawa territory, has been controversial due to its impact on their habitat and privacy.

Conclusion:

The **Jarawa Tribe stands as a living testament** to the resilience of ancient cultures. As India approaches a new phase of demographic analysis through its census, it must **balance data collection with respect for indigenous autonomy**. Preserving the Jarawas' **heritage, habitat, and human rights** remains a critical responsibility—not only for India but for global humanity.

GS Paper 3 – Science & Technology

Patriot Air Defence Missile System: Shield of the Skies

Context: In a significant move to bolster Ukraine's defenses, the **President of the United States** has confirmed the deployment of **Patriot Air Defence Missile Systems** to **Ukraine**, amid escalating **Russian military aggression**. This step underscores Washington's commitment to supporting Kyiv with advanced defense capabilities in the face of ongoing threats.

Overview of the Patriot Air Defence System:

The **Patriot Missile System (MIM-104)**, short for **Phased Array Tracking Radar to Intercept on Target**, is a state-of-the-art **surface-to-air missile (SAM)** defense platform. Designed to **operate in all weather conditions and at all altitudes**, the Patriot is one of the **most advanced and combat-tested missile defense systems** in the world.

Initially developed to **intercept enemy aircraft**, the system has evolved to **neutralize ballistic missiles, cruise missiles, loitering munitions**, and **unmanned aerial vehicles (UAVs)**.

Key Manufacturer and Operators:

- **Developed by**: **Raytheon Technologies Corporation**, a leading **US defense and aerospace company**.
- **Primary user**: **United States Army**
- **Global operators**: The Patriot system is fielded by numerous U.S. allies, including **Germany, Japan, Israel, South Korea, Saudi Arabia, Poland, Romania, Sweden, Taiwan**, and others, making it a symbol of **shared defense strategy**.

Combat History:

The Patriot first saw combat during the **1991 Gulf War**, protecting territories such as **Saudi Arabia, Kuwait**, and **Israel**. It was later used extensively during the **2003 U.S. invasion of Iraq**. Since then, it has become a critical element of **air defense strategies across multiple continents**.

System Components and Structure:

A **Patriot battery**—the basic combat unit—includes:

- A **phased-array radar** for target detection and tracking
- An **engagement control station** (ECS)
- Advanced **computer systems** and **power generators**
- Up to **eight launchers**, each carrying **four ready-to-fire missiles**

Typically, around **90 soldiers** are assigned to one battery, but during operations, only **three personnel** are needed in the ECS to manage combat engagement.

Advanced Features and Technology:

- **Guidance System**: Utilizes **Track-Via-Missile (TVM)** technology, allowing the system to **transmit mid-course guidance** updates from the control center directly to the missile.
- **Interceptor Variants**:

- **PAC-2**: Employs a **blast-fragmentation warhead**
- **PAC-3**: Features cutting-edge **hit-to-kill kinetic energy technology** for direct target interception

- **Radar Range**: Over **150 kilometers (93 miles)**
- **Interceptor Range**: Can destroy targets up to **160 kilometers** away and at altitudes exceeding **24 kilometers**

Extra Facts and Global Relevance:

- The **Patriot system's flexibility** allows integration into **NATO's missile defense network**.
- It has successfully **intercepted missiles in live combat scenarios**, including recent attacks involving **drones and hypersonic threats**.
- The **PAC-3 Missile Segment Enhancement (MSE)** variant offers **improved range, speed**, and **maneuverability**, making it effective against **high-speed ballistic missile threats**.
- As global missile threats become more sophisticated, the **Patriot remains a cornerstone** in the evolving **multi-layered air defense strategy** of both the United States and its allies.

Conclusion: The **Patriot Air Defence System** stands as a symbol of **technological superiority and global defense collaboration**. Its deployment to **Ukraine** signals a strategic escalation in Western support and reflects the system's critical role in **modern warfare and deterrence**. With evolving interceptor technology and combat-proven reliability, Patriot continues to be a **trusted shield in the skies**.

GS Paper 3 – Environment and Ecology

Flue Gas Desulphurisation (FGD): Balancing Clean Air and Energy Demands

Context: In a controversial policy shift, the **Ministry of Environment, Forest and Climate Change** has recently **exempted most coal-based power plants** in India from the mandatory installation of **Flue Gas Desulphurisation (FGD)** systems. These systems are designed to control **sulphur dioxide (SO_2) emissions**, a major contributor to **air pollution** and **acid rain**.

What is Flue Gas Desulphurisation (FGD)?

Flue Gas Desulphurisation (FGD) refers to a **pollution-control technology** that removes **sulphur dioxide (SO_2)** from the exhaust gases released by burning **fossil fuels**, especially **coal**. The primary objective of FGD is to **reduce SO_2 emissions**, which contribute to:

- **Acid rain**
- **Smog formation**
- **Soil and water acidification**
- **Human respiratory diseases**
- **Infrastructure corrosion**

How Does FGD Work?

FGD systems rely on chemical reactions that **neutralise SO_2** using substances like:

- **Limestone ($CaCO_3$)**
- **Lime (CaO)**
- **Ammonia (NH_3)**

These chemicals **absorb or react** with sulphur dioxide, forming compounds like **gypsum ($CaSO_4 \cdot 2H_2O$)**, which can be used in **cement and construction industries**.

Types of FGD Technologies:

1. **Dry Sorbent Injection (DSI)**
    - Injects **lime or limestone** directly into the flue gas stream.
    - Suitable for **small to medium plants** with **lower upfront costs**.
2. **Wet Limestone Scrubbing**
    - The most widely used method.
    - A **limestone slurry** reacts with SO_2, forming **gypsum**.
    - Effective but requires **larger infrastructure** and **water usage**.
3. **Seawater FGD**
    - Utilises the **alkalinity of seawater** to absorb SO_2.
    - Cost-effective for **coastal power stations**.
    - Generates **no solid waste**, but is **limited to marine locations**.

Policy Evolution and Present Scenario:

In **2015**, India introduced new emission standards, mandating **all thermal power plants** to install FGD systems by **2017**. The directive applied to around **180 coal-fired plants** (approximately **600 individual units**). However, progress has been sluggish:

- As of now, **only about 8%** of units have installed FGDs.
- Most completed installations are by **NTPC**, India's largest public-sector power utility.

Reasons Behind the Exemption:

Recent studies cited by the Environment Ministry include:

- **Low sulphur content** in **Indian coal**.
- **SO_2 concentrations** around plants with and without FGDs show **minor differences**.
- **Sulphates** in the atmosphere may have a **cooling effect**, counteracting some aspects of **global warming**.

Practical challenges also played a role:

- **Shortage of global FGD vendors**
- **High capital and operational costs**
- **COVID-19 disruptions**
- **Concerns over rising electricity tariffs**

Additional Facts and Global Context:

- Globally, countries like **China, the U.S., and Germany** have made **FGD systems mandatory**, drastically cutting down SO_2 emissions.
- **Gypsum** produced from FGDs is a valuable byproduct used in **wallboard manufacturing** and **cement production**.
- According to the **World Health Organization (WHO)**, prolonged exposure to SO_2 can cause **asthma, bronchitis**, and other **lung diseases**.
- Lack of FGD installation may **impact India's international climate commitments**, especially under the **Paris Agreement**.

Conclusion:

The exemption from FGD installation raises critical questions about the **trade-off between environmental responsibility and economic practicality**. While cost and feasibility challenges are real, **neglecting SO_2 control** could lead to long-term public health and ecological costs. As India continues to pursue energy security, there is a need for **cleaner coal technologies**, **increased renewable energy integration**, and **sustainable pollution control policies** that balance development with environmental protection.

GS Paper 3 – Government Policies Related to Agriculture

Why India Must Back CIMMYT and IRRI: Honouring the Legacy of the Green Revolution

Context: The term **"Green Revolution"** was first introduced in **1968 by William S. Gaud** of **USAID**, referring to a sweeping global effort to boost agricultural productivity through scientific innovation. At the heart of this transformation were **high-yielding wheat and rice varieties**, which played a decisive role in **averting famines** in countries like **India**.

Recently, the **United States Agency for International Development (USAID)**—a key driver of global agricultural development—was **shut down** under a U.S. policy overhaul. This closure has left institutions like **CIMMYT** (International Maize and Wheat Improvement Center) facing a significant **funding shortfall**. In 2024, **USAID contributed $83 million** of CIMMYT's **$211 million** annual revenue.

Now, with U.S. support gone, **CIMMYT is turning to India**, one of its **biggest beneficiaries**, to secure its future.

What Is CIMMYT? Why Does It Matter?

CIMMYT, based in **Mexico**, is a **global leader in maize and wheat research**. It is to wheat what the **International Rice Research Institute (IRRI)**, based in the **Philippines**, is to rice. Both were created with support from the **Rockefeller and Ford Foundations**, and both were part of a broader **Cold War-era strategy** to combat food insecurity and prevent social unrest in developing nations.

Legendary agronomist **Norman Borlaug**, often called the **"Father of the Green Revolution,"** was closely associated with CIMMYT. His team developed **semi-dwarf wheat varieties** like **Lerma Rojo 64A** and **Sonora 63**, which were first sown in India in **1964–65**—ushering in a **new era of food self-sufficiency**.

India's Green Revolution: A Debt Owed

India reaped enormous benefits from research at **CIMMYT** and **IRRI**. Indian scientists adapted their breeding materials to create iconic wheat and rice varieties, such as:

- **Wheat**:
  - *Kalyan Sona* and *Sonalika* (1967–68)
  - *HD 2285* (1982), *HD 2329* (1985), *HD 2967* (2011)
- **Rice**:
  - *Swarna* (1982), *Samba Mahsuri* (1986) by Andhra Pradesh Agricultural University
  - *Pusa Basmati 1* (1989), *1121* (2003), *1509* (2013) by IARI

In **2024–25**, India exported **6.1 million tonnes** of **basmati rice** worth nearly **$6 billion**, with over **90% of varieties developed at IARI**.

Norman Borlaug praised **India's scientific strength**, pointing to institutions like **IARI** and visionary leaders like **M.S. Swaminathan**, who steered the country from famine to food surplus.

CIMMYT and IRRI: Still Vital for India's Future

The need for **international research support** has not faded. In **2024–25**, **six of the top 10 wheat varieties** in India—covering **over 20 million hectares** out of 32 million—originated from **CIMMYT breeding material**.

Since the peak of **HD 2967** (a wholly Indian-bred variety) in 2017–19, most new wheat varieties released in India are still heavily reliant on **CIMMYT germplasm**.

Likewise, **IRRI** continues to support rice research in areas such as:

- **Drought and heat tolerance**
- **Pest and disease resistance**
- **Shorter maturity cycles**
- **Nutritional quality improvement (e.g., zinc and iron-rich rice)**

Strategic Research Areas for the Future:

To ensure **long-term food security** and resilience in the face of **climate change**, India must invest in **cutting-edge agricultural research**, including:

- **Heat- and drought-tolerant crop varieties**
- **Nitrogen-use efficiency** to reduce fertilizer dependency
- **Gene-editing tools like CRISPR** for precision breeding
- **AI and remote sensing** for smart farming and yield prediction

India's Investment: Too Little, Too Late?

Despite the immense benefits derived over decades, India's recent funding is **surprisingly modest**:

- **$0.8 million** to **CIMMYT**
- **$18.3 million** to **IRRI**

Given India's pivotal role in **global food trade** and its dependence on international breeding research, this level of support is **inadequate and unsustainable**.

Conclusion: A Debt India Must Repay

India owes much of its food security, agricultural prosperity, and scientific progress to the foundational work done by **CIMMYT** and **IRRI**. With **USAID funding no longer available**, India must step up—not just out of gratitude, but out of strategic necessity.

Supporting these institutions is **not a donation—it is an investment** in:

- **Future crop resilience**
- **Global leadership in food systems**
- **Strengthened scientific collaboration**

However, this global support must go **hand-in-hand with strengthening India's own agricultural research system**, ensuring a **balanced, self-reliant yet globally connected food future**.

GS Paper 3 – Environmental Pollution and Degradation

Recognising India's Open Ecosystems: A Call for Ecological Justice and Policy Transformation

Context: In a **landmark move** to reduce emissions and promote sustainable logistics, the **Government of India has officially launched its first dedicated electric truck incentive scheme** under the newly unveiled **PM E-DRIVE (Electric-Drive for Rapid Innovation & Vehicle Electrification)** initiative. This marks a significant shift in India's electric mobility policy, especially for the **commercial and heavy-duty vehicle sector**, which had been previously overlooked under earlier programs like **FAME (Faster Adoption and Manufacturing of Electric Vehicles)**.

500 Crore Allocated for Electrifying India's Truck Fleet:

A total **outlay of 500 crore** has been sanctioned for this scheme to support the procurement of **5,600 electric trucks** across the country. In a focused effort to tackle urban pollution, **20% of this fund** is reserved for vehicles **registered in Delhi**, one of the world's most polluted cities.

Key Highlights of the Electric Truck Incentive Scheme:

- **Eligibility Criteria:**
  - Manufacturers must offer a **battery warranty of 5 years or 5 lakh kilometres**, whichever comes earlier.
  - The **motor and vehicle must carry a warranty** of **5 years or 2.5 lakh kilometres**.
  - **Mandatory scrapping of old diesel trucks** is required to avail the incentive, promoting fleet modernization and reduced emissions.
- **Implementation Period:**
  - The scheme will be **active from October 1, 2024, to March 31, 2026**.
  - It **subsumes the existing EMPS-2024 (Electric Mobility Promotion Scheme)**, making PM E-DRIVE the umbrella scheme for EV subsidies in India.

Extended Subsidy Structure for Other EV Categories:

The PM E-DRIVE scheme also **revamps the subsidy** structure for other categories of electric vehicles:

- **Electric Two-Wheelers:**
  - **Year 1:** 5,000 per kWh (maximum incentive 10,000).
  - **Year 2:** 2,500 per kWh (maximum incentive 5,000).
- **Electric Three-Wheelers:**
  - Standard e-rickshaws: 25,000 in Year 1, 12,500 in Year 2.
  - **L5 Category Cargo E-Three-Wheelers**: 50,000 in Year 1, 25,000 in Year 2.

Smart e-Voucher System for Hassle-Free Subsidies:

To ensure transparency and ease in claiming subsidies, the **Ministry of Heavy Industries is introducing an innovative e-voucher system**:

- **One vehicle per Aadhaar** card will be eligible.

- Upon purchase, an **e-voucher will be auto-generated and signed**.
- This **e-voucher is essential** for OEMs (**Original Equipment Manufacturers**) to claim **reimbursement**.

Charging Infrastructure Expansion to Tackle Range Anxiety:

Understanding the importance of charging availability, the scheme will **prioritize the development of Electric Vehicle Public Charging Stations (EVPCS)**:

- **Select cities** with high EV adoption will see rapid installation of chargers.
- **Highways** with heavy freight traffic will also be equipped to support electric truck journeys.

Additional Insights: India's Push Towards a Greener Transport Sector

- India's **road freight sector contributes nearly 40% of vehicular emissions**, despite trucks making up less than 5% of total vehicles.
- Transitioning even **10% of the truck fleet to electric** could save over **3 billion litres of diesel annually**.
- India aims to **electrify 30% of its vehicle fleet by 2030** under its **National Electric Mobility Mission Plan**.

Conclusion:

With the **first-ever focused incentive scheme for electric trucks**, India is sending a strong signal towards achieving **net-zero emissions** in the transport sector. The **PM E-DRIVE initiative** not only accelerates the shift towards clean mobility but also supports **Make in India**, **job creation**, and a **greener economy**.

GS Paper 1 – Geography

Singapore in Focus: A Strategic Maritime Hub and India's Trusted Partner

Context: India's **External Affairs Minister** recently held discussions with his **Singaporean counterpart**, aiming to deepen **bilateral cooperation** across trade, defence, digital connectivity, and strategic affairs. This engagement reinforces the growing importance of **Singapore** as a key partner for India in the **Indo-Pacific region**.

Singapore: A City-State of Global Significance

- **Capital**: *Singapore*
- **Location**: A **sovereign city-state** situated at the **southern tip of the Malay Peninsula**, Singapore consists of **one main island** and around **60 smaller islets**.
- It lies approximately **137 km north of the Equator**, granting it a **tropical equatorial climate** with **high humidity, year-round rainfall**, and **uniformly warm temperatures**.

Maritime Boundaries and Strategic Positioning:

- **North**: Bordered by **Malaysia**, separated by the **Johor Strait**.
- **South**: Close to **Indonesia**, across the **Singapore Strait**.
- Strategically located near the **Strait of Malacca**, one of the **world's busiest shipping lanes**, connecting the **Indian Ocean** with the **South China Sea**.

Geographical and Economic Significance:

- Singapore is **Southeast Asia's largest port** and consistently ranks among the **top global ports by cargo tonnage**.
- It has leveraged its **geographical advantage** to emerge as a **major hub for global finance, logistics, and maritime trade**.
- Its **Port of Singapore** serves over **600 ports in 120 countries**, underscoring its critical role in **global commerce**.

India-Singapore Relations: A Growing Partnership

- Singapore is one of the **largest foreign investors in India**, with strong ties in **infrastructure, fintech, startups, and skill development**.
- The two nations engage in **joint military exercises**, cyber cooperation, and are part of **key regional forums** like the **ASEAN**, **East Asia Summit**, and **Indian Ocean Rim Association (IORA)**.
- Singapore also hosts a large and vibrant **Indian diaspora**, enhancing **people-to-people ties**.

Extra Insight:

- Singapore was once part of **British Malaya**, gaining independence in **1965** after a brief merger with Malaysia.
- Despite its small size, Singapore ranks **high on global indices** of education, innovation, and ease of doing business.
- The country follows a **parliamentary republic model**, with a **unicameral legislature** and is known for **efficient governance and low corruption**.

Conclusion:
Singapore's **strategic maritime location**, **economic prowess**, and **robust governance** make it a crucial player in **regional geopolitics**. For India, deepening ties with this island nation is not just beneficial—it's **essential for a secure, connected, and prosperous Indo-Pacific**.

GS Paper 2 – Governance, Constitution, Polity, Social Justice

NITI Aayog Unveils Strategic Roadmap to Empower State Science & Technology Councils

Context: In a bid to invigorate India's decentralized scientific landscape, **NITI Aayog** has released a forward-looking **Roadmap for Strengthening State Science & Technology (S&T) Councils**. This initiative aims to catalyze innovation-led growth at the grassroots by addressing long-standing structural and operational gaps in state-level science governance.

Vision: Science for State-Centric Development

The roadmap envisions a robust, inclusive, and agile **S&T ecosystem** that not only promotes innovation but also aligns it with state-specific **socio-economic priorities**. It focuses on building strong institutional frameworks and enabling states to play a proactive role in India's evolving science and technology mission.

Key Objectives of the Roadmap:

- **Strengthen State-Level Innovation Ecosystems:** Foster state-driven scientific solutions for regional challenges, from agriculture to urban development.
- **Promote Multi-Stakeholder Collaboration:** Build seamless coordination between **state governments, academia, industry, ministries**, and **funding agencies**.
- **Drive Innovation & Knowledge Dissemination:** Support **patent facilitation**, **remote sensing applications**, **grassroots innovation**, **science popularisation**, and **human resource development**.

Major Challenges Hindering Progress:

The roadmap identifies critical roadblocks that have limited the effectiveness of State S&T Councils:

- **Weak Institutional Governance:** Infrequent meetings, leadership voids, and slow decision-making processes.
- **Insufficient Funding:** Overdependence on core grants and underutilization of central support schemes.
- **Human Resource Deficits:** Unfilled posts, limited career growth, and a shortage of skilled scientists and technical staff.
- **Limited Industry & Academia Linkages:** Inadequate partnerships that reduce the scalability and impact of research.
- **Administrative Rigidities:** Fragmented mandates, procedural delays, and outdated rules that hamper implementation.

Strategic Recommendations to Transform State S&T Councils

1. Structural and Institutional Reforms:

- Expand **Governing Councils** to include experts from **central institutions**, **industry**, **academia**, and **public sector undertakings (PSUs)**.
- Appoint a **full-time Executive Director** with strong scientific credentials to provide effective leadership.

- Create thematic **sub-units** for focused work on **patents**, **technology transfer**, **biodiversity**, and **science outreach**.

2. Financial Revamp:

- Encourage states to allocate **at least 0.5% of their GSDP** towards S&T development—an ambitious yet essential target aligned with global best practices.
- Transition to **project-based funding models**, except in the case of **Northeast states and Union Territories** which may continue with core grants.
- Promote **performance-linked incentives** and tap into **industry contributions** and **inter-ministerial funding pools**.

3. Strengthening Human Capital:

- Ensure a **70:30 ratio of scientific to administrative staff** to maintain research orientation.
- Regularize staff positions with **state funding** and well-defined **career progression pathways**.
- Encourage **secondment of university faculty**, engagement of **retired scientists**, and training programs to build long-term capacity.

4. State-Specific Prioritization:

- Undertake **S&T needs mapping** tailored to each state's geography, resources, and development goals.
- Foster **local R&D ecosystems** by funding state universities and research institutions.
- Introduce **state-level awards**, **fellowships**, and **internships** to recognize talent and promote young researchers.

5. Boosting Collaboration and Outreach:

- Establish strong partnerships with **national science agencies**, **industries**, and **academic institutions**.
- Organize annual **Science, Technology & Innovation (STI) conclaves** for inter-state knowledge sharing and showcasing local innovations.
- Upgrade **science cities**, **museums**, and **science centres** to improve public engagement with science.

Did You Know?

- Globally, countries like **South Korea** and **Israel** invest over **4% of their GDP** in R&D, while India remains below **1%**.
- States like **Kerala** and **Gujarat** have already pioneered successful S&T models with active councils and local innovations.
- India ranks **40th** on the **Global Innovation Index (2024)**, but has significant scope to improve through state-level interventions.

Conclusion: A Call to Scientific Federalism

This roadmap by NITI Aayog marks a crucial step toward **scientific federalism**, where states are empowered not just as implementers but as **innovators and leaders** of change. By bridging policy gaps, mobilizing funding, and investing in people and partnerships, India can harness the **transformative power of science** for inclusive, sustainable development across all states.

GS Paper 3 – Economic Development

Starlink Gets Final Regulatory Clearance to Launch in India: A New Era of Satellite Internet Begins

Context: In a significant development for global food security and scientific collaboration, the **International Maize and Wheat Improvement Center (CIMMYT)** has called upon **India** to extend financial support as it faces a critical funding shortfall. With major donors like **USAID withdrawing**, CIMMYT now seeks stronger backing from emerging economies like India that have long benefited from its agricultural breakthroughs.

The Context: A Global Research Giant in Crisis

CIMMYT, a global leader in **agricultural innovation**, is currently battling a serious **financial crisis** following the shutdown of **USAID operations**. In 2024 alone, USAID had provided around **$83 million**, accounting for nearly **40%** of CIMMYT's total budget of **$211 million**. The abrupt end of this support has created a massive vacuum, threatening to stall ongoing research that underpins food production systems in many parts of the world.

CIMMYT: A Pillar of Global Food Security

History & Evolution:

- **Established** in **1966**, headquartered in **Mexico**, CIMMYT emerged from a Rockefeller Foundation initiative in collaboration with the Mexican government in the **1940s and 1950s**.
- Spearheaded by **Dr. Norman Borlaug**, the "Father of the Green Revolution," it became a catalyst for **Asia's agricultural transformation**.

Notable Contributions:

- Development of **high-yielding wheat varieties** like **Lerma Rojo 64A**, **Sonora 64**, and **Mayo 64**.
- Partnership with Indian scientists to introduce path-breaking varieties such as **Kalyan Sona (1967)** and **Sonalika (1968)**—milestones in India's food self-sufficiency journey.
- In 1995, **PBW 343** became one of the most widely cultivated wheat varieties in India.

CIMMYT's Present-Day Impact:

- Its improved **maize and wheat varieties** are grown on **over 60 million hectares globally**.
- In **India**, **over 50% of wheat area** is covered by varieties released **post-2019**, developed jointly by CIMMYT and **ICAR**.
- Through the **Borlaug Institute for South Asia (BISA)**—established in **2011** in collaboration with ICAR—CIMMYT continues cutting-edge research in **climate resilience**, **heat tolerance**, **nutrient efficiency**, and **disease resistance**.

Why CIMMYT Matters to India's Future

1. **Strategic Food Security:**
   - In **2024**, India cultivated wheat on approximately **32 million hectares**.
   - Six of the **top 10 wheat varieties** in India, covering **15.3 million hectares**, trace their origins to **CIMMYT**.

- Rising **March temperatures** in north India have started affecting wheat productivity. Studies show that every **1°C rise in night temperature** may reduce yields by **up to 6%**.
- CIMMYT's research on **heat-tolerant and climate-resilient varieties** is vital to protect India's food production.

2. **Strengthening Global Leadership:**
   - By increasing its support, **India can position itself as a key player in South-South Cooperation**, shaping **global agricultural R&D agendas**.
   - Supporting CIMMYT would also enhance India's credibility in global forums such as the **FAO**, **CGIAR**, and **G20 Agricultural Working Groups**.
   - It would reinforce India's soft power in **Africa**, **Southeast Asia**, and other developing regions where Indian agri-expertise is already valued.
3. **Human Capital Synergy:**
   - Around **10% of CIMMYT's global staff** are of Indian origin.
   - Indian scientists hold critical positions in CIMMYT's research teams, further strengthening scientific ties.

The Road Ahead: India's Role as a Global Research Partner

1. **Increase National Support:** India must **substantially raise its financial contributions** to CIMMYT to:
   - Sustain existing research platforms.
   - Influence governance and research priorities.
   - Ensure continuity of crucial R&D for **global food security**.
2. **Foster Public-Private Partnerships (PPPs):**
   - India can mobilize **CSR funds**, **seed companies**, and **agri-tech firms** to co-invest in collaborative research.
   - Synergies between government, private players, and global institutions like CIMMYT can create **innovative agri-solutions** for the 21st century.
3. **Launch a Global South Innovation Network:**
   - India can take the lead in establishing a **"Global South Agricultural Innovation Forum"** in partnership with CIMMYT.
   - This would facilitate **technology transfers**, **joint crop breeding programs**, and **capacity building** in Asia and Africa.

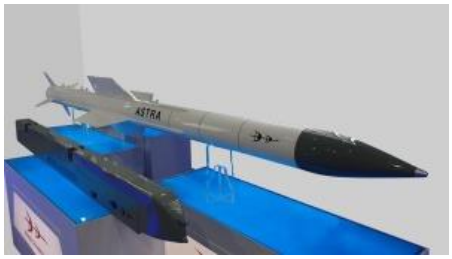
A Time to Give Back—and Lead Forward

India has reaped decades of benefits from CIMMYT's path-breaking research. At a time when global agricultural systems face the triple threat of **climate change**, **nutrition challenges**, and **yield stagnation**, the opportunity is ripe for India to **invest**, **lead**, and **transform**.

Supporting CIMMYT is not just about philanthropy—it's a strategic investment in India's food security, international reputation, and agricultural future.

GS Paper 3 – Science & Technology

India Successfully Tests Indigenous Astra Missile with Enhanced Capabilities



Context: In a major boost to India's air combat capabilities, the **Defence Research and Development Organisation (DRDO)** and the **Indian Air Force (IAF)** have successfully carried out the latest flight-tests of the **Astra Missile**, reaffirming its precision, reliability, and indigenous strength.

Astra: India's Homegrown Beyond Visual Range Air-to-Air Missile (BVRAAM)

The **Astra missile** is India's first **indigenously developed Beyond Visual Range Air-to-Air Missile (BVRAAM)**, designed to engage and destroy highly maneuverable enemy aircraft at long ranges. Developed by **DRDO**, Astra is a key component of India's strategy to achieve **self-reliance in advanced missile systems**.

Key Features and Advanced Technology:

- **Indigenous RF Seeker**: Astra is now equipped with a **cutting-edge Radio Frequency (RF) seeker** developed entirely within India. This seeker enables the missile to home in on targets with extreme accuracy.
- **Extended Range**: Capable of engaging targets **beyond 100 km**, Astra allows fighter jets to strike threats **well before they are detected visually**, giving a decisive edge in aerial combat.
- **Precision Navigation and Guidance**: The missile is integrated with **state-of-the-art navigation, mid-course guidance, and terminal homing systems**, ensuring high success rates in complex combat scenarios.
- **Integration with Su-30MKI**: Astra is deployed on India's frontline fighter aircraft, **Su-30MKI**, with future integration planned for other platforms like **Tejas** and **Rafale**.

Collaborative Development: A National Effort:

The Astra missile project is a shining example of **public-private partnership** in India's defence sector. More than **50 public and private sector industries**, including **Hindustan Aeronautics Limited (HAL)**, have played a vital role in the development and realization of the complete weapon system.

The successful tests also involved multiple **DRDO laboratories**, showcasing the synergy between R&D and industrial manufacturing.

Flawless Flight-Test Performance:

- Two successful **flight-tests** were conducted against **high-speed unmanned aerial targets** under different launch conditions and target profiles.
- In both cases, the missile **achieved direct hits**, demonstrating **pinpoint accuracy** and confirming the **performance of all subsystems**, especially the **indigenously developed RF seeker**.
- Test data was captured by advanced **Range Tracking instruments** deployed by the **Integrated Test Range (ITR), Chandipur**, validating the overall performance and mission success.

Strategic Significance and the Way Forward:

The successful test of the Astra missile underlines India's growing capabilities in the **strategic domain of air-to-air missile systems**. With its superior range, high accuracy, and indigenous design, Astra is poised to replace many foreign missile systems and reduce dependency on imports.

Did You Know?

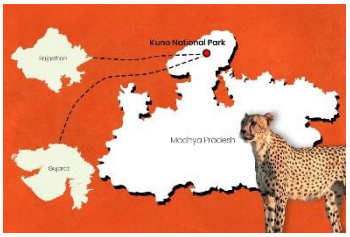
- Astra's name means **"weapon"** in Sanskrit, symbolizing its role as a force multiplier in the skies.
- Future variants of Astra, including **Astra Mk-II and Mk-III**, are under development, with ranges expected to exceed **150–300 km**.
- Astra is a key part of India's effort to build a **comprehensive aerial combat ecosystem** in line with the **Atmanirbhar Bharat** initiative.

Conclusion: A Leap Toward Self-Reliance in Missile Technology

With this successful test, India takes a **giant leap forward in its indigenous air combat capabilities**. The **Astra missile** not only strengthens the IAF's operational edge but also represents India's growing stature as a **global player in high-end defence technology**. As development continues, Astra is set to become a cornerstone of **India's aerial supremacy in the 21st century**.

GS Paper 1 – Geography

Kuno National Park: A Rising Sanctuary for Cheetahs in the Heart of India



Context: India's bold wildlife conservation initiative, **Project Cheetah**, continues to make significant strides, as seen in the recent release of captivating videos by the **Union Minister of Environment, Forest and Climate Change**, showcasing cheetahs gracefully adapting to the vibrant landscapes of **Kuno National Park**.

A Jewel of Madhya Pradesh's Wilderness:

Situated in the **Sheopur district** of **Madhya Pradesh**, **Kuno National Park** lies nestled near the **Vindhyan Hills**, offering a scenic blend of grasslands, woodlands, and riverine terrain. Spanning over **750 square kilometers**, the park derives its name from the **Kuno River**, a tributary of the **Chambal River**, which divides the park into two distinct ecological zones.

A Chosen Home for the Cheetah:

Selected under the **'Action Plan for Introduction of Cheetah in India'**, Kuno was chosen for its suitable terrain, prey base, and minimal human disturbance—ideal for reintroducing the world's fastest land animal, which went extinct in India in 1952.

Project Cheetah Milestones:

- **8 cheetahs** from **Namibia** were introduced in **September 2022**.
- **12 more cheetahs** arrived from **South Africa** in **February 2023**, bringing the total to **20**.
- The cheetahs are monitored with satellite collars and ground teams to ensure adaptation, health, and breeding success.

Rich Biodiversity: Flora & Fauna

Floral Wealth:

Kuno boasts a thriving **tropical dry deciduous forest ecosystem**, supporting more than **129 species of trees**. Prominent flora includes:

- **Anogeissus pendula (Kardhai)**
- **Senegalia catechu (Khair)**
- **Boswellia serrata (Salai)**

  These forests not only provide food and shelter to herbivores but also contribute to maintaining ecological balance in the region.

Faunal Diversity:

Kuno is home to a wide range of **carnivores and herbivores**, making it a perfect ecological fit for cheetahs. Its wildlife includes:

- **Indian leopard**, **sloth bear**, **jungle cat**, **dhole** (wild dog), **Indian wolf**
- **Striped hyena**, **Bengal fox**, **golden jackal**
- Over **120 species of birds**, enriching its avifaunal diversity

A Vision for the Future of Conservation

The successful reintroduction of cheetahs is part of India's broader conservation vision. If successful, **Kuno may also serve as a model for rewilding other extinct or endangered species** in the Indian subcontinent.

Did You Know?

- Cheetahs are the only large carnivores to have gone extinct in India, primarily due to overhunting and habitat loss.
- The African cheetahs brought to Kuno are a different subspecies but have been genetically proven to be suitable for adaptation to Indian landscapes.
- Kuno was once considered for relocating the **Asiatic lion** from Gir Forest, but the plan was delayed due to political and ecological concerns.

Conclusion: A New Chapter in India's Wildlife Legacy

Kuno National Park stands at the center of one of India's most ambitious wildlife projects. With every successful stride taken by the cheetahs across its grasslands, **Kuno reclaims its place in the global spotlight as a symbol of ecological restoration, biodiversity, and hope**. As India marks a historic return of the cheetah, Kuno's evolving success story could soon inspire rewilding projects around the world.

GS Paper 3 – Environment & Ecology

India Rolls Out First-Ever Incentive Scheme for Electric Trucks Under PM E-DRIVE Initiative

Context: In a **landmark move** to reduce emissions and promote sustainable logistics, the **Government of India has officially launched its first dedicated electric truck incentive scheme** under the newly unveiled **PM E-DRIVE (Electric-Drive for Rapid Innovation & Vehicle Electrification)** initiative. This marks a significant shift in India's electric mobility policy, especially for the **commercial and heavy-duty vehicle sector**, which had been previously overlooked under earlier programs like **FAME (Faster Adoption and Manufacturing of Electric Vehicles)**.

500 Crore Allocated for Electrifying India's Truck Fleet:

A total **outlay of 500 crore** has been sanctioned for this scheme to support the procurement of **5,600 electric trucks** across the country. In a focused effort to tackle urban pollution, **20% of this fund** is reserved for vehicles **registered in Delhi**, one of the world's most polluted cities.

Key Highlights of the Electric Truck Incentive Scheme:

- **Eligibility Criteria:**
  - Manufacturers must offer a **battery warranty of 5 years or 5 lakh kilometres**, whichever comes earlier.
  - The **motor and vehicle must carry a warranty** of **5 years or 2.5 lakh kilometres**.
  - **Mandatory scrapping of old diesel trucks** is required to avail the incentive, promoting fleet modernization and reduced emissions.
- **Implementation Period:**
  - The scheme will be **active from October 1, 2024, to March 31, 2026**.
  - It **subsumes the existing EMPS-2024 (Electric Mobility Promotion Scheme)**, making PM E-DRIVE the umbrella scheme for EV subsidies in India.

Extended Subsidy Structure for Other EV Categories:

The PM E-DRIVE scheme also **revamps the subsidy** structure for other categories of electric vehicles:

- **Electric Two-Wheelers:**
  - **Year 1:** 5,000 per kWh (maximum incentive 10,000).
  - **Year 2:** 2,500 per kWh (maximum incentive 5,000).
- **Electric Three-Wheelers:**
  - Standard e-rickshaws: 25,000 in Year 1, 12,500 in Year 2.
  - **L5 Category Cargo E-Three-Wheelers**: 50,000 in Year 1, 25,000 in Year 2.

Smart e-Voucher System for Hassle-Free Subsidies:

To ensure transparency and ease in claiming subsidies, the **Ministry of Heavy Industries is introducing an innovative e-voucher system**:

- **One vehicle per Aadhaar** card will be eligible.

- Upon purchase, an **e-voucher will be auto-generated and signed**.
- This **e-voucher is essential** for OEMs (**Original Equipment Manufacturers**) to claim **reimbursement**.

Charging Infrastructure Expansion to Tackle Range Anxiety:

Understanding the importance of charging availability, the scheme will **prioritize the development of Electric Vehicle Public Charging Stations (EVPCS)**:

- **Select cities** with high EV adoption will see rapid installation of chargers.
- **Highways** with heavy freight traffic will also be equipped to support electric truck journeys.

Additional Insights: India's Push Towards a Greener Transport Sector

- India's **road freight sector contributes nearly 40% of vehicular emissions**, despite trucks making up less than 5% of total vehicles.
- Transitioning even **10% of the truck fleet to electric** could save over **3 billion litres of diesel annually**.
- India aims to **electrify 30% of its vehicle fleet by 2030** under its **National Electric Mobility Mission Plan**.

Conclusion:

With the **first-ever focused incentive scheme for electric trucks**, India is sending a strong signal towards achieving **net-zero emissions** in the transport sector. The **PM E-DRIVE initiative** not only accelerates the shift towards clean mobility but also supports **Make in India**, **job creation**, and a **greener economy**.

GS Paper 3 – Biodiversity Conservation & Wildlife protection Schemes

Gharial and Sloth Bear Proposed for Inclusion in India's Prestigious Species Recovery Programme

Context: In a significant step towards conserving India's threatened species, the **Gharial** and the **Sloth Bear** have been **recommended for inclusion** under the **Species Recovery Programme** of the **Centrally Sponsored Scheme for Integrated Development of Wildlife Habitats (CSS-IDWH)**.

The proposal was made by the **Standing Committee of the National Board for Wildlife (SC-NBWL)**, a statutory body formed under the **Wildlife (Protection) Act, 1972**, which advises the Government of India on policies related to wildlife protection and conservation.

Gharial: The Critically Endangered River Guardian

- **Habitat**: The Gharial is a freshwater specialist found primarily in the **Chambal and Girwa rivers** (India) and the **Rapti-Narayani River** (Nepal), all part of the **Ganga river system**.
- **Conservation Status**:
  - **IUCN Red List**: *Critically Endangered*
  - **Wildlife (Protection) Act, 1972**: *Schedule I*
  - **CITES**: *Appendix I*
- **Distinctive Traits**:
  - The Gharial's **long, narrow snout** is the most elongated among all crocodilian species.
  - Males develop a unique bulbous structure at the snout's end, called a **"ghara"**, used to produce vocal sounds and bubbles for courtship.
  - Known as the **most aquatic of all crocodilians**, the Gharial is adapted for life in deep, fast-flowing rivers.

Did You Know?

Less than **250 adult Gharials** are estimated to survive in the wild today, making their recovery a high conservation priority.

Sloth Bear: India's Shy Insect-Eating Mammal

- **Habitat**: Found in **India, Sri Lanka, and Nepal**, this bear species inhabits **five biogeographic zones in India** – including the **Western Ghats**, **Deccan Plateau**, and **Gangetic Plains**.
- **Conservation Status**:
  - **IUCN Red List**: *Vulnerable*
  - **Wildlife (Protection) Act, 1972**: *Schedule I*
  - **CITES**: *Appendix I*
- **Notable Characteristics**:
  - Sloth bears have a **shaggy black coat**, **long curved claws**, and a distinct **snout adapted for insect feeding**.

- Their diet is dominated by **termites and ants**, which they suck up with a loud vacuum-like sound.
- Generally **solitary** and **nocturnal**, these bears play a vital ecological role by regulating insect populations.

Interesting Fact: Despite their slow gait and mild appearance, sloth bears can be aggressive if provoked and are responsible for more human-wildlife conflicts in India than tigers or leopards.

About the CSS-IDWH Scheme:

The **Centrally Sponsored Scheme for Integrated Development of Wildlife Habitats (CSS-IDWH)** is India's flagship conservation funding mechanism. It **provides financial and technical support** to State and Union Territory governments for activities aimed at **wildlife protection and habitat restoration**.

Key Components of CSS-IDWH:

1. **Support to Protected Areas** – National Parks, Wildlife Sanctuaries, Conservation and Community Reserves.
2. **Protection of Wildlife Outside Protected Areas** – Including **conflict mitigation** in human-dominated landscapes.
3. **Species Recovery Programmes** – For the **conservation of critically endangered species and their habitats**.

So far, **22 species** have been selected under this programme, including:

- **Snow Leopard**
- **Asiatic Lion**
- **Great Indian Bustard**
- **Hangul**
- **Malabar Civet**

Why This Matters:

Inclusion of the **Gharial and Sloth Bear** under the Species Recovery Programme will:

- Enable **dedicated funding** for scientific research, habitat protection, and breeding programs.
- Support **community engagement and conflict resolution** in sensitive areas.
- Enhance **collaborative conservation efforts** across states and transboundary regions (like Indo-Nepal river systems).

Looking Ahead:

With escalating threats from habitat loss, pollution, and human-wildlife conflict, the move to prioritise these species under a **national recovery plan** is both timely and crucial. It highlights India's ongoing commitment to preserving its **rich but imperilled biodiversity** for future generations.